AERONAUTICAL MATERIAL SPECIFICATION

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PROTECTIVE TREATMENTS for MAGNESIUM BASE ALLOYS

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

2. PURPOSE: To increase corrosion resistance and provide surfaces which will insure maximum paint adherence.

3. PREPARATION: (a) Machined and fabricated parts shall be thoroughly cleaned of all traces of dirt, grease and oil before treatment. These surface contaminations may be removed by the vapor degreasing method, by spraying with clean organic solvent, or by alkaline cleaners. Alkaline cleaners will produce a more uniform color.

(b) If rough castings exhibit visible surface oxidation, they shall be dipped for 10 seconds in a solution at room temperature containing by volume 90 parts of water, 8 parts of concentrated nitric acid and 2 parts of concentrated sulfuric acid, then washed thoroughly in cold running water followed by a dip in hot water and rapid drying.

(c) Die lubricant and/or oxide film on stampings, forgings, or die castings, or on finished parts where close dimensional tolerances are required, shall be removed by immersing 1-15 minutes in an aqueous solution containing approximately 1.5 pounds of chromic acid (CrO_3) per gallon and operated at 190-212°F, then washing thoroughly in cold running water followed by a dip in hot water and rapid drying. If tap water is used for making this pickling solution, it shall be sufficiently low in chloride and sulfate content not to attack the magnesium or it shall be suitably treated to precipitate excess chlorides.

4. DICHROMATE: (a) Application.- This treatment shall be used on finished parts made from either cast or wrought alloys, except as in section 5 and except those with high manganese content. It shall be applied after the conclusion of all external and all possible internal machining operations. Parts shall receive the treatment before assembly with any aluminum, aluminum alloy or cadmium plated parts, unless permission is granted otherwise. Parts machined or accidentally scratched after this treatment shall be chrome-pickled according to section 5.

(b) Solutions.-

(1) A water solution containing 15-20% by weight of hydrofluoric acid (HF).

(2) A water solution containing 10-15% of sodium dichromate ($Na_2Cr_2O_7.2H_2O$) and 0.25% of magnesium fluoride (MgF_2) by weight. The solution shall be maintained in a saturated condition with respect to the magnesium fluoride by continuous immersion of a cloth bag (canvas anode bag is suitable) containing the compound.

(c) Temperatures.- The hydrofluoric acid solution shall be operated at room temperature. The sodium dichromate solution shall be operated at not less than 200°F and preferably at boiling temperature.

(d) Procedure.- (1) The cleaned parts shall be immersed in the hydrofluoric acid solution for not less than 5 minutes and then rinsed thoroughly in cold running water.

(2) The wet parts shall then be immersed in the sodium dichromate solution for not less than 30 minutes, then rinsed thoroughly in cold running water, dipped in hot water and dried rapidly with a clean, dry air blast.

Note: Properly applied finish will vary from dark brown to black depending upon the alloy composition, condition of solution and time of treatment.

5. CHROME-PICKLE: (a) Application.- This treatment is applicable as follows:

(1) It shall be used for local touch-up of previously dichromate-treated parts where additional finishing has been necessary after painting or surfaces have been accidentally scratched during other operations.

(2) It may be used for finished parts where dimensional tolerances permit.

(b) Solution.-

Sodium Dichromate ($Na_2CrO_7.2H_2O$)	1.5 pounds
Nitric Acid (HNO_3 - sp gr 1.42)	1.5 pints
Water-to make	1.0 gallon

(c) Procedure.- The surfaces or local areasto be treated shall be flooded continuously with freshly prepared chrome-pickle solution by flowing, brushing or swabbing, or shall be immersed in the solution at room temperature. Time of treatment shall, when dimensional tolerances permit, be $\frac{1}{2}$ to 2 minutes; in other cases time of treatment shall be as long as practicable without removing metal in excess of dimensional tolerances. Parts shall then be rinsed thoroughly with clean, running water and dried with clean, dry air blast.

6. PRECAUTIONS: (a) Surfaces to be painted shall be handled with extreme care after treatment to prevent rupture of the film or contamination by dirt or oil before painting, which should be done as soon after treatment as practicable.