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400 Commonwealth Dr., Warrendale, PA 15096

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

SAE AMS 2418D

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Superseding AMS 2418C

COPPER PLATING

1. SCOPE:

1.1 Form: This specification covers the engineering requirements for electrodeposition of copper on metals and the properties of the deposit.

1.2 Application: Primarily to provide an anti-seize surface, to prevent carburizing of surfaces on which carburizing is neither required nor permitted, to prevent decarburization, or to provide a source of copper for furnace brazing.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2350 - Standards and Test Methods

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM B487 - Measurement of Metal and Oxide Coating Thicknesses by Microscopical Examination of a Cross Section

ASTM B499 - Measurement of Coating Thicknesses by the Magnetic Method: Nonmagnetic Coatings on Magnetic Basis Metal

ASTM B504 - Measurement of Thickness of Metallic Coatings by the Coulometric Method

ASTM E376 - Measuring Coating Thickness by Magnetic-Field or Eddy-Current (Electromagnetic) Test Methods

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Printed in U.S.A.

2.3 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Military Standards:

MIL-STD-794 - Parts and Equipment, Procedures for Packaging and Packing of

3. TECHNICAL REQUIREMENTS:

3.1 Preparation:

3.1.1 All welding and brazing (except when copper plate is used as a source of copper for brazing) shall be completed before parts are plated.

3.1.2 Parts, prior to immersion in the plating solution, shall have chemically clean surfaces, prepared with minimum abrasion, erosion, or pitting.

3.1.3 Electrical contacts between the parts and power source shall be made in such a manner as will ensure that neither chemical or immersion deposition nor electrical arcing or overheating will occur. If parts are to be plated all over, contact points shall be located where specified or where agreed upon by purchaser and vendor. If parts are not required to be plated all over, contact points shall be located in areas on which plating is not required or is optional. These requirements do not apply to the bulk plating process.

3.2 Procedure: Parts shall be plated in the following sequence using the solutions specified:

3.2.1 Copper Plate: Copper shall be electrodeposited from a conventional copper cyanide solution directly on the metal part or from a high speed copper plating solution following a "copper strike", except that a preliminary flash of nickel or other suitable metal is permissible on parts made from corrosion-resistant and heat-resistant steels or alloys.

3.2.2 Rinsing: The plated parts shall be removed from the plating solution, thoroughly rinsed, and dried.

3.3 Post Treatment: After plating, rinsing, and drying, all parts having hardness higher than 40 HRC that are not to be subsequently carburized, heat treated, or brazed, shall be suitably heated to relieve possible embrittlement. Temperatures to which parts are heated shall be such that maximum embrittlement relief is obtained without reducing the hardness of parts below drawing limits but shall be not lower than 300°F (150°C) for not less than one hour.

3.4 Properties: Plated parts shall conform to the following requirements:

3.4.1 Thickness: Shall be as specified on the drawing and as follows, determined on representative parts or test panels in accordance with ASTM B487, ASTM B499, ASTM B504, ASTM E376, or other suitable method agreed upon by purchaser and vendor:

3.4.1.1 AMS 2418 shall designate plate thickness of 0.0005 - 0.0007 in. (12.5 - 18 μm).

3.4.1.2 Other plate thicknesses may be specified by this specification number and a suffix number designating the minimum thickness in ten thousandths of an inch (2.5 μm). A tolerance of +0.0002 in. (+5 μm) will be allowed. Thus, AMS 2418-1 designated a thickness of 0.0001 - 0.0003 in. (2.5 - 7.5 μm), AMS 2418-6 designates a thickness of 0.0006 - 0.0008 in. (15 - 20 μm).

3.4.1.3 Where "copper flash" is specified, the thickness of copper shall be approximately 0.0001 in. (2 μm).

3.4.1.4 If internal surfaces or surfaces of small holes and deep recesses are required to be plated, notes on drawings will so specify but minimum plate thickness requirements will be waived except when such surfaces can be touched by a sphere 0.75 in. (19.0 mm) in diameter. When plating of such surfaces is specified, external surfaces may have plate thickness greater than that specified, but this will not be cause for rejection if dimensions of parts are within specified tolerances.

3.4.2 Porosity: Copper plate applied for heat treatment strip-off purposes shall Ø be nonporous so as to not give a blue color when tested for 5 min. with potassium ferricyanide solution of the following composition:

Potassium ferricyanide	10 g
Sodium chloride	5 g
Water	100 mL

3.5 Quality: Copper plate, as received by purchaser, shall be smooth, Ø continuous, adherent to basis metal, uniform in appearance, and not coarsely crystalline, and shall be free from pin holes, porosity, blisters, nodules, pits, and other imperfections detrimental to usage of the plate. Slight staining or discoloration is permissible. Acceptance standards shall be as agreed upon by purchaser and vendor.

3.5.1 Double plating and spotting-in after plating are not permitted.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The processing vendor shall supply all Ø samples for vendor's tests and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.5. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that processing conforms to the requirements of this specification.

4.2 Classification of Tests: Tests to determine conformance to all technical Ø requirements of this specification are classified as acceptance tests and as preproduction tests and shall be performed prior to or on the initial shipment of plated parts to a purchaser, on each lot, when a change in processing requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

4.2.1 For direct U.S. Military procurement, substantiating test data and, when requested, preproduction test material shall be submitted to the cognizant agency as directed by the procuring activity, the contracting officer, or the request for procurement.

4.3 Sampling: Shall be not less than the following; a lot shall be all parts Ø made of the same basis metal, plated to the same range of plate thickness in the same set of solutions in each consecutive 24-hr period of operation of fraction thereof, and presented for vendor's inspection at one time.

4.3.1 Thickness: Three parts from each lot. Ø

4.3.2 Quality: As agreed upon by purchaser and vendor.

4.3.3 When plated parts are of such configuration or size as to be not readily adaptable to the specified tests, separate test specimens cleaned, plated, and post-treated with the parts represented may be used. Specimens shall be panels of low-carbon steel approximately 0.032 x 4 x 1 in. (1 x 100 x 25 mm) or shall be bars approximately 0.5 in. (10 mm) in diameter and 4 in. (100 mm) long.

4.4 Approval:

4.4.1 Sample plated parts shall be approved by purchaser before parts for production use are supplied, unless such approval be waived by purchaser. Results of tests on production parts shall be essentially equivalent to those on the approved sample parts.

4.4.2 Vendor shall use manufacturing procedures, processes, and methods of inspection on production parts which are essentially the same as those used on the approved sample parts. If necessary to make any change in type of equipment or in established composition limits and operating conditions of process solutions, vendor shall submit for reapproval a statement of the proposed changes in processing and, when requested, sample plated parts, test panels, or both. Production parts plated by the revised procedure shall not be shipped prior to receipt of reapproval.

4.5 Reports: The processing vendor shall furnish with each shipment a report stating that the parts have been processed and tested in accordance with the requirements of this specification and that they conform to the technical requirements. This report shall include the purchase order number, lot number, AMS 2418D, part number, and quantity.