SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS2420 | REV. D

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Superseding AMS2420C

Plating of Aluminum for Solderability
Zinc Immersion Pre-Treatment Process

RATIONALE

AMS2420D has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE:

1.1 Purpose:

This specification covers the requirements for preparation of aluminum and aluminum alloys for soldering by zinc immersion pre-treatment followed by copper plating and tin or tin-zinc alloy plating.

1.2 Application:

This process has been used typically to facilitate soldering of aluminum and aluminum alloy mechanical and electronic instrument enclosures, but usage is not limited to such applications.

1.3 Classification:

The final plating shall be one of the following. When a Class is not specified, Class 1 shall apply.

Class 1 - Tin Plating
Class 2 - Tin-Zinc Plating

1.4 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.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
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SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AMS2420D

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.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 2408 Plating, Tin
AMS 2418 Plating, Copper
AMS 2434 Plating, Tin-Zinc
AMS 4751 Solder, Tin-Lead, Eutectic, 63Sn - 37Pb

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM B 253 Preparation of Aluminum Alloys for Electroplating
ASTM B 487 Measurement of Metal and Oxide Coating Thicknesses by Microscopical Examination of a Cross Section
ASTM B 567 Measurement of Coating Thickness by the Beta Backscatter Method
ASTM B 568 Measurement of Coating Thickness by X-Ray Spectrometry
ASTM B 571 Adhesion of Metallic Coatings

3. TECHNICAL REQUIREMENTS:

3.1 Preparation:

3.1.1 Cleaning and Deoxidizing: Parts shall have clean, waterbreak-free surfaces and shall be deoxidized to prepare for zinc immersion coating as a pretreatment for plating.

3.2 Procedure:

3.2.1 Zinc Immersion Coating: Parts shall be processed in accordance with ASTM B 253 or other method acceptable to purchaser.

3.2.2 Plating: Parts shall be pre-plated with a brass or copper strike from an alkaline solution, followed by electrodeposition of copper in accordance with AMS 2418. When Class 1 is specified, parts shall receive a final deposit of tin in accordance with AMS 2408. When Class 2 is specified, parts shall receive a final deposit of a tin-zinc alloy in accordance with AMS 2434 with a maximum of 25% zinc.

3.2.2.1 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 on which plating is not required.

3.2.3 Spotting in is not permitted.

3.2.4 When reflow is specified for tin plate the deposit shall be reflowed to a bright, shiny appearance by immersion in hot oil at 490 to 525 °F (254 to 274 °C).

3.3 Properties:

The deposit shall conform to the following requirements:

3.3.1 Thickness: Shall be as follows, determined in accordance with ASTM B 487, ASTM B 567, ASTM B 568, or other method acceptable to purchaser.

3.3.1.1 Copper Plate: Shall be 0.0003 to 0.0007 inch (8 to 18 µm).

3.3.1.2 Tin or Tin-Zinc Alloy Plate: Shall be 0.0003 to 0.0005 inch (8 to 13 µm).

3.3.1.3 The plate shall be substantially uniform in thickness on significant surfaces, except that build-up at exterior corners or edges will be permitted provided finished drawing dimensions are met.

3.3.1.4 No requirements are established for minimum plate thickness on surfaces of holes, recesses, internal threads, contact areas of parts plated all over, and other areas where a controlled deposit cannot be obtained under normal plating conditions, but such surfaces shall not be masked to prevent plating. The resultant thickness shall be considered only when such surfaces can be touched by a sphere 0.75 inch (19.0 mm) in diameter.

3.3.2 Heat Resistance: Parts shall show no visual evidence of blistering after reflow or after being held at 350 °F ± 10 (177 °C ± 6) for 30 minutes ± 3.

3.3.3 Adhesion: Plate shall be firmly and continuously bonded to the underlying metal, determined, on representative parts or a test specimen as in 4.3.3, in accordance with a method described in ASTM B 571. There shall be no indication of separation from the base metal or internal delamination. In case of dispute, the bend test shall apply.

