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AEROSPACE MATERIAL SPECIFICATION

SAE AMS 2409F

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Superseding AMS 2409E

Submitted for recognition as an American National Standard

PLATING, IMMERSION TIN
For Aluminum Alloys

1. SCOPE:

1.1 Purpose:

This specification covers the engineering requirements for producing a thin tin coating on aluminum alloys by an immersion process.

1.2 Application:

This process has been used typically to prevent scuffing and galling of aluminum alloy parts, 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 publications shall be the issue in effect on the date of the purchase order.

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 567	Measurement of Coating Thickness by the Beta Backscatter Method
ASTM B 568	Measurement of Coating Thickness by X-Ray Spectrometry

2.2 U.S. Government Publications:

(R)

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 Plating Bath:

Shall consist of an aqueous solution of stannate salts.

3.2 Operating Parameters:

(R)

Temperature of bath, pH, solution concentration, and immersion time shall be controlled to provide a deposit meeting the requirements of 3.5.

3.3 Preparation:

(R)

Parts shall have clean surfaces free of waterbreak prior to immersion in the plating solution. Transfer parts to plating solution without drying after rinsing.

3.4 Procedure:

3.4.1 Parts shall be immersed in the plating bath and shall remain in the bath
(R) until reaction is essentially complete, as indicated by virtual cessation of evolution of hydrogen.

3.4.1.1 Parts shall not be allowed to dry during the entire sequence of operations until completion of the final rinse.

3.4.1.2 After plating, parts shall be thoroughly rinsed and dried.
(R)

3.5 Properties:

Plated tin shall conform to the following requirements:

3.5.1 Thickness: The plate thickness shall be approximately 0.0001 inch
(R) (2.5 μm), determined in accordance with ASTM B 487, ASTM B 567, ASTM B 568, or other method acceptable to purchaser.

3.5.2 Adhesion: Plated parts shall show no blisters after being heated in a
(R) circulating-air oven to 300 °F ± 15 (149 °C ± 8) and held at heat for not less than three hours.

3.5.2.1 (R) When acceptable to purchaser, adhesion may be verified on specimens, having a composition generically similar to the parts represented and processed with the parts represented, which shall not show evidence of flaking when scratched with a sharp needle point and examined at up to 6X magnification.

3.6 (R) Quality:

Plated tin, as received by purchaser, shall be smooth, continuous, adherent to basis metal, uniform bright gray in appearance, and free from blisters and other imperfections detrimental to usage of the plating. Slight staining or discoloration is permissible.

4. QUALITY ASSURANCE PROVISIONS:

4.1 (R) Responsibility for Inspection:

The processing vendor shall supply all samples for vendor'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 (R) Acceptance Tests: Tests for adhesion (3.5.2 or 3.5.2.1, as applicable) and quality (3.6) are acceptance tests and shall be performed to represent each lot.

4.2.2 (R) Periodic Tests: Tests for thickness (3.5.1) and tests of cleaning and plating solutions are periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.2.3 (R) Preproduction Tests: Tests for 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 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 (R) Sampling and Testing:

Shall be not less than the following; a lot shall be all plated parts made of the same aluminum alloy of the same part number plated in the same solution(s) in not longer than eight consecutive hours and presented for vendor's inspection at one time:

4.3.1 For Acceptance Tests: As shown in Table 1.
(R)

TABLE 1 - Sampling for Quality and Adhesion

Number of Part in Lot	Quality	Adhesion
Up to 7	All	3
8 to 15	2	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 Periodic Tests and Preproduction Tests: As acceptable to purchaser.
(R)

4.4 Approval:

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

4.4.2 The supplier 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 judgement of the cognizant engineering organization, could affect the properties or performance of the parts.
(R)

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

a. Precleaning procedure
b. Bath composition limits
c. Bath temperature limits
d. Bath pH limits

4.5 Reports:

The vendor of plated parts 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 acceptance test requirements. This report shall include the purchase order number, lot number, AMS 2409F, part number, and quantity.