AEROSPACE
MATERIAL SPECIFICATIONS

SOCIETY OF AUTOMOTIVE ENGINEERS, Inc. 485 Lexington Ave., New York, N. Y. 10017

AMS 2470F
Superseding AMS 2470E
Issued 1-23-40
Revised 9-30-66

ANODIC TREATMENT OF ALUMINUM BASE ALLOYS
Chromic Acid Process

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

2. APPLICATION: To increase corrosion resistance and provide surfaces which will ensure satisfactory adherence of paint and other organic finishes. This process is primarily applicable to aluminum and aluminum alloy parts which do not have nominal copper content greater than 5% or total nominal alloy content greater than 7.5%.

3. PREPARATION: Parts prior to being coated shall have clean surfaces prepared with minimum abrasion, erosion, or pitting. Cleaning by a process giving a slightly etched surface is desirable.

4. SOLUTIONS:

4.1 Electrolyte: Shall be an aqueous solution of technical grade chromic acid (99.5% min CrO_3) of suitable concentration. A chloride content in the solution of the equivalent of 0.2 g of NaCl per liter or a sulfate content equivalent to 0.5 g of H_2SO_4 per liter may result in unsatisfactory operation of the process. The temperature of the solution shall be maintained at 91 - 99 F (32.8 - 37.2 C).

4.2 Sealer: Shall be water maintained at a temperature of 170 - 210 F (76.7 - 98.9 C). The pH value shall not exceed 6.8. Chromic acid may be used to maintain acidity.

4.2.1 A sodium dichromate sealing solution is acceptable when approved by the purchaser.

5. PROCEDURE:

5.1 The cleaned parts shall be made the anode in the electrolyte contained in a suitable metal tank which may also serve as the cathode. Direct current shall be applied and the voltage raised to 40 v and held for 30 - 60 minutes. A rate of increase of 8 v per min. is recommended but is not a requirement. Alloys containing not over 5% copper, with total silicon plus copper of 7.5% or more, shall be treated for not less than 20 min. for not less than 600 volt-minutes. Other conditions of time, temperature, and voltage may be used, when approved. After anodizing, all parts shall be rinsed thoroughly in cold running tap water.

5.2 Parts shall be immersed in the sealer solution for not less than 20 min. at a temperature not lower than 170 F (77 C), or for not less than 10 min. at a temperature not lower than 200 F (93 C). The rinse should be as thorough as practicable but slight chromic acid stains are not considered objectionable.

6. TECHNICAL REQUIREMENTS: When ASTM methods are specified for determining conformance to the ø following requirements, tests shall be conducted in accordance with the issue of the ASTM method listed in the latest issue of AMS 2350.

6.1 Coating Weight: Shall be not less than 200 mg per sq ft on parts which are not to be dyed and not less than 500 mg per sq ft on parts which are to be dyed but routine determinations are not required. If parts are of such size or shape that surface area cannot readily be determined, coating weight determinations may be made on separate specimens not less than 3 x 3 in. in width and length and 0.025 - 0.063 in. thick but routine determinations are not required; separate specimens, when used, shall be of an alloy of the same class as the parts represented, as follows:

Class 1. Alloys of commercial designations 1100, 3003, 3004, 5052, 6053, 6061, 6063, and all alclad alloys.

Class 2. All wrought alloys not listed as class 1 and all casting alloys.

Separate specimens shall be processed with the work they represent. Determinations of coating weight shall be made in accordance with ASTM B137 on parts or specimens which have been anodized and rinsed but not sealed or dyed.

6.1.1 If small parts such as rivets and machine screws are anodized in bulk in a container, the specified coating weight shall apply to not less than 75% of the parts treated together, determined by random sampling, but in no case shall any part show uncoated areas.

6.2 Corrosion Resistance:

6.2.1 For control purposes, samples of AMS 4037 sheet 0.040 in. thick and not less than 3 x 10 in. (the 10 in. dimension being perpendicular to the direction of rolling) treated in accordance with Section 5 shall withstand 250 hr exposure to salt spray without corroding to the extent that would cause more than 5% decrease in tensile strength or 10% decrease in elongation from those of duplicate treated but unexposed panels. Test results for both exposed and unexposed panels shall be reported as the average of three specimens from each panel. The salt spray corrosion test shall be conducted in accordance with ASTM B117. Tensile tests shall be conducted in accordance with the latest issue of AMS 2355. The foregoing test is not required when material or parts treated in accordance with Section 5 are subsequently to be painted.

6.2.2 Each part that is anodized and not subsequently painted shall be capable of withstanding salt spray test for 250 hr conducted in accordance with ASTM B117 without showing more than a few scattered, visual corrosion pits.

7. PRECAUTIONS:

7.1 Surfaces to be painted should be handled with care after anodizing to prevent rupture of the film and contamination by dirt or oil before painting, which should be performed as soon after treatment as practicable.

7.2 Good, tight electrical contact should be maintained during the anodic treatment to prevent burning of parts but small irregularities of coating at points of electrical contact will be permitted.

7.3 Anodizing baths should be provided with an exhaust system as a protection for the operators and prevention of corrosion of metal equipment in the vicinity.

7.4 Unless otherwise specified, all parts should be anodized after all heat treatment, machining, welding, forming, and perforating operations have been completed, insofar as practicable.

7.5 Sub-assemblies may be anodized provided the surfaces which are exposed after complete assembly are anodized. Surfaces exposed to fuels, intake air, and coolants should not be machined after anodizing, but surfaces continually protected by oil films may be machined after anodizing.

7.6 Anodic films have high electrical resistance. Aluminum parts, therefore, which are to be used for bonding and radio shielding, if anodized, should have the anodic film removed at any area of electrical contact.

7.7 Aluminum parts which contain inserts of other metals should be properly masked during anodizing to seal off the non-aluminum material.

7.8 Hooks or racks should have anodic film removed from the contact areas prior to reuse.