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Replacing GB/T 12769-2003

Titanium-clad copper bar

钛铜复合棒

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Titanium-clad copper bar

1 Scope

This standard specifies the requirements, test methods, inspection rules, marking, packaging, transportation, storage, quality certificate and contract (or purchase order) of titanium-clad copper bar.

This standard is applicable to titanium-clad copper bar (hereinafter referred to as composite bar) used in the manufacture of metal anode electrolyzer and other applications produced by hot-extrusion, hot-extrusion stretching, explosive composite, or explosive composite hot-rolling.

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) are applicable to this standard.

GB/T 4698 (all parts) Methods for chemical analysis of titanium sponge, titanium and titanium alloys

GB/T 5121 (all parts) Methods for chemical analysis of copper and copper alloys

GB/T 5231 Designation and chemical composition of wrought copper and copper alloys

JB/T 10061 Commonly used specification for A-mode ultrasonic flaw detector using pulse echo technique

3 Requirements

3.1 Classification of products

3.1.1 Designation, status, section shape

3.1.1.1 The base material of the composite bar is the copper of designation T1 or T2, the composite material is pure titanium of designations TA1, TA2, ZTA1, ZTA2, TA1G, TA2G, TA3G.

T2 and ZTA2 which has a side length of 29 mm, a composite material's thickness of 2 mm, an arc radius of 7.5 mm, a length of 840 mm is marked as:

Square T2-ZTA2 R 29×29×2-7.5×840 GB/T 12769-2015

Example 2: A cold-worked state rectangular titanium-clad composite bar produced by T2 and ZTA2, which has a width of 40 mm, a thickness of 20 mm, a composite material's thickness of 1.0 mm, an arc radius of 2.0 mm, a length of 1500 mm is marked as:

Rectangular T2-ZTA2 Y 40×20×1.0-2.0×1500 GB/T 12769-2015

Example 3: An explosive composite hot-worked state flat titanium-clad composite bar produced by T2 and TA2, which has a width of 50 mm, a thickness of 15 mm, a composite material's thickness of 1.0 mm, an arc radius of 12.0 mm, a length of 1500 mm is marked as:

Flat T2-TA2 BR 50×15×1.0-12.0×1500 GB/T 12769-2015

Example 4: An explosive composite annealed state drum-shaped titanium-clad copper bar produced by T2 and ZTA2, which has a diameter of 32 mm, a plane width of 14 mm, a composite material's thickness of 1.5 mm, a length of 1120 mm is marked as:

Drum-shaped T2-ZTA2 BM Φ32×14×1.5×1120 GB/T 12769-2015

Example 5: A cold-worked state round titanium-clad copper bar produced by T2 and TA2, which has a diameter of 25 mm, a composite material's thickness of 1.0 mm, a length of 850 mm is marked as:

Round T2-TA2 Y Φ25×1.0×850 GB/T 12769-2015

3.2 Chemical compositions

3.2.1 The chemical composition of the composite bar's substrate shall comply with the provisions on the corresponding designations in GB/T 5231.

3.2.2 The chemical composition of the composite bar's composite material shall comply with the requirements of Table 2.

3.3.5 The twisting degree of the composite bar shall be not more than 1 mm per meter.

3.4 Composite quality

Composite bar shall be composited tightly, it shall comply with the requirements of Table A.1 of Appendix A.

3.5 Surface quality

The surface of the composite bar shall be clean and free of defects such as cracks, folds, inclusions, etc.; it is allowed for local pulling marks, bumps and pits which do not exceed the allowable deviation of dimensions; it is allowed to remove the local surface defects, but after removal, it shall not make the shape and the composite material's thickness exceed its allowable minimum dimensions.

4 Test methods

4.1 The chemical composition of the composite bar's substrate shall be carried out in accordance with the provisions of GB/T 5121. The chemical composition of the composite material shall be carried out in accordance with the provisions of GB/T 4698.

4.2 The dimensions of the composite bar are checked by a gauge of appropriate accuracy.

4.3 The measurement method of the composite material's thickness, round corners, sharp corners of the composite bar shall be negotiated by the supplier and purchaser.

4.4 The bending degree of the composite bar is tested by a feeler gauge.

4.5 The twisting degree of the composite bar is tested by a feeler gauge.

4.6 Inspection of the composite quality of the composite bar shall be carried out in accordance with the provisions of Appendix A.

4.7 The surface quality of the composite bar is checked visually.

5 Inspection rules

5.1 Inspection and acceptance

5.1.1 The composite bar shall be inspected by the supplier to ensure that the quality of the product complies with the requirements of this standard and the

5.4.1 If the chemical composition test fails, the batch is unqualified.

5.4.2 When the thickness, round corners, sharp corners of the composite material are unqualified, the sample is doubled for inspection. If it is still unqualified, the batch is unqualified. The supplier is allowed to check it one by one, the qualified products are group-batched again for delivery.

5.4.3 When the dimensions, bending degree and twisting degree of the composite bar are unqualified, the single product is unqualified.

5.4.4 If the inspection of the composite quality of the composite bar fails, the single product is unqualified.

5.4.5 If the inspection of the surface quality of the composite bar fails, the single product is unqualified.

6 Marking, packaging, transportation, storage, quality certificate

6.1 Marking

Each container shall have a sign or label, indicating:

a) The name or code of the supplier;

b) The designation, specifications and status of product;

c) Batch number.

6.2 Packaging, transportation and storage

6.2.1 Composite bar shall be shipped in wooden boxes, metal boxes or special containers (or shipped by other methods approved by the supplier and the purchaser). The box shall be sturdy and marked of the lifting position. The lifting ring (hook) used in the container shall be properly configured.

6.2.2 When transporting and storing, it is necessary to prevent collision damages, moisture, or corrosion by active chemicals.

6.3 Quality certificate

Each batch of composite bars shall be accompanied by a product quality certificate, indicating:

a) Name of the supplier;

b) Name of product;

Appendix A

(Normative)

Ultrasonic testing method for titanium-clad copper bar

A.1 Scope

The method is suitable for confirming the ultrasonic flaw detection of the composite quality of the titanium-clad copper bar.

A.2 Flaw detection equipment

A.2.1 Flaw detector

Use a type-A pulse reflection ultrasonic flaw detector. The performance of the instrument shall comply with the technical specifications as specified in JB/T 10061.

A.2.2 Probe

Use the straight probe which has a frequency of 2.5 MHz ~ 5 MHz and a wafer's diameter of 10 mm ~ 20 mm.

A.2.3 Coupling agent

Use clean water or oil as a coupling agent.

A.2.4 Standard test bar

Select a completely composite bar which has the same material, the same dimensional specification as that of the tested piece, as well as the good acoustic performance as the sensitivity adjustment standard test bar.

A.3 Flaw detection

A.3.1 Detection method

The bottom wave multiple reflection method is used for contact detection or contactless detection.

A.3.2 Determination of flaw detection surface

Regardless of the rectangular, square or drum-shaped bar, any one of the axial planes is determined to be the flaw detection surface for thorough flaw detection.

A.3.3 Detection sensitivity

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