



Standard Guide for Preparation of Lead and Lead Alloys for Electroplating¹

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1. Scope

1.1 This guide provides methods for preparing lead or lead alloy products for the application of electroplated or autocatalytic coatings.

1.2 *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 establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*²

B 281 Practice for Preparation of Copper and Copper-Base Alloys for Electroplating and Conversion Coatings

3. Significance and Use

3.1 The preparation of lead and lead-alloy surfaces for electroplating is often critical to the successful performance of electrodeposited and autocatalytic metallic coatings.

3.2 This standard outlines the process operation procedures and processing solutions required, that lead to satisfactory electrodeposited metallic coatings (including undercoating) on surfaces of lead and lead-alloys.

4. Nature of Lead

4.1 The tensile strength of lead and lead alloys ranges from 15 to 35 MPa (2000 to 5000 psi), therefore, the measured adhesion of electroplated coatings cannot be greater than these values.

4.2 Difficulties in applying high-quality electroplated coatings to lead are due to the following properties of lead:

4.2.1 The very active chemical nature of lead, leading to the formation of oxide films in air,

4.2.2 The fact that the lead surface will form films of insoluble lead salts with most acids used in pickling,

4.2.3 The ease with which lead diffuses in contact with nonferrous metals, and

4.2.4 The poor resistance to plastic deformation during polishing.

5. Process Precautions

5.1 The following process precautions should be observed:

5.1.1 Precleaning of raw castings is sometimes necessary to remove mold parting compounds, surface oxides, and residues from recessed areas which are never reached by polishing-wheel or scratch-brush operations (Section 6).

5.1.2 In high-speed type cyanide electroplating solutions, the initial current density must be controlled and kept low enough so that no gassing occurs to cause poor adhesion. This is revealed as groups of blisters in the high-current-density areas of the electroplate.

5.1.3 If a strike electroplate is used, it should be thick enough to prevent the next electroplating solution from attacking the basis lead. A copper or nickel strike 2.5 μm thick should be used, but because there are so many variables involved, no specific recommendations can be made.

5.1.4 Preplates should be of such thickness that complete alloying with the lead does not take place, an occurrence that causes poor adhesion of subsequent deposits. This defect is indicated by blistering after prolonged storage or after an accelerated aging test.

5.1.5 The lead compounds formed by the action of acids and alkalis most often used in electroplating are not water soluble. Caution must be taken to remove or prevent the formation of these to eliminate subsequent adhesion failure. Acids that cannot be used are sulfuric, hydrochloric, and hydrofluoric. (Acids that can be used are sulfamic and fluoboric.) Alkalies should not be high in caustic content. Mild or buffered cleaners are preferred in order to minimize attack on the basis lead surface.

5.1.6 Engraving of electroplated finishes on lead cannot be performed on deposits over 5 μm thick as the deposit will tear away from the lead at cross cuts. Engine turning by burnishing can be done on any thickness of deposits.

¹ This guide is under the jurisdiction of ASTM Committee B08 on Metallic and Inorganic Coatings and is the direct responsibility of Subcommittee B08.02 on Pre Treatment.

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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.