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400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 2429B

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Superseding AMS 2429A

Plating, Bronze
Nitriding Stop-off
90Cu - 10Sn

1. SCOPE:

1.1 Purpose:

This specification covers the engineering requirements for electrodeposition and removal of bronze plate.

1.2 Application:

This process has been used typically as a maskant to prevent nitriding of surfaces on which nitriding is neither required nor permitted, 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 form 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.

QUESTIONS REGARDING THIS DOCUMENT: (724) 772-7161 FAX: (724) 776-0243
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2.1 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or URL http://www.astm.org/cgi-bin/softcart-exe/store/store/htm?e+mystore.

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 B 567	Measurement of Coating Thicknesses by the Beta Backscatter Method
ASTM B 568	Measurement of Coating Thickness by X-Ray Spectrometry
ASTM B 571	Adhesion of Metallic Coatings
ASTM E 376	Measuring Coating Thickness by Magnetic-Field or Eddy-Current (Electromagnetic) Test Methods
ASTM E 478	Chemical Analysis of Copper Alloys
ASTM F 519	Mechanical Hydrogen Embrittlement Evaluation of Plating Processes and Service Environments

3. TECHNICAL REQUIREMENTS:

3.1 Preparation:

3.1.1 Prior to immersion in the plating solution, parts shall be clean and free of water break.

3.1.2 Except for barrel plating, electrical contact 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 on which plating is not required.

3.1.3 Auxiliary anodes shall be used as necessary to ensure proper plate thicknesses in holes, recesses, and closed-end deep bores on parts to be protected against nitriding.

3.2 Procedure:

3.2.1 Parts shall be plated by electrodeposition of copper-tin alloy from a suitable bronze plating solution. A preliminary strike of copper or, for corrosion and heat resistant steels, of nickel is permissible.

3.2.2 After plating, the parts shall be thoroughly rinsed and dried.

3.3 Hydrogen Embrittlement Relief:

After plating, parts having hardness higher than 40 HRC shall be baked for not less than 23 hours at 375 °F ± 10 (191 °C ± 6) or shall be started in the nitriding cycle within four hours after plating.

3.3.1 After nitriding, the bronze plate shall be stripped from parts with an alkaline copper stripper that will not cause pitting or other damage to the basis metal.

3.4 Properties:

The deposited copper-tin alloy shall conform to the following requirements:

3.4.1 Thickness: Shall be not less than 0.0005 inch (13 µm) on all surfaces of representative parts or test panels cleaned and plated with the parts represented, determined in accordance with ASTM B 487, ASTM B 499, ASTM B 504, ASTM B 567, ASTM B 568, and ASTM E 376 or other method acceptable to purchaser.

3.4.1.1 Where "copper strike" or "nickel strike" is specified, the thickness of the strike shall be approximately 0.0001 inch (2.5 µm).

3.4.2 Composition: The tin content of the bronze plate shall be 5 to 15% by weight, determined by wet chemical methods in accordance with ASTM E 478, by spectrochemical methods, or by other analytical methods acceptable to purchaser.

3.4.3 Adhesion: Shall be tested on parts using the heat quench test for copper in accordance with ASTM B 571.

3.4.4 Porosity: Bronze plated low-alloy steel panels, plated with the parts represented, shall be sufficiently nonporous to not give a blue color when tested for five minutes with potassium ferricyanide solution made up in accordance with Table 1. Alternate tests, providing equal sensitivity, may be used when approved by purchaser (See 8.8).

TABLE 1 - Ferricyanide Test Solution

Ingredient	Amount
Potassium ferricyanide	10 grams
Sodium chloride	5 grams
Deionized water	100 mL

3.4.5 Hydrogen Embrittlement: The plating and stripping process shall not cause embrittlement in ferrous metals. Testing in accordance with ASTM F 519 Type 1 using notched round specimens, stressed in tension under constant load. For test purposes, plating shall be 0.0005 to 0.0007 inch (13 to 18 µm) measured on the smooth section of the specimen, but with visual evidence of plating at root of the notch.

3.5 Quality:

Plating, as received by purchaser, shall be continuous, adherent to basis metal, uniform in appearance, and essentially free from blisters, nodules, pits, and other surface imperfections. Slight staining or discoloration is permissible.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The processor shall supply all samples for processor's tests and shall be responsible for the performance of 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: Thickness (3.4.1), adhesion (3.4.3), porosity (3.4.4), and quality (3.5) are acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests: Composition (3.4.2), hydrogen embrittlement (3.4.5), and tests of cleaning and plating solutions to ensure that the deposited metal will conform to the specified requirements (See 8.7) 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: All technical requirements are preproduction tests and shall be performed prior to or on the initial shipment of plated parts to a purchaser, when a change is made 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.

4.3 Sampling and Testing:

Shall be not less than the following; a lot shall be all parts of the same part number plated to the same specified thickness range, processed in each consecutive eight-hours of operation in the same set of solutions, and presented for processor's inspection at one time:

4.3.1 For Acceptance Tests: Test samples shall be selected randomly from all parts in the lot. Unless purchaser supplies a sampling plan, the minimum number of samples shall be as shown in Table 2.

TABLE 2 - Sampling for Acceptance Tests

Lot Size	Quality	Thickness Porosity Adhesion	Destructive Test (if required)
Up to 7	All	3	0
7 to 15	7	4	0
16 to 40	10	4	1
41 to 110	15	5	2
111 to 300	25	6	3
301 to 500	35	7	4
501 to 700	50	8	5
701 to 1200	75	10	6

4.3.2 For Periodic Tests: Sample quantity shall be at the discretion of the processor unless otherwise specified by purchaser.

4.3.3 When plated parts are of such configuration or size as to be not readily adaptable to the specified tests, separate specimens made of an alloy of the same class as the parts represented, cleaned, plated, and post-treated with the parts represented may be used. For adhesion and thickness tests, specimens shall be bars approximately 0.5 inch (13 mm) in diameter and 4 inches (102 mm) long.

4.4 Approval:

4.4.1 The process and control factors, a preproduction sample part, and/or both, whichever is specified, shall be approved by the cognizant engineering organization before production parts are supplied.

4.4.2 The supplier shall make no significant change to materials, processes, or control factors from those on which approval was based, unless the change is approved by the cognizant engineering organization. A significant change is one which, in the judgment of the cognizant engineering organization, could affect the properties or performance of the parts.

4.4.3 Control factors shall include, but not be limited to, the following:

Surface preparation method(s)
Composition and temperature limits of the plating bath
Testing frequency for plating bath composition
Periodic test plan
Method of thickness determination.