

AEROSPACE MATERIAL SPECIFICATION



AMS 2413E

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Superseding AMS 2413D

Plating, Silver-Rhodium

1. SCOPE:

1.1 Purpose:

This specification covers the engineering requirements for electrodeposition of silver and rhodium and the properties of the deposit.

1.2 Application:

This electrodeposit has been used typically to provide a conductive surface for electrical contacts, reflective coating for waveguide surfaces for parts operating up to 300 °F (149 °C), but usage is not limited to such applications.

1.3 Safety - Hazardous Materials:

While the materials, methods, applications, and processes described or referenced in this specification may involve the use of hazardous materials, this specification does not address the hazards which may be involved in such use. It is the sole responsibility of the user to ensure familiarity with the safe and proper use of any hazardous materials and to take necessary precautionary measures to ensure the health and safety of all personnel involved.

2. APPLICABLE DOCUMENTS:

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been canceled and no superseding document has been specified, the last published issue of that document shall apply.

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2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001 or www.sae.org.

AMS 2759/9 Hydrogen Embrittlement Relief (Baking) of Steel Parts

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or www.astm.org.

ASTM B 117 Operating Salt Spray (Fog) Testing Apparatus

ASTM B 487 Measurement of Metal and Oxide Coating Thicknesses by Microscopical Examination of a Cross Section

ASTM B 568 Measurement of Coating Thickness by X-Ray Spectrometry

ASTM B 571 Adhesion of Metallic Coatings

ASTM F 519 Qualitative Mechanical Hydrogen Embrittlement Evaluation of Plating Processes and Service Environments

3. TECHNICAL REQUIREMENTS:

3.1 Preparation:

3.1.1 Parts shall be within drawing dimension limits before plating.

3.1.2 Steel parts having hardness of 40 HRC or higher and which have been roll threaded or ground after heat treatment shall be cleaned to remove surface contamination and stress relieved before cleaning for plating. Temperatures to which parts are heated shall be such that maximum stress relief is obtained without reducing hardness of parts below drawing limits, but, unless otherwise specified, not less than 275 °F (135 °C) for five hours for parts 55 HRC or over; for other parts, use 375 °F (191 °C) for four hours.

3.1.3 Parts shall have clean surfaces, free from water break, prior to immersion in the plating solution.

3.2 Procedure:

Parts shall be plated in the following sequence, using the solution specified; parts shall be immersed in each plating solution with the current on:

3.2.1 Except for barrel plating, electrical contact points shall be as follows. For parts which are to be plated all over, locations shall be acceptable to purchaser; for parts which are not to be plated all over, locations shall be in areas where plating is not required.

3.2.2 Copper Flash or Copper Strike: Except as specified in 3.2.2.1, a copper flash or copper strike shall be electrodeposited from a suitable copper plating solution.

3.2.2.1 When parts to be plated are made of a corrosion-resistant alloy, a nickel flash or nickel strike shall be electrodeposited instead of the copper flash or copper strike.

3.2.3 Silver Plating: Parts shall be plated by electrodeposition of silver from a suitable silver plating solution directly onto the flash or strike surfaces of 3.2.2 or 3.2.2.1.

3.2.4 Rhodium Plating: Parts shall be plated by electrodeposition of rhodium from a rhodium sulfate, rhodium phosphate, or other suitable rhodium plating solution onto the silver plating surfaces.

3.2.5 Spotting in is not permitted.

3.3 Hydrogen Embrittlement Relief:

After plating, rinsing and drying, ferrous parts shall be treated in accordance with AMS 2759/9 using the parameters specified for cadmium.

3.4 Properties:

The silver-rhodium plating shall conform to the following requirements:

3.4.1 Thickness: Shall be as follows, unless otherwise specified, determined on representative parts or on test panels as in 4.3.3 in accordance with ASTM B 487, ASTM B 568, or other method acceptable to purchaser.

3.4.1.1 Copper or Nickel Flash or Strike: Not less than 0.0001 inch (2.5 μm).

3.4.1.2 Silver Plate: Not less than 0.0005 inch (12.7 μm).

3.4.1.3 Rhodium Flash: Not less than 0.00002 inch (0.5 μm).

3.4.1.4 The plate shall be uniform in thickness on significant surfaces except that slight build-up on exterior corners or edges will be permitted provided drawing dimensions are met.

3.4.1.5 Thickness requirements apply to surfaces that can be touched by a sphere 0.75 inch (19 mm) in diameter. Other areas, such as surfaces of holes, recesses, internal threads, or contact areas of parts plated all over, where a controlled deposit cannot be obtained under normal plating conditions, shall show evidence of plating.

3.4.1.5.1 If internal surfaces as defined in 3.4.1.5 are required to be plated to a specified thickness, notes on the drawing shall so specify.

3.4.2 Adhesion: Plating shall be firmly and continuously bonded to the underlying metal, determined on representative parts or test panels in accordance with a method described in ASTM B 571. A test shall be selected from ASTM B 571 from those specified for silver electrodeposits.