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400 COMMONWEALTH DRIVE, WARRENDALE, PA 15096

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

AMS 2482

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TEFLON-IMPREGNATED OR CODEPOSITED HARD COATING TREATMENT OF ALUMINUM ALLOYS

1. SCOPE:

1.1 Form: This specification establishes the engineering requirements for producing a hard, teflon-impregnated or codeposited coating on aluminum alloys and the properties of such coating.

1.2 Application: Primarily to increase, by the formation of a dense, teflon-impregnated aluminum oxide, surface hardness and resistance to abrasion and corrosion of 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 SAE publications shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2350 - Standards and Test Methods

2.2 ASTM Publications: Available from ASTM, 1916 Race Street, Philadelphia, PA 19103.

ASTM B117 - Salt Spray (Fog) Testing
ASTM B244 - Measurement of Thickness of Anodic Coatings on Aluminum and of Other Nonconductive Coatings on Nonmagnetic Basis Metals with Eddy-Current Instruments
ASTM D1193 - Reagent Water
ASTM D1894 - Static and Kinetic Coefficients of Friction of Plastic Film and Sheeting
ASTM D4060 - Abrasion Resistance of Organic Coatings by the Taber Abraser

2.3 U.S. 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 processed.

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, codeposited or impregnated with teflon, 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.

3.3 Properties: Coating on parts shall conform to the following requirements:

3.3.1 Thickness: AMS 2482 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 2482-3 designates a finished coating thickness of 0.003 inch ± 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, eddy-current method in accordance with ASTM B244, or other method agreed upon by purchaser and vendor. 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. The specimens shall be 0.04 x 2 x 4 inches (1.0 x 51 x 102 mm) or of suitable configuration to provide an accurate measurement. 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 Corrosion Resistance: The coated specimens, 0.04 x 3 x 10 inches (1.0 x 76 x 254 mm), shall be washed in ASTM D1193, Type IV, water, dried, and then subjected to a 5% salt spray test for 336 hours in accordance with ASTM B117, except that the significant surface shall be inclined approximately 6 degrees from the vertical. The coated specimens, after salt-spray testing, shall show no more than five isolated spots or pits, none larger then 1/32 inch (0.8 mm) in diameter, in a total of 30 square inches (194 cm^2) of test area. Areas are excepted if they are within 1/16 inch (1.6 mm) of identification markings and electrical contact marks that remain after processing.

3.3.3 Abrasion Resistance: Test specimens, 0.004 x 4 x 4 inches (1.0 x 102 x 102 mm), shall be tested in accordance with ASTM D4060, using CS17 wheels with a 1000 gram load. The wheels shall revolve on the coating at a speed of 70 revolutions per minute for 10,000 cycles. After abrading, the specimens shall be weighed to the nearest milligram to determine weight loss. Maximum weight loss shall be 40 milligrams for aluminum alloy 2024 and 20 milligrams for all other aluminum alloys.

3.3.4 Coefficient of Friction: Coated test specimens, 0.04 x 5 x 10 inches (1.0 x 127 x 254 mm) or suitable configuration to ensure accurate measurement, shall be tested in accordance with ASTM D1894 or other method agreed upon by purchaser and vendor. Maximum coefficient of friction shall be 0.15.

3.4 Quality: Coating, as received by purchaser, shall be smooth, uniform in appearance, and free from scratches, chips, and burned areas. Small irregularities at points of electrical contact are permitted.

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. Results of such tests shall be reported to the purchaser as required by 4.5. 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 to determine conformance to requirements for thickness (3.3.1) and quality (3.4) are classified as acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests: Tests to determine conformance to requirements for corrosion resistance (3.3.2), abrasion resistance (3.3.3), and coefficient of friction (3.3.4) are classified as 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 to determine conformance to all technical requirements of this specification are classified as 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 Sampling: 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 Quality: All parts.

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

4.3.2.1 If test panels of an alloy different from that of the parts they represent are used, 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 Sample coated parts and the coating procedure shall be approved by purchaser before parts for production use are supplied, unless such approval be waived by purchaser. Results of tests on production parts shall be essentially equivalent to those on the approved sample parts.