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INDUSTRY STANDARD
OF THE PEOPLE'S REPUBLIC OF CHINA

JB/T 8987-1999

**The Specification of AgCu Alloy Wire for
Commutators**

换向器用银铜合金线材技术条件

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Foreword

This standard is drafted for the AgCu commutator segment material that is used for motor commutator installed on electric tools, household appliances and other industrial electrical equipment. The technical specification of this standard is established and based on the requirements of AgCu commutator segment to the materials specified in the "Dimensions for Commutators and Slip-rings" (IEC 60356-1971) and the Japanese industrial standard "Commutator Bars" (JIS C 2801-1995). This standard also makes reference to the commutator manufacturer's enterprise standards in industrially-advanced countries and the actual situation of AgCu material applied to commutator products in China in the last decade.

This standard lists the oxygen content as an independent indicator; and makes stricter requirements than the above-mentioned standards, as the oxygen content directly affects the cold workability of AgCu material. Because the conductivity varies with cold working rate and heat treatment state, the conductivity indicator of AgCu wires involved in this standard during supply cannot represent the conductivity of commutator segment. Therefore, this standard specifies that the conductivity of wires at annealed state acts as the basis of evaluation.

This standard is voluntary. Since the issuance and implementation, the ordering and inspection of AgCu commutator segment materials shall comply with this standard. For many pure copper commutators currently used in electric tools in China, it may also use the AgCu alloy wires specified in this standard to fabricate the commutators.

This standard was proposed by and is under the jurisdiction of the National Standardization Technical Committee of Electrical Alloy.

Responsible drafting organizations of this standard: Beijing Electric Comprehensive Technology Economics Research Institute, and Anping Electric Alloy Factory.

Participating drafting organization of this standard: Rui'an Electric Alloy Materials Factory.

Chief drafting staffs of this standard: Guo Liping, Chen Miaonong, Du Manyin, Zhao Jifeng, Zhang Xiulan, and Li Qingmin.

This standard is first-time issued.

Beijing Electric Comprehensive Technology Economics Research Institute is in charge of the interpretation of this standard.

The specification of AgCu Alloy Wire for Commutators

1 Scope

This standard specifies the technical requirements, test methods, inspection rules and the like for AgCu alloy wires.

AgCu alloy wires specified in this standard are applicable to the manufacture of AgCu commutators which are mainly used for the electric tools, household appliances and the small power motors of other industrial electrical equipment. The AgCu alloy wires specified in this standard may replace the commutator segment materials of pure copper commutators.

2 Normative References

The following normative documents contain provisions which, through reference in this standard, constitute provisions of this standard. At time of publication, the editions indicated were valid. All the standards will be revised, all parties coming to an agreement according to this standard are encouraged to study whether the latest editions of the following standards are applicable.

GB/T 466-1982 Classification of Copper

GB/T 467-1982 Electrolytic Copper

GB/T 4340-1984 Metallic Materials - Vickers Hardness Test

GB/T 5121.1-1985 Methods for Chemical Analysis of Copper - The Electrolytic Method for the Determination of Copper Content

GB/T 5586-1985 Test Method for Essential Property of Electric Contact Material

JB/T 5351-1991 Test Method for Basic Properties of Contact Materials of Vacuum Switches

3 Product Variety and Code

The product variety and code of AgCu alloy wires are listed in Table 1, according to the different silver contents.

4 Technical Requirements

5.1.3 The analysis of oxygen content shall be carried out with those specified in 3.4 of JB/T 5351. And samples shall be taken from wire billets.

5.2 Determination of I.A.C.S conductivity

The determination of the conductivity of wire billets shall be carried out according to those specified in 3.3 of JB/T 5351.

5.3 Determination of the density

The determination of density of wire shall be carried out according to those specified in GB/T 5586.

5.4 Determination of the hardness

The determination of Vickers hardness shall be carried out according to GB/T 4340. During the determination, apply a load of 196.1 N. Horizontally place the tested AgCu alloy wire. Measure at six positions, among which at least five positions shall be in accordance with those specified in Table 1 in 4.1 of this standard.

5.5 Determination of hot hardness

Place the finished AgCu alloy wire in the chamber-type electric furnace or tube-type resistance furnace and heat for 1h at $300 \pm 15^{\circ}\text{C}$. Cool AgCu alloy wire together with the furnace to the room temperature. Then conduct the hardness determination according to the requirements stated in 5.4 of this standard.

5.6 Appearance inspection

Inspect the appearance of AgCu alloy wires with the naked eyes.

5.7 Inspection on dimensions and permissible dimension deviation

Select corresponding measuring tools according to the diameter dimension and its deviation determined by the supplier and purchaser through negotiation.

6 Inspection Rules

6.1 The technical supervision department of the supplier shall conduct the end-of-manufacturing inspection of AgCu alloy wire products by batches. And fill in the product warranty and product qualification certificate. The products manufactured with the same-batch of materials, same-process, and containing the same-silver content shall be regarded as a batch.

6.2 Each batch of products shall be inspected for their appearance and diameter dimension coil by coil.

6.3 For each batch of products, one coil of wire shall be sampled for inspection of the silver content, oxygen content, conductivity, density, and hardness. If it fails in the inspection, the inspection may be carried out furnace by furnace.

6.4 The silver content inspection shall be carried out furnace by furnace.

6.5 When the material manufacturer, grade or process has been changed, not only the items specified in 6.2 and 6.3 of this standard shall be inspected but also shall the hot hardness be inspected.

6.6 The purchaser may conduct quality inspection on the received products. If the inspection result has discrepancy with the quality certificate provided by the supplier, it shall be proposed to the supplier within 2 months upon the receipt of the products. And it be settled through negotiation by the supplier and the purchaser. If any dispute still exists, it shall be judged by the arbitration organization, i.e. the relevant ministry-level material detection centers or higher agency.

7 Marking, Packaging, Transportation and Storage

7.1 Product marking

Each coil of wire shall be equipped with a label as the product mark. The contents of label shall include:

- a) Manufacturer's name;
- b) Product name;
- c) Product code;
- d) Weight, kg;
- e) Wire diameter;
- f) Production date / manufacturing batch number and furnace No..

7.2 Each coil of wire shall be accompanied with quality certificate of which the contents include:

- a) Manufacturing batch number and furnace No.;
- b) Silver content, oxygen content, conductivity, density and hardness;
- c) Manufacturer's name;
- d) Production date;

e) Inspector's stamp (or code).

7.3 Each coil of wire shall be wrapped with soft materials to prevent the wire surface from being bumped.

7.4 Proper damp proof and rain-proof measures shall be taken during transportation.

7.5 The products shall be stored in a dry, well-ventilated indoor environment without acid and alkali atmosphere.

_____ **END** _____