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400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 2410H

Issued AUG 1945
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Superseding AMS 2410G

Submitted for recognition as an American National Standard

Plating, Silver
Nickel Strike, High Bake

1. SCOPE:

1.1 Purpose:

This specification covers the engineering requirements for electrodeposition of silver on other metals, usually with a nickel strike between the basis metal and the silver, and the properties of the deposit.

1.1.1 MAM 2410 is the metric version of this AMS.

1.2 Application:

This process has been used typically to provide a bearing surface and to prevent galling or seizing of surfaces of parts made of corrosion-resistant steels and alloys and of parts made of other metals not deleteriously affected by high-temperature baking, 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 following publications form a part of this specification to the extent specified herein. The applicable issue of referenced documents shall be the issue in effect on the date of the purchase order.

QUESTIONS REGARDING THIS DOCUMENT: (724) 772-7154 FAX: (724) 776-0243
TO PLACE A DOCUMENT ORDER: (724) 776-4970 FAX: (724) 776-0790
SAE WEB ADDRESS: http://www.sae.org

2.1 ASTM Publications:

Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM B 487 Measurement of Metal and Oxide Coating Thicknesses by Microscopical Examination of a Cross Section
ASTM B 499 Measurement of Coating Thicknesses by The Magnetic Method: Nonmagnetic Coatings on Magnetic Basis Metals
ASTM B 504 Measurement of Thickness of Metallic Coatings by the Coulometric Method
ASTM E 376 Measuring Coating Thickness by Magnetic-Field or Eddy-Current (Electromagnetic) Test Methods

2.2 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

MIL-STD-2073-1 DOD Materiel, Procedures for Development and Application of Packaging Requirements

2.3 ANSI Publications:

Available from American National Standards Institute, 11 West 42nd Street, New York, NY 10036.

ANSI B46.1 Surface Texture

3. TECHNICAL REQUIREMENTS:

3.1 Preparation:

3.1.1 All fabrication-type operations, such as forming, welding, machining, and heat treatment, shall be completed before parts are plated.

3.1.2 Prior to cleaning, texture of surfaces to be plated on parts, other than nuts, shall be not rougher than 80 microinches, determined in accordance with ANSI B46.1.

3.1.3 Parts shall have clean surfaces, free of waterbreak, prior to immersion in the plating solution.

3.1.4 Electrical contacts between the parts and power source shall be made to 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, except in the case of barrel plating, 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:

3.2.1 Parts shall be plated in the following sequence except as permitted by 3.2.1.1., 3.2.1.2, or 3.2.1.3.

a. Nickel strike
b. Silver strike
c. Silver plate

3.2.1.1 The nickel strike may be omitted when plating copper and copper alloys.

3.2.1.2 A gold or palladium strike may be used in place of the silver strike when approved by purchaser.

3.2.1.3 When approved by purchaser, silver may be plated directly onto the substrate without the use of either the nickel or silver strike.

3.2.2 Parts shall be plated by electrodeposition of silver from a suitable plating bath.

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

3.3 Post Treatment:

Except as specified herein, all parts, except nuts, shall be heated to 935 to 965 °F after plating, rinsing, and drying and held at heat for 20 to 60 minutes; temperature of the parts shall not be over 400 °F for more than 7 hours during the heating and cooling part of the cycle. Above 400 °F, the heating and cooling medium shall be a neutral or reducing atmosphere (except that hydrogen shall not be used) or shall be a neutral or nonoxidizing molten salt bath. If such heating would lower hardness or properties of parts below drawing limits or otherwise deleteriously affect the parts, heating shall be at the highest practicable temperature which will maintain specified properties. Heating of nuts is not required.

3.4 Properties:

The deposited silver shall conform to the following requirements:

3.4.1 Thickness: Shall be as follows, determined on representative parts or on test panels as in 4.3.3 in accordance with ASTM B 487, ASTM B 499, ASTM B 504, ASTM E 376, or other method agreed upon by purchaser and vendor.

