

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

Issued JUL 1957
Revised MAR 1996

Superseding AMS 2420B

(R) PLATING OF ALUMINUM FOR SOLDERABILITY Zinc Immersion Pre-Treatment Process

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.

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2. APPLICABLE DOCUMENTS:

The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

2.1 SAE Publications:

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

AMS 2408 Plating, Tin
AMS 2418 Plating, Copper
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

2.3 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

3. TECHNICAL REQUIREMENTS:

3.1 Preparation:

- 3.1.1 All fabrication-type operations, such as forming, heat treating, brazing, and welding, shall be completed before parts are plated.
- 3.1.2 Cleaning and Deoxidizing: Parts shall have clean, waterbreak-free surfaces and shall be deoxidized to prepare for zinc immersion coating.
- 3.1.3 Electrical contact between the parts and power source shall be made to prevent chemical or immersion deposition, electrical arcing, or overheating. 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.

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 with a maximum of 25% zinc.
- 3.2.3 When reflow is specified, tin plate 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 All surfaces of the part, except those which cannot be touched by a sphere 0.75 inch (19 mm) in diameter, shall be plated to the specified thickness. Unless otherwise specified, surfaces, such as holes, recesses, threads, and other areas where a controlled deposit cannot be obtained under normal plating conditions, may be under the specified limits provided they show coverage.
- 3.3.2 Heat Resistance: Parts shall show no visual evidence of blistering after reflow or after being held at 350 °F \pm 10 (177 °C \pm 6) for 30 minutes \pm 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.
- 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.

3.4 Quality:

Plating, as received by purchaser, shall be smooth, continuous, adherent to basis metal, uniform in appearance, and not coarsely crystalline and visually free from pin holes, porosity, blisters, nodules, pits, and other imperfections detrimental to usage of the plating. Slight staining or discoloration is permissible.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The processor shall supply all specimens for processors 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:

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.

- 4.2.1 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 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.