AERONAUTICAL MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
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AMS 2402C

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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 corrosion.

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 C33 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 the 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 Unless otherwise specified, zinc plated parts, after the final rinse from the plating operation, shall be treated by a process which will prevent the formation of white corrosion products when the plated parts are subjected for 100 hours to salt spray in accordance with the procedure referred to in 7.2.

4.3 After plating, washing and drying, steel parts shall be treated as follows, unless otherwise permitted, to remove hydrogen embrittlement due to cleaning and plating.

4.3.1 Parts, including roll threaded parts, cold worked after being heat treated 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.

4.3.2 Springs and all other parts, excluding parts covered by 4.3.3, having hardness of Rockwell C33 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.

4.3.3 Parts, including carburized parts, which will decrease in hardness 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.

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 7.2.2.

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 plus 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 thickness of plate in holes, recesses, and other areas where a controlled deposit cannot be obtained under normal plating conditions, and 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.

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

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 Thickness may be determined by 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.

6.2 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, 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.

7.2 The salt spray corrosion resistance of the plate may be determined by subjecting representative plated parts or test panels representing parts to continuous salt spray corrosion test conducted in accordance with ASTM B117-44T. Plate shall be capable of withstanding salt spray for the minimum time specified in the following paragraphs for the respective thicknesses or thickness designations, without definite rusting, pitting, or other visible damage. Slight stain or discoloration which readily washes off without damage to the plate, when scrubbed with a cloth or bristle brush, is permissible.

7.2.1 Plated surfaces of parts, except the surfaces of external threads, shall be capable of meeting the following:

Specified Plate Thickness inch, min	Required Salt Spray Resistance hours, min
0.0001	100
0.0002	150
0.0005	200

7.2.2 For all thickness designations specified for externally threaded parts, threads shall be capable of withstanding salt spray exposure for not less than 100 hours, and all other surfaces shall be capable of withstanding exposure for times not less than required in 7.2.1 for the thickness specified for such surfaces.

7.2.3 Salt spray corrosion test requirements above shall be applicable only to zinc plated steel parts except those covered by 7.2.4, but the treated plating on parts of any metal shall prevent formation of white corrosion products during 100 hours exposure to the salt spray.

7.2.4 Salt spray corrosion test requirements shall not be applicable to parts on which plated areas are to be painted or otherwise protected against corrosion of the treated plate.

7.3 Steel strip specimens approximately 1/32 X 1 X 4 inches, when cleaned and plated simultaneously with parts, shall withstand rapid bending at room temperature through an angle of 180 degrees around a diameter equal to the thickness of specimen, without showing separation from the basis metal at the interface when examined at approximately four diameters magnification. Bend tests shall be performed on specimens with a plate thickness of 0.0006-0.0008 inch where the thickness of the plating on actual parts exceeds 0.001 inch. The formation of cracks which do not result in flaking or blistering of the plate shall not be considered as nonconformance to this requirement. Specimens may be the same ones used for determination of thickness.