AERONAUTICAL MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
29 West 39th Street
New York City

AMS 2402 D

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ZINC PLATING

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

2. APPLICATION: Primarily for use on metal parts to protect against oorrosion.

3. PREPARATION:

3.1 Ground case hardened parts shall be stress relieved at a temperature not lower than 275 F before cleaning.

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

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

3.4 Unless otherwise specified, parts shall be within drawing limits before plating.

3.5 Parts having hardness of Rockwell C 33 or over and parts roll threaded after heat treatment shall not be cleaned with inorganic acids (hydrochloric or sulfuric) unless specifically approved; cleaning of other parts with inorganic acids is not prohibited but permission to use that method on a particular part shall first be obtained from purchaser. In either case a momentary dip in acid after alkaline cleaning is permissible.

4. PROCEDURE:

4.1 The plating process consists of electrodeposition of zinc from a zinc cyanide solution. The zinc shall be deposited directly on the metal part, without a flash coating of other metal, such as copper or nickel, underneath, except in the case of parts made of corrosion resistant steel on which a preliminary flash of nickel or other suitable metal is permissible.

4.2 After the final rinse from the plating operation, zino plated steel parts shall be treated as follows, unless otherwise permitted, to remove hydrogen embrittlement due to cleaning and plating.

4.2.1 Parts, including roll threaded parts, cold worked after being heat treated by hardening and tempering, shall be heated to 375 F ± 10 in air, preferably in a circulating air furnace and held at temperature for not less than 3 hours.

4.2.2 Springs and all other parts, excluding parts covered by 4.2.3, having hardness of Rockwell C 33 or over shall be heated to 375 F ± 10 in air, preferably in a circulating air furnace, and held at temperature for not less than 3 hours.

4.2.3 Parts and assemblies, including carburized parts, which will decrease in hardness or be otherwise deleteriously affected if heated to 375 F, shall be heated to 275 F ± 10 in air, preferably in a circulating air furnace, and held at temperature for not less than 5 hours, excepting parts requiring special handling, which shall be treated as agreed upon by purchaser and vendor.

4.3 Unless otherwise specified, zinc plated parts, after the embrittlement relief treatment, shall be treated by a process which has been demonstrated to be capable of preventing the formation of white corrosion products after 100 hours salt spray test in accordance with the procedure referred to in 7.2.

5. THICKNESS:

5.1 AMS 2402 shall designate plate thickness of 0.0005-0.0007 inch, except when applied to nuts, washers, bolts, screws, and studs, and to parts having major portions externally threaded; on all such parts, all unthreaded portions shall have plate thickness of not less than 0.0002 inch and plate thickness on external threads shall conform to the requirements of 7.2.

5.2 Other plate thicknesses may be specified by this specification number and a suffix number designating the minimum thickness in ten thousandths of an inch, thus AMS 2402-1 designates a thickness of 0.0001-0.0003 inch, AMS 2402-6 designates a thickness of 0.0006-0.0008 inch, etc. A tolerance of + 0.0002 inch in thickness of plate is allowed, unless otherwise specified.

5.2.1 When AMS 2402-1 is specified for externally threaded parts, the plate thickness on the roots of threads shall be not less than 0.0001 inch but the plate thickness on the other surfaces of such parts shall be not less than 0.0002 inch.

5.2.2 When AMS 2402 with any suffix number other than "-1" is specified for externally threaded parts, the minimum plate thickness requirement shall apply to all surfaces of such parts, except those of the threads, on which the plate thickness at the roots may be 0.0001 inch less than that required by the suffix number specified.

5.2.3 AMS 2402-1, 2402-2, 2402-3 or 2402-4 shall not be specified except for parts, the dimensional tolerances of which will not permit maximum plate thickness of 0.0007 inch; for such parts the thickest plate permitted by the tolerances shall be specified.

5.3 No requirements are established for minimum thickness of plate for holes, recesses and other areas where a controlled deposit cannot be obtained under normal plating conditions, but such areas shall not be masked to prevent plating. Except as specified above for externally threaded sections, the resulting thickness shall be considered only when such surfaces of parts can be touched by a sphere 0.75 inch in diameter unless otherwise noted on drawings.

5.3.1 If internal surfaces as defined in 5.3 are required to be plated to a specified thickness, notes on the drawing will so specify.

5.4 Where zinc flash is specified, the thickness of zinc shall be approximately 0.0001 inch.

6. THICKNESS DETERMINATION: Thickness of plate shall be determined on representative parts, or on separate specimens representing parts and plated simultaneously with them, by one of the following methods as applicable. (Plate thickness on externally threaded parts shall be determined by measurements made on unthreaded portions.)

6.1 When possible, thickness shall be determined on plated parts by the drop test method. The drop test method consists of allowing an aqueous solution containing 200 g of chromic acid and 27 ml of sulfuric acid (sp gr 1.84) per liter at a temperature of 70-80 F to drop at a uniform rate of 100 ± 5 drops per minute directly upon properly cleaned surfaces of plated parts until the basis metal is exposed. The dropping apparatus may be a 250 ml laboratory separatory funnel equipped with a stopcock to regulate the solution flow and having the discharge orifice of the outlet tube constricted to deliver drops approximately 0.05 ml each. Plated parts shall be supported so that the surface to be tested is at an angle of 45 degrees from the horizontal and about 7/8 inch below the discharge orifice. Plating which meets specified thickness requirements shall not be perforated in less than the following times:

Specified Plate Thickness Inch, min	Perforation Time Seconds, min		
Solution Temperature, F	70	75	80
Under 0.0001 (Flash)	No requirement		
0.0001	10	10	10
0.0002	20	20	19
0.0003	30	30	29
0.0005	51	49	47
0.0007	71	69	66
0.001	102	98	94

6.2 When plated parts are of such form that they are not adaptable to determination of plate thickness by the drop test method, thickness may be determined, by drop test or micrometer measurement, on steel strip specimens approximately 1/32 X 1 X 4 inches in the case of still plating, or on cylindrical specimens with cross-sectional areas approximately equal to those of the parts in the case of barrel plating, which are processed simultaneously with the parts through the complete cleaning and plating cycle.

6.3 Magnetic methods may be used for determining plate thickness if the results are dependably accurate.

7. QUALITY:

7.1 Plated zinc shall be smooth, continuous, adherent, uniform in appearance, and not coarsely crystalline, and shall be free from pin holes, porosity, blisters, nodules, pits, and other harmful defects. Slight staining or discoloration will not be cause for rejection.