AEROSPACE
MATERIAL SPECIFICATIONS
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AMS 2469

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Revised

# PROCESS AND PERFORMANCE REQUIREMENTS OF HARD COATING TREATMENT OF ALUMINUM ALLOYS

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

2. APPLICATION: Primarily to increase surface hardness and abrasion and corrosion resistance of aluminum and aluminum alloy parts containing, in general, less than 5% copper or 8% silicon. Alloys with higher silicon content 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.

5. THICKNESS:

5.1 AMS 2469 shall designate coating thickness of 0.002 in. ± 0.0005 unless otherwise specified. 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 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, nor 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. coating thickness.







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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 shall be reduced in thickness not more than 0.001 in. per 50,000 cycles when tested with a Taber Abraser, using CS-17 wheels with a 1,000 g load, operated in accordance with the instructions of the equipment manufacturer. The wheels shall be dressed prior to each test run (50,000 cycles) and the test specimens shall be kept free of excessive abrasive particles by periodic brushing or the use of a continuous air blast or suction. The test specimens shall consist of 4 in. diameter or 4 in. sq panels of the alloy being processed, not less than 0.063 in. thick with a 0.25 in. diameter hole in the center. The final determination of wear resistance shall be made by averaging the amount of wear found on 3 test panels. Other means of abrasion testing may be used as agreed upon by purchaser and vendor.

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 shall show no evidence of corrosion after exposure to salt spray for a period of 240 hr when tested in accordance with ASTM B 117-49T with the test panel inclined approximately 6 deg from the vertical.

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 should, if they also are in contact with the electrolyte, be made of aluminum, aluminum alloys, or titanium.

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 should 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 clad materials when the cladding thickness is 50% or less of the final coating thickness.

8.6 Only parts made of the same alloy should be processed in a single batch.