Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AEROSPACE MATERIAL SPECIFICATION

AMS 2468B
Superseding AMS 2468A
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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 the coating.

1.2 Application: Primarily to increase, by the formation of a dense aluminum oxide, surface hardness and resistance to abrasion and corrosion of aluminum and aluminum-alloy parts containing, in general, less than 5% copper or 8% silicon or a total of 8% of both. 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.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2350 - Standards and Test Methods

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM B137 - Weight of Coating on Anodically Coated Aluminum

2.3 Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Military Standards:

MIL-STD-794 - Parts and Equipment, Procedures for Packaging and Packing of

3. TECHNICAL REQUIREMENTS:

3.1 Preparation:

3.1.1 All heat treatment, machining, forming, brazing, welding, and perforating operations shall, insofar as practicable, be completed before parts are hard coated.

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

3.2 Procedure: Consists 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:

3.3.1 Thickness: AMS 2468 designates finished coating thickness of 0.002 in. ± 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. A tolerance of ± 0.0005 in. (± 0.013 mm) in thickness of coating will be allowed, unless otherwise specified. Thus, AMS 2468-3 designates a finished coating thickness of 0.003 in. ± 0.0005 (0.08 mm ± 0.013).

3.3.1.1 Thickness of coating shall be determined on representative parts or specimens by microscopic method, micrometer measurement, or as agreed upon by purchaser and vendor. When micrometer measurement is used, specimens for thickness determinations 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 g per sq in. per 0.001 in. (0.18 g per cm^2 per mm) of coating thickness, determined in accordance with ASTM B137.

3.3.3 Color: Coating 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 Abrasion Resistance: Coating shall have abrasion resistance acceptable to the purchaser, determined by a procedure agreed upon by purchaser and vendor.

3.3.5 Corrosion Resistance: Coating shall have corrosion resistance acceptable to the purchaser, determined by a procedure agreed upon by purchaser and vendor.

3.4 Quality: Coating 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 will be permitted.

3.5 Tolerances: When a limited area to be hard coated is specified, a tolerance of -0, +1/16 in. (+1.6 mm), unless otherwise specified, will be permitted on the extent of the hard coated area except when such area ends at a corner; in such cases, 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 and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.5. Purchaser reserves the right to perform such confirmatory testing as he deems necessary to ensure that processing conforms to the requirements of this specification.

4.2 Classification of Tests: Tests to determine conformance to all technical requirements of this specification are classified as acceptance or routine control tests.

4.2.1 For direct U. S. Military procurement, qualification test material and supporting test data shall be submitted to the cognizant qualification agency as directed by the request for procurement, the procuring activity, or the contracting officer.

4.3 Sampling: Shall be as follows; a lot shall be all parts made from the same alloy, processed to the same coating thickness, and presented for vendor's inspection at one time.

4.3.1 Coating Weight: Shall be determined for original qualification and thereafter at least monthly on representative 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 - 0.063 in. (0.64 - 1.60 mm) thick and not less than 3 in. (76 mm) square made of the same alloy as the parts represented.

4.3.1.1 Test panels, if used, shall be processed with the work they represent.

4.4 Approval:

4.4.1 Sample coated parts shall be approved by purchaser before parts for production use are supplied, unless such approval be waived. Results of tests on production parts shall be essentially equivalent to those on the approved samples.

4.4.2 Vendor shall use manufacturing procedures, processes, and methods of inspection on production parts which are essentially the same as those used on the approved sample parts. If any change is necessary in type of equipment or in established compositional limits and operating conditions of process solutions, vendor shall submit for reapproval of the process a statement of the proposed changes in processing and, when requested, sample coated parts, test panels, or both. No production parts coated by the revised procedure shall be shipped prior to receipt of reapproval.

4.5 Reports: The vendor of coated parts shall furnish with each shipment three copies of a report stating that the parts have been processed and tested in accordance with the requirements of this specification and that the parts conform to the technical requirements. This report shall include the purchase order number, this specification number and its revision letter, part number, lot number, and quantity.

4.6 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 and no additional testing shall be permitted. Results of all tests shall be reported.

4.6.1 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 by a method approved by purchaser which does not roughen, pit, or embrittle the basis metal, recoated, and retested.

5. PREPARATION FOR DELIVERY:

5.1 Parts shall be handled and packaged in such a manner as will ensure that the required physical characteristics and properties of the coating are preserved.

5.2 Packages of parts shall be prepared for shipment in accordance with commercial practice to ensure carrier acceptance and safe transportation to the point of delivery. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.

5.3 For direct U. S. Military procurement, packaging shall be in accordance with MIL-STD-794, Level A or Level C, as specified in the request for procurement. Commercial packaging as in 5.2 will be acceptable if it meets the requirements of Level C.