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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 26309-2010

Silver evaporation material

银蒸发料

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Foreword

This standard is under the jurisdiction of the National Technical Committee on Nonferrous Metals of Standardization Administration of China (SAC/TC 243).

The organization responsible for drafting this standard is Beijing Grish Hitech Co. Ltd.

1 Scope

The Chinese national product standard for the small pieces of high-purity silver that are loaded into a vacuum coater and evaporated to lay down a silver film. Silver is the most reflective and the most conductive metal there is, which is why it is used for the metallized electrodes of quartz crystal oscillators, for contacts and mirror layers in semiconductor devices, and for optical coatings. In evaporation, however, everything in the charge ends up in the film: a trace of carbon, hydrogen, oxygen, nitrogen or sulfur that would be irrelevant in

bulk silver becomes a defect in a layer a few hundred nanometres thick, and an oily fingerprint or a burr on the piece will spit and throw droplets as the charge melts. So the standard limits not only the silver assay, by referring the composition to the national silver standard, but also the non-metallic elements, and it is unusually explicit about surface quality: the pieces must be bright, flat and clean, with intact edges and corners, free from flash, burrs, inclusions, cracks, oil, corrosion, adhering particles and other contamination. It specifies the requirements, the test methods, the inspection rules, and the marking, packaging, transport, storage, quality certificate and order contents of silver evaporation material, in the two shapes supplied, sheet and cylindrical. It applies to the silver evaporation materials used in the manufacture of semiconductor electronic devices and quartz crystal oscillators, and may be used as a reference for silver evaporation material intended for other purposes.

This standard specifies the requirements, the test methods, the inspection rules, and the marking, packaging, transport, storage, quality certificate and contents of the order form or contract for silver evaporation material.

This standard applies to the various silver evaporation materials used in such industries as the manufacture of semiconductor electronic devices and quartz crystal oscillators. Silver evaporation material for other uses may also be used with reference to this standard.

2 Normative references

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

GB/T 2828.1 Sampling procedures for inspection by attributes - Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection.

GB/T 4135 Silver.

GB/T 11067 (all parts) Methods for chemical analysis of silver.

GB/T 15077 Measuring method for geometric size of precious metals and their alloys.

3.1 Product classification

By chemical composition, silver evaporation material is of a single type, of the grade designated IC-Ag99.99.

By shape, silver evaporation material is divided into two kinds, sheet and cylindrical, as shown in Figure 1.

Figure 1 shows the two shapes with their dimensional symbols. The sheet form is drawn in plan and in edge view, with the two side lengths, the thickness and the corner radius

marked; the cylindrical form is drawn in side view and in end view, with the length and the diameter marked.

3.2 Chemical composition

3.2.1 The chemical composition of silver evaporation material of grade IC-Ag99.99 shall comply with the provisions of GB/T 4135.

3.2.2 The content of non-metallic elements in silver evaporation material of grade IC-Ag99.99 shall comply with the provisions of Table 1. Where the purchaser has other special requirements, they shall be settled by negotiation between the supplier and the purchaser.

Table 1 gives, for the single grade, the maximum mass fraction permitted for each of the five non-metallic elements controlled by this standard, namely carbon, hydrogen, oxygen, nitrogen and sulfur.

3.3 Delivery condition

Silver evaporation material is delivered in the processed condition.

3.4 Geometrical dimensions

The dimensions of silver evaporation material and their permissible deviations are given in Table 2.

Table 2 is divided into the sheet form and the cylindrical form. For the sheet form it lists the standard combinations of the two side lengths, the thickness and the corner radius, each dimension carrying its own permissible deviation; for the cylindrical form it lists the standard combinations of diameter and length with their permissible deviations. The units of the table are millimetres.

3.5 Surface quality

The surface of silver evaporation material shall be bright and flat and clean, with the edges and corners intact, and free from flash, burrs, inclusions, cracks and other defects; it shall be free from oil stains and from corrosion; and it shall carry no adhering particles or other contamination.

4 Test methods

4.1 The arbitration method for the analysis of the chemical composition of silver evaporation material of grade IC-Ag99.99 shall be carried out in accordance with the provisions of GB/T 11067 (all parts). The arbitration method for the analysis of the other non-metallic impurity elements carbon, hydrogen, oxygen, nitrogen and sulfur shall be decided by negotiation

between the supplier and the purchaser.

4.2 The measurement of the geometrical dimensions of silver evaporation material shall be carried out in accordance with the provisions of GB/T 15077.

4.3 The surface quality shall be inspected visually; where an abnormal phenomenon is found, it shall be inspected visually under a magnifier of the magnification stated in this clause.

4.4 The packaging quality shall be inspected visually.

5.1 Inspection and acceptance

5.1.1 The product shall be inspected by the inspection department of the supplier, which shall guarantee that the product quality complies with the provisions of this standard or of the order contract and shall fill in a quality certificate.

5.1.2 The purchaser shall re-inspect the product received in accordance with the provisions of this standard. Where the result of the re-inspection does not agree with the provisions of this standard or of the order contract, the purchaser shall raise the matter with the supplier within three months from the date of receipt of the product, and it shall be settled by negotiation between the supplier and the purchaser. Where arbitration is required, the arbitration sampling shall be carried out jointly by the supplier and the purchaser at the premises of the purchaser.

5.2 Batching

The product shall be submitted for acceptance in batches. Each batch shall consist of product of the same charge batch and of the same specification.

5.3 Inspection items and sampling

The inspection items, the sampling positions and the sampling quantities shall comply with the provisions of Table 3.

Table 3 lists the four inspection items - chemical composition, geometrical dimensions, surface quality and packaging quality - and gives for each of them the sampling position, the sampling quantity, and the clause of this standard that states the requirement and the clause that states the inspection method. The chemical composition is sampled from beneath the shrinkage cavity of the ingot, at the proportion of the ingots stated in the table and with a minimum number of ingots and of samples per ingot; the geometrical dimensions and the surface quality are sampled at random from the finished product according to the sampling plan of GB/T 2828.1 named in the table; the packaging quality is inspected piece by piece.