AEROSPACE MATERIAL SPECIFICATION

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29 West 39th Street
New York City

AMS 2416

Issued 8-15-55
Revised

NICKEL-CADMIUM PLATING, DIFFUSED

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

2. APPLICATION: Primarily to prevent corrosion of carbon and low alloy steel parts which may operate at temperatures up to 900 F. This process is not suitable for use on parts of complex shape where minimum nickel plate thickness requirements cannot be met and on parts whose hardness would be reduced below drawing requirements by heating at 640 F.

3. PREPARATION:

3.1 All brazing or welding shall be completed before parts or assemblies are plated.

3.2 Unless otherwise specified, parts having hardness higher than Rockwell C 40 and which have been ground after heat treatment shall be suitably stress-relieved before cleaning for plating. Temperatures to which parts are heated shall be such that maximum stress-relief is obtained without reducing hardness of parts below drawing limits.

3.3 Before placing parts in plating solutions, they shall have chemically clean surfaces, prepared with minimum abrasion, erosion, or pitting.

4. PROCEDURE:

4.1 Nickel Plating: Unless otherwise specified, consists of electrodeposition of nickel from a chloride or sulfate-chloride solution containing no addition agents which might have a detrimental effect on the properties of the plate or the basis metal.

4.1.1 After being nickel plated, parts shall be rinsed, neutralized in alkali, and transferred directly to the cadmium plating solution, except that parts to be used for determining thickness of the nickel plate shall be neutralized in alkali, rinsed, and dried after nickel plating, and then cadmium plated as soon as possible after nickel plate thickness determination by non-destructive methods.

4.2 Cadmium Plating: Consists of electrodeposition of cadmium from a cadmium cyanide solution. The cadmium shall be deposited directly on the nickel plate. Parts shall then be rinsed. Extreme care shall be exercised to avoid deposition of cadmium on any area not previously covered by nickel.

4.2.1 Parts which have been used for determination of nickel plate thickness by non-destructive methods shall be cleaned and the nickel reactivated prior to cadmium plating.

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4.3 Chromate Treatment: After rinsing following cadmium plating, and without drying, parts shall be treated by an approved chromate process which will prevent fingerprinting and staining.

4.4 Heating: After chromate treatment, washing, and drying, parts shall be heated to 630 F ± 10 in air, preferably in a circulating air furnace, and held at heat for not less than 30 minutes.

5. TECHNICAL REQUIREMENTS:

5.1 Thickness:

5.1.1 Nickel Plate: Shall be 0.0002-0.0004 in. thick on significant surfaces of parts and not less than 0.0005 in. thick on surfaces of parts on which a controlled deposit cannot be maintained, such as holes, grooves, recesses, etc. Thickness of nickel plate shall be determined on representative parts from each batch or on separate specimens representing parts and plated simultaneously with them, by microscopic method, micrometer measurement, magnetic test, drop test, or electro-strip method, before parts are cadmium plated.

5.1.2 Cadmium Plate: Shall be approximately 0.0001-0.0002 in. thick. Routine determination of cadmium plate thickness will not be required; the process of plating shall be controlled to produce the specified thickness.

5.2 Bonding:

5.2.1 Nickel Plate: Shall be firmly and continuously bonded to the basis metal and shall be smooth, uniform in appearance on areas of equivalent hardness and surface finish, and free from frosty areas, pin holes, nodules, blisters, and other harmful defects.

5.2.2 Cadmium Plate: Shall be firmly and continuously bonded to the nickel plate, and shall be smooth, uniform in appearance, not coarsely crystalline, and free from pin holes, porosity, blisters, nodules, pits, and other harmful defects.

5.3 Color and Appearance: Finished plate after heating as in 4.4 shall have dull matte finish usually gray to black in color, shall be free from balling when examined under magnification up to 10X, and shall be smooth to the touch.

5.4 Heat Resistance: Plate on parts, or on specimens representing parts and processed through the complete cleaning and plating cycle with the parts represented, shall be capable of being heated in air, preferably in a circulating air furnace, at 700 F ± 10 for 23 hr followed by heating at 1000 F ± 10 for 1 hr without blistering or cracking on significant surfaces. Appearance of a loose powdery film which can readily be wiped off will not be cause for rejection.

5.5 Corrosion Resistance: There shall be no corrosion on significant surfaces and no appreciable corrosion on any surface of parts after being subjected to salt spray corrosion test conducted in accordance with ASTM B117-49T for 100 hr, both on the finished plate after heating as in 4.4 and after the heat resistance test of 5.4. In lieu of actual parts, specimens processed through the complete cleaning and plating cycle with the parts they represent may be used.