3.4.1.1 Where silver flash is specified, plate thickness shall be approximately 0.0001 inch.

3.4.1.2 Thickness of plate, other than flash, shall be as specified on the part drawing. If machining of plated metal is required, plate thickness as deposited shall be sufficient to allow machining of all areas of plated surfaces to the dimensions specified on the drawing.

3.4.2 Composition: Silver, as plated, shall be not less than 99.9% pure, determined by a method acceptable to purchaser. The plating process and solution chemistry shall be controlled to ensure the required purity.

3.4.3 Adhesion:

3.4.3.1 Plated metal shall be firmly and continuously bonded to the underlying metal. Plating, after heating as in 3.3, shall show no evidence of blisters or other indications of poor bond.

3.4.3.2 Parts, other than nuts, shall withstand, after heating as in 3.3, a shear or chisel test conducted to indicate quality of the bond. Silver shall shear away with no parting of plate and basis metal.

3.4.3.3 Nuts shall show no peeling of the silver when scratched with a knife or other sharp tool.:

3.5 Quality:

3.5.1 Silver plate, as received by purchaser, shall be smooth, continuous, adherent to the basis metal, uniform in appearance and color, and free from blisters, porosity, nodules, pits, and other imperfections detrimental to usage of the silver plate. Selectively plated areas shall be sharply defined. Slight staining or discoloration is permissible.

3.5.1.1 Discoloration of plate during storage is acceptable.

3.5.2 Abrasion of plating on corners and edges of nuts is acceptable but plate shall be continuous on the threads. Marking of the cone section of selflocking nuts, produced in offsetting the locking beams or other locking feature, is acceptable.

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

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The processor shall supply all samples for processor's tests and shall be responsible for performing all required tests. 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:

4.2.1 Acceptance Tests: Tests for thickness (3.4.1), adhesion (3.4.3), and quality (3.5) are acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests: Tests for composition (3.4.2) and tests of cleaning and plating solutions to ensure that the deposited silver will conform to this specification are periodic tests and shall be performed at a frequency selected by the processor unless frequency of testing is specified by purchaser.

4.2.3 Preproduction Tests: Tests for all technical requirements are preproduction tests and shall be performed prior to or on the first-article shipment of plated parts to a purchaser, when a change in material and/or processing requires approval by the cognizant engineering organization (see 4.4.2), and when purchaser deems confirmatory testing to be required.

4.2.3.1 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, contracting officer, or request for procurement.

4.3 Sampling and Testing:

Shall be not less than the following; a lot shall be all parts of the same size and shape, made of the same alloy, plated to the same range of plate thickness in the same set of solutions within one 24-hour period of operation, and presented for processor's inspection at one time:

4.3.1 For Acceptance Tests: As shown in Table 1.

TABLE 1 - Sampling for Acceptance Tests

Number of Parts in Lot	Visual for Adhesion, Coverage, and Quality	Thickness Non-Destructive	Thickness Destructive	Adhesion Destructive
Up to 7	all	all	0	0
8 to 15	7	3	0	0
16 to 40	10	4	0	0
41 to 150	15	5	1	1
151 to 300	25	6	1	1
301 to 500	35	7	1	1
Over 500	50	8	2	2

4.3.1.1 When a statistical sampling plan has been agreed upon by purchaser and processor, sampling shall be in accordance with such plan in lieu of sampling as in 4.3.1 and the report of 4.5 shall state that such plan was used.

4.3.2 For Periodic Tests and Preproduction Tests: As agreed upon by purchaser and processor.

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 fabricated from the same class of alloy as parts represented, cleaned, and plated with the parts they represent may be used. For adhesion tests, such specimens shall be strip approximately 0.032 x 4 x 1 inch and for thickness and quality tests shall be panels of the same size and type or shall be bars approximately 0.5 inch in diameter and 4 inches long.