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AEROSPACE MATERIAL SPECIFICATION

SAE AMS 2468E

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Superseding AMS 2468D

Submitted for recognition as an American National Standard

HARD COATING TREATMENT OF ALUMINUM ALLOYS

1. SCOPE:

1.1 Purpose:

This specification establishes the engineering requirements for producing a hard coating on aluminum alloys and the properties of such coating.

1.2 Application:

This coating has been used typically to increase, by the formation of a dense aluminum oxide, surface hardness and resistance to abrasion and corrosion of aluminum-alloy parts containing, in general, less than 6% copper or 8% silicon or a total of 8% of both, but usage is not limited to such applications. Alloys with higher silicon content alone can be coated satisfactorily with proper precautions in processing. Careful consideration should be given to the use of this process on highly-stressed parts because of the resultant marked lowering of fatigue performance and on parts with sharp corners and edges where chipping may result.

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 137 Measurement of Weight of Coating on Anodically Coated Aluminum
ASTM B 244 Measurement of Thickness of Anodic Coatings on Aluminum and of Other Nonconductive Coatings on Nonmagnetic Basis Metals with Eddy-Current Instruments

2.2 U.S. Government Publications:

Available from Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

MIL-STD-2073-1 DOD Materiel, Procedures for Development and Application of Packaging Requirements
MIL-A-8625 Anodic Coatings, for Aluminum and Aluminum Alloys

3. TECHNICAL REQUIREMENTS:

3.1 Preparation:

3.1.1 (R) All heat treatment, machining, forming, brazing, welding, perforating, and shot peening or other surface compressive stressing processes shall be completed before parts are hard coated.

3.1.2 Parts, prior to being coated, shall have clean surfaces, free from water-break, prepared with minimum abrasion, erosion, or pitting.

3.1.3 When parts are to be selectively coated, electrical contact should be made on a surface not required to be coated. When parts are not to be masked, the areas in which electrical contact is permissible shall be indicated on the drawing.

3.1.4 Aluminum parts containing inserts of other metals shall have the inserts masked off before the parts are coated.

3.2 Procedure:

Shall consist of the formation of aluminum oxide on surfaces of parts made the anode in a suitable electrolyte. After coating, parts shall be thoroughly rinsed in cold, clean water and dried.

3.2.1 Coated surfaces shall be honed or lapped as necessary to meet specified surface finish requirements.

3.2.2 Sealing of parts for improved corrosion resistance may be accomplished at the sacrifice of wear resistance when permitted by purchaser.

3.3 Properties:

Coating on parts shall conform to the following requirements:

3.3.1 Thickness: AMS 2468 designates finished coating thickness of 0.002 inch ± 0.0005 (0.05 mm ± 0.013). Other coating thicknesses may be specified by this specification number and a suffix number designating the nominal thickness in thousandths of an inch (25 μm). A tolerance of ± 0.0005 inch (±0.013 mm) in thickness of coating will be allowed. Thus, AMS 2468-3 designates a finished coating thickness of 0.003 inch ± 0.0005 (0.08 mm ± 0.013).

3.3.1.1 (R) Thickness of coating shall be determined on representative parts or specimens by microscopic method, micrometer measurement, ASTM B 244, or other method acceptable to purchaser. When micrometer measurement is used, specimens for thickness determination shall be of the same alloy as the parts they represent and shall be processed with the parts. Micrometer measurements shall be calibrated against microscopic measurements on specimens of the same alloy processed to the same nominal coating thickness. Coating thickness requirements shall not apply to blind holes or recesses with depth greater than twice the diameter or in open holes with depth greater than seven times the diameter unless a specific coating thickness is specified in those areas.

3.3.2 Coating Weight: Shall be not less than 0.030 grams per square inch/0.001 inch (0.118 g/cm^2/mm) of coating thickness, determined in accordance with ASTM B 137 on unsealed coatings.

3.3.3 Color: Shall be substantially uniform on pieces of the same alloy processed to the same nominal coating thickness. Coated surfaces shall not have a sooty appearance or the presence of a moire pattern.

3.3.4 (R) Abrasion Resistance: Shall be acceptable to purchaser, determined in accordance with MIL-A-8625 or other procedure acceptable to purchaser.

3.4 Quality:

Coating, as received by purchaser, shall be substantially uniform in thickness except in small holes unless a specific coating thickness is specified, and in fillets, radii, and deep recesses, and shall be free from scratches, chips, and burned areas. Small irregularities at points of electrical contact are permitted.

3.5 Tolerances:

When a limited area to be hard coated is specified, a tolerance of -0, +0.063 inch (+1.60 mm) will be permitted on the extent of the hard coated area except when such area ends at a corner; in such case, the area shall not extend beyond the corner by more than the projected thickness of the coating.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The coating 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 Acceptance Tests: Tests for thickness (3.3.1) or coating weight (3.3.2), color (3.3.3), and quality (3.4) are acceptance tests and shall be performed on each lot.

4.2.2 (R) Periodic Tests: Tests for coating weight (3.3.2) unless determined in lieu of thickness for acceptance and for abrasion resistance (3.3.4) 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 Preproduction Tests: Tests for all technical requirements are preproduction tests and shall be performed prior to or on the initial shipment of coated parts to a purchaser, when a change in material and/or processing requires reapproval as in 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 as follows; a lot shall be all coated parts made from the same alloy, processed to the same coating thickness, and presented for vendor's inspection at one time:

4.3.1 For Acceptance Tests:

4.3.1.1 Thickness: Three parts from each lot.

4.3.1.2 Color and Quality: All parts.

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

4.3.2.1 Samples for determination of coating weight shall be actual coated parts when size and shape permit accurate determination of surface area. If parts are of such size and shape that surface area cannot be determined readily, coating weight determinations shall be made on test panels 0.025 to 0.063 inch (0.64 to 1.60 mm) in nominal thickness and not less than 3 inches (76 mm) square and, except as specified in 4.3.2.1.1, made of the same alloy as the parts and processed with the parts they represent.

4.3.2.1.1 (R) Test panels of an alloy different from that of the parts they represent may be used if acceptable to purchaser. In such case, panels shall be processed under conditions, previously established, which will produce the same coating thickness as that on the parts they represent.

4.4 Approval:

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

4.4.2 (R) The processor shall make no significant changes in materials, processes, or controls 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 coated parts.

4.5 Reports:

The vendor of coated parts shall furnish with each shipment a report stating that the parts have been processed and tested in accordance with the technical requirements and that the parts conform to the acceptance test requirements. This report shall include the purchase order number, lot number, AMS 2468E, part number, and quantity.

4.6 (R) Resampling and Retesting:

If any specimen used in the above tests fails to meet the specified requirements, disposition of the parts may be based on the results of testing three additional specimens for each original nonconforming specimen. Except as specified in 4.6.1, failure of any retest specimen to meet the specified requirements shall be cause for rejection of the parts represented. Results of all tests shall be reported.

4.6.1 (R) If any part fails to meet the specified requirements, either on the original sampling as in 4.3 or upon resampling as in 4.6, the parts in that lot may be stripped, provided finished dimensional tolerances can be maintained, by a method approved by purchaser which does not roughen, pit, or embrittle the basis metal, recoated, and retested.