3.3.4 Solderability: The plating shall demonstrate good solderability using AMS 4751 tin/lead solder and a mildly activated rosin (RMA) flux. The solder shall flow uniformly and show no evidence of dewetting except for surfaces exempt from coating thickness requirements as in 3.3.1.4.

3.4 Quality:

Plating shall be smooth, continuous, free from delamination within the plating, uniform in appearance and free from imperfections detrimental to usage of the plating. Plating shall be visually free from frosty areas, pin holes, porosity, blisters, nodules, and pits. Slight staining or discoloration is permissible.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The processor shall supply all specimens for processor's tests and shall be responsible for the performance of all required tests. Parts, if required for tests, shall be supplied by purchaser. Purchaser reserves the right to sample and to perform any confirmatory tests deemed necessary to ensure that processing conforms to specified requirements.

4.2 Classification of Tests:

4.2.1 All technical requirements are acceptance tests and preproduction tests and shall be performed prior to or on the initial shipment of processed parts to a purchaser, on each lot, when a change in materials and/or processing requires approval by the cognizant engineering organization (See 4.4.2), and when purchaser deems confirmatory testing to be required.

4.2.2 Periodic Tests: Tests of preparatory and plating solutions (See 8.4) to ensure that the deposited metal will conform to specified requirements are periodic tests and shall be performed at a frequency selected by the processor unless frequency of testing is specified by purchaser.

4.3 Sampling and Testing:

Shall be not less than the following; a lot shall be all parts of the same part number processed in the same solution(s) in not longer than eight consecutive hours, and presented for processor's inspection at one time.

4.3.1 For Acceptance Tests:

4.3.1.1 Quality, Heat Resistance, Adhesion, Solderability, and Thickness: As shown in Table 1.

TABLE 1 - Minimum Sampling for Acceptance Testing

Number of Parts in Lots	Quality	Thickness, Heat Resistance, Adhesion, and Solderability
Up to 7	All	3
8 to 15	7	4
16 to 40	10	4
41 to 110	15	5
111 to 300	25	6
301 to 500	35	7
Over 500	50	8

4.3.2 For Preproduction Tests: Shall be acceptable to purchaser.

4.3.3 Test Specimens: Where practical, tests shall be performed on actual parts. Nondestructive testing shall be performed wherever practical and where authorized herein. When destructive tests are required and plated parts are of such configuration or size as to be not readily adaptable to the specified tests, separate test specimens may be used provided they are made of the same generic class of alloy, cleaned, plated, and post-treated with the parts represented. Specimens shall be either panels approximately 0.032 x 1 x 4 inches (0.81 x 25 x 102 mm) or 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 procedure, a preproduction sample, or both, whichever is specified by purchaser, shall be approved by the cognizant engineering organization before production parts are supplied.

4.4.2 The processor shall make no significant change to materials, processes, or control factors from those on which the 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 and cleaning procedures
Surface activation procedures
Plating bath compositions and control limits
Plating bath temperature limits and controls
Current/voltage/time limits and controls
Method for testing plating thickness
Method for checking adhesion

4.5 Reports:

The processor shall furnish with each shipment a report stating that the parts have been processed and tested in accordance with specified requirements and that they conform to the technical requirements. This report shall include the purchase order number, lot number, AMS 2420D, part number, quantity, and class of plating.

4.6 Resampling and Retesting:

4.6.1 If any lot acceptance test fails to meet specified requirements, parts in that lot may be stripped by a method acceptable to purchaser that does not roughen, pit or embrittle the basis metal or adversely affect part dimensions, pretreated, plated, post treated as defined herein and tested. Alternatively, all parts in the lot may be inspected for the nonconforming attribute, and the nonconforming parts may be stripped by a method acceptable to purchaser that does not pit, roughen embrittle the basis metal, or adversely affect part dimensions, pretreated, plated, post treated as defined herein, and tested. After any stripping and replating, parts shall meet the requirements of the drawing.