

# AERONAUTICAL MATERIAL SPECIFICATIONS

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## AMS 2417

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Revised

### NICKEL-ZINC ALLOY PLATING

1. ACKNOWLEDGMENT: A vendor shall mention this specification number in all quotations and when acknowledging purchase orders.
2. APPLICATION: Primarily to prevent corrosion of steel parts which may operate at temperatures up to 900 F. No diffusion heat treatment of the coating is required.
3. PREPARATION:
  - 3.1 All brazing, forming, machining, and welding shall be completed before parts or assemblies are plated.
  - 3.2 Unless otherwise specified, parts having hardness of Rockwell C 40 or over and which have been ground after heat treatment shall be suitably stress relieved before cleaning for plating. Temperature to which parts are heated shall be such that maximum stress relief is obtained without reducing the hardness of the parts below drawing limits.
  - 3.3 Prior to plating, parts shall have chemically clean surfaces prepared with minimum abrasion, erosion, or pitting; treatments which may produce hydrogen embrittlement shall be avoided.
4. PROCEDURE:
  - 4.1 Nickel Strike: Prior to application of the alloy plate, the parts shall receive a nickel strike.
  - 4.2 Nickel-Zinc Alloy Plate: Unless otherwise specified, consists of the electro-deposition, over the nickel strike, of a nickel-zinc alloy plated from a nickel chloride and zinc chloride and acetic acid solution containing no addition agents which might have a detrimental effect on the properties of the plate or basis metal; stress reducing agents shall not be used unless specifically authorized by the purchaser. The alloy plate shall be 16 - 30% nickel and the balance zinc.
5. TECHNICAL REQUIREMENTS:
  - 5.1 Thickness:
    - 5.1.1 Nickel Strike: Shall be not less than 0.00005 inch.
    - 5.1.2 Nickel-Zinc Alloy Plate: Thickness of plate for parts other than washers or externally threaded items shall be 0.0003 - 0.0007 in., unless otherwise specified on the drawing.
    - 5.1.3 Washers and parts with externally threaded areas shall have a thickness of 0.0002 - 0.0004 in., unless otherwise specified on the drawing.

- 5.1.4 No requirements are established for minimum thickness for holes, recesses, internal threads, and other areas where a controlled deposit is not normally obtained and which can not be touched by a sphere  $3/4$  in. in diameter.
- 5.1.5 Parts whose dimensional tolerances do not permit 0.0003 in. shall be given the maximum thickness of plating compatible with dimensional tolerances.
- 5.2 Adhesion: The adhesion of the nickel strike and the nickel-zinc alloy plate shall be such that plate does not show separation from the basis metal when subjected to a bend test of approximately 180 deg around a diameter equal to the thickness of the specimen.
- 5.3 Corrosion Resistance: Parts or representative test panels, plated to a thickness of 0.0002 - 0.0004 in., shall show no visual evidence of corrosion of the basis metal when subjected to salt spray corrosion test conducted in accordance with ASTM B117-49T for 48 hours.
- 5.4 Hydrogen Embrittlement Relief:
- 5.4.1 Carbon and low alloy steel parts having hardness of Rockwell C 36 - 39 shall be heated for 3 hr at 375 F  $\pm$  25 after plating.
- 5.4.2 Carbon and low alloy steel parts having hardness of Rockwell C 40 or higher shall be heated for 23 hr at 375 F  $\pm$  25 after plating.
- 5.4.3 All corrosion resistant steel parts hardened by heat treatment having hardness of Rockwell C 38 or higher shall be heated for 3 hr at 375 F  $\pm$  25 after plating.
- 5.4.4 Parts which would be reduced in hardness below drawing limits by heating to 375 F shall be heated for 3 hr at 325 F  $\pm$  25 after plating.
6. QUALITY: Plated surfaces shall be smooth, continuous, and uniform in appearance, and shall be free from pin holes, porosity, blisters, nodules, pits, and other harmful imperfections. Slight staining or discoloration will not be cause for rejection.
7. PRECAUTIONS:
- 7.1 The embrittlement relief treatments required in 5.4 should be done as soon as possible after the plating operation.
- 7.2 Plating in accordance with this specification is not recommended on steel parts with hardness higher than Rockwell C 48.
8. APPROVAL:
- 8.1 To assure adequate performance characteristics, plated parts shall be approved by purchaser before parts for production use are supplied, unless such approval be waived.
- 8.2 Vendor shall use the same manufacturing procedures, processes, and methods of inspection for conformance to this specification for production parts as for approved sample parts. If necessary to make any change in processing which could unfavorably affect any characteristics of the plate, vendor shall obtain permission from purchaser prior to incorporating such change.