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Standard Guide for Silver-Tin Oxide Contact Material[1]

This standard is issued under the fixed designation B844; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This standard provides guidelines for users and manufacturers of silver-tin oxide material produced in strip, rod, wire, and part form for electrical contact applications.

1.2 Silver-tin oxide refers to contact material containing silver, tin oxide, and other metal oxide which may be used for either improving the processing or performance of the material.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to become familiar with all hazards including those identified in the appropriate Safety Data Sheet (SDS) for this product/material as provided by the manufacturer, to establish appropriate safety, health, and environmental practices, and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

B311 Test Method for Density of Powder Metallurgy (PM) Materials Containing Less Than Two Percent Porosity

B476 Specification for General Requirements for Wrought Precious Metal Electrical Contact Materials

NOTE 1—Test Method B311 is applicable to fully dense forms. Specification B476 is applicable to strip, rod, or wire only. Test Method is applicable to forms less than 99 % dense.

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *lot, n*—(usage involving discrete manufactured parts)—all parts of the same form, and dimensions, from the same alloy melt or batch of particulate (if manufactured by consolidation), processed under the same conditions, and submitted for inspection at the same time.

4. Significance and Use

4.1 The methods for manufacture (proprietary or otherwise) of these materials vary significantly among suppliers, and these methods influence such properties as arc erosion, contact resistance, and tendency to weld in service. Since the performance of contacts in a device depends on numerous factors outside the contact itself (opening speed, closing speed, contact pressure, contact bounce, environmental variations, assembly technique and variations, etc.) this guide cannot ensure performance control in the application. As part of the qualification on initial samples it is recommended that the user electrically test the materials in a functional manner for all devices applicable to the material's use. This guide will provide a means for the contact manufacturer and contact user to reach agreement on the details of material to be supplied for a specific use and how to provide reasonable assurance that future lots will be similar in properties and microstructure to the initial test of sample contacts supplied.

5. Materials and Manufacture

5.1 Various processes may be utilized to produce silver-tin oxide contact materials. Internal oxidation of a silver-tin alloy is a viable method. However, if oxidized at relatively low pressures, a binary silver-tin alloy develops a stable layer of tin oxide at the surface which inhibits further oxidation of the material. Because of this phenomenon, usually at least a third element (such as indium) is added to the alloy in order to promote internal oxidation. Oxidation may be carried out under elevated oxygen pressure and also at various temperatures; oxidation conditions determine size and distribution of the resulting oxide particles. Other manufacturing processes utilize powder metallurgical techniques. Silver- and tin-oxide powders may be blended and consolidated by heat or pressure, or both, into wire or strip suitable for further processing, or may be blended and sintered directly into contacts. Methods that can be used to prepare silver- and tin-oxide powder mixtures include either coprecipitation or sequential precipitation of silver and tin compounds from aqueous solutions, coating of

[1] This guide is under the jurisdiction of ASTM Committee B02 on Nonferrous Metals and Alloys and is the direct responsibility of Subcommittee B02.05 on Precious Metals and Electrical Contact Materials.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.