Society of Automotive Engineers, Inc.
TWO PENNSYLVANIA PLAZA, NEW YORK, N.Y. 10000

AEROSPACE MATERIAL SPECIFICATION

AMS 2469C
Superseding AMS 2469B
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PROCESS AND PERFORMANCE REQUIREMENTS FOR HARD COATING TREATMENT OF ALUMINUM ALLOYS

1. ACKNOWLEDGMENT: A vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.

2. APPLICATION: Primarily to increase 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, by the formation of a dense aluminum oxide. 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 resulting marked lowering of endurance limit and on parts with sharp corners and edges where chipping may result.

3. PREPARATION: Parts prior to coating shall have clean surfaces prepared with minimum abrasion, erosion, or pitting.

4. PROCEDURE: Consists of the formation of aluminum oxide on surfaces of parts made the anode in a suitable electrolyte.

4.1 After coating, parts shall be thoroughly rinsed in cold, clean water and dried. When specified by purchaser, coated parts shall be given a supplementary sealing treatment in a suitable sodium or potassium dichromate solution prior to rinsing and drying.

4.2 Coated surfaces shall be honed or lapped as necessary to meet the specified surface finish.

5. THICKNESS:

5.1 AMS 2469 designates finished coating thickness of 0.002 in. ± 0.0005. 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. in thickness of coating will be allowed, unless otherwise specified on the drawing. Thus, AMS 2469-3 designates a finished coating thickness of 0.003 in. ± 0.0005.

5.2 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 shall not be measured in blind holes or recesses with depth greater than twice the diameter or in open holes with depth greater than seven times the diameter.

6. TECHNICAL REQUIREMENTS: The following requirements apply to tests conducted on the parts or on specimens of the same alloy and surface finish as parts and processed with the parts. Frequency of specimen preparation and test shall be as agreed upon by purchaser and vendor.

6.1 Weight: Weight of coating shall be not less than 0.030 g per sq in. per 0.001 in. of coating thickness.

6.2 Color: Coating may vary in color from amber to black but 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.

6.3 Abrasion and Wear Resistance: Coating that has not been given a supplementary sealing treatment shall be tested for abrasion resistance in accordance with Method 6192 of Federal Standard No. 141 using CS-17 wheels with a 1000 g load. The wheels shall revolve on the anodic coating at a speed of 70 rpm for Ø 10,000 cycles. Three specimens shall be used for this test. The test specimens shall consist of 4 in. diameter or 4 in. square panels of the alloy being processed, not less than 0.063 in. thick with a 0.25 in. diameter hole in the center. They shall be weighed to the nearest milligram before and after test and the average weight loss of the three panels shall be used as the basis for establishing wear resistance.

6.3.1 Anodic coating loss of 2024 alloy or other 2000 series aluminum alloy shall not exceed 40 mg and that of Ø any other aluminum alloy shall not exceed 20 mg when tested as in 6.3.

6.4 Adhesion: Coatings shall show no evidence of delamination, peeling, or flaking on the tension side when submitted to the following bend test: Specimens 0.063 in. thick x 10 in. long x 1 in. wide, with the long dimension transverse to the direction of rolling, shall be coated and then bent 90 deg around a 0.5 in. diameter. Delamination or spalling on the compression side and crazing on the tension side shall not be cause for rejection.

6.5 Corrosion Resistance: Coating that has been given a supplementary sealing treatment shall show no evidence of corrosion after exposure to salt spray for a period of 240 hr when tested in accordance with the issue of ASTM B117 listed in the latest issue of AMS 2350, with the test panel inclined approximately 6 deg from the vertical.

6.6 When a limited area to be hard coated is specified on the drawing, a tolerance of -0 and +1/16 in., 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.

7. QUALITY: Coating shall be substantially uniform in thickness except in small holes, 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.

8. PRECAUTIONS:

8.1 Wire, hooks, racks, and clamps used to suspend parts in the electrolyte, if they also are in contact with the electrolyte, should be made of aluminum, aluminum alloys, titanium, or titanium alloys.

8.2 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 will be indicated on the drawing.

8.3 Aluminum parts containing inserts of other metal should have the inserts stopped off before the parts are coated.

8.4 In general, growth of parts will be approximately half the coating thickness, but this relationship will vary with material and coating thickness.

8.5 Difficulty may be encountered when treating some alclad materials when the cladding thickness is 50% or less of the final coating thickness.

8.6 Only parts made of the same alloy and, in the case of heat-treatable alloys the same temper, should be processed in a single batch.