AERONAUTICAL MATERIAL SPECIFICATIONS

SOCIETY OF AUTOMOTIVE ENGINEERS, Inc. 485 Lexington Ave., New York 17, N.Y.

AMS 2470D

Issued 1-23-40
Revised 1-15-59

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 Ø 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 to be treated shall be cleaned, if necessary, in such a manner as to leave the surfaces free from grease, oil, soaps, alkalies, or other contaminants. The operation may be accomplished with a hot, free-rinsing soap cleaner or by degreasing with a volatile solvent. Cleaning by a process giving a slightly etched but neutral 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 Ø 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.

4.2 Sealer: Shall be water maintained at a temperature of 170 - 210 F. 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 not a requirement. Alloys con- Ø taining 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, or for not less than 10 min. at a temperature not lower than 200 F. The rinse should be as thorough as practicable but slight chromic acid stains are not considered objectionable.

6. PRECAUTIONS:

6.1 Ø 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.

6.2 Ø Good, tight electrical contact should be maintained during the anodic treatment to prevent burning of parts.

6.3 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.

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

6.5 Ø 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.

6.6 Ø 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.

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

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

6.9 Ø Alloys containing over 5% nominal copper content or over 7.5% nominal total alloy content may be treated by this process but may require special conditions such as agitation and cooling of the solution.

7. CORROSION RESISTANCE:

7.1 Ø For control purposes, a sample of AMS 4037 sheet 0.040 in. thick and 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 test without corroding to the extent that would cause more than 5% decrease in tensile strength and 10% decrease in elongation from the average of three specimens cut from a duplicate treated but unexposed panel; in no case shall a corroded panel have tensile strength lower than 62,000 psi or elongation lower than 12%. The salt spray corrosion test shall be conducted in accordance with ASTM B117-49T. Tensile test specimens shall conform to ASTM E8-57T. The foregoing test is not required when material or parts treated in accordance with Section 5 are subsequently painted.

7.2 Each part that is anodized and not subsequently painted shall be capable of withstanding the salt spray test conducted in accordance with ASTM B117-49T for 250 hr without showing more than a few scattered corrosion pits.