AEROSPACE
MATERIAL SPECIFICATIONS

SOCIETY OF AUTOMOTIVE ENGINEERS, Inc. 485 Lexington Ave., New York 17, N.Y.

AMS 2424

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Revised

NICKEL PLATING
Low Stressed Deposit

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

2. APPLICATION: Primarily for moderate corrosion and oxidation resistance where low tensile stress in the deposit is required to avoid marked reduction of fatigue strength.

3. TECHNICAL REQUIREMENTS:

3.1 Surfaces of parts to be plated shall be smooth and substantially free from blemishes, pits, tool marks, and other irregularities.

3.2 Unless otherwise specified, steel 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.

3.4 Tight electrical connections shall be made and maintained for satisfactory plating.

3.5 Plating shall be performed by electrodeposition of nickel from a sulfamate solution containing no addition agents, including stress-reducing agents, which might have a detrimental effect on properties of the plate or the basis metal. Unless otherwise specified, nickel shall be deposited directly on the basis metal without a prior flash coating of metal other than nickel, except that a preliminary chemical coating, immersion plate, and/or metal flash is permissible on aluminum, magnesium, and their alloys.

3.6 After plating, washing, and drying, steel parts as listed in 3.6.1, 3.6.2, and 3.6.3 shall be treated as follows, unless otherwise permitted, to remove hydrogen embrittlement due to cleaning and plating; heating shall be in air, preferably in a circulating air furnace. Heating should be started as soon as possible after plating and preferably within 1 hour. Treatment of other parts is not required.

3.6.1 Parts Cold Worked After Hardening and Tempering: Such parts, including roll threaded parts, regardless of hardness shall be heated to 375 F ± 10 (190.6 C ± 5.6) and held at heat for not less than 3 hr, except as specified in 3.6.3.

3.6.2 Parts Having Hardness of Rockwell C 33 and Over and Springs: Such parts shall be heated to 375 F ± 10 (190.6 C ± 5.6) and held at heat for not less than 3 hr, except as specified in 3.6.3.

Note. Some parts having hardness of Rockwell C 40 and over may require heating for 23 hours.

3.6.3 Parts Affected By Heating to 375 F (190.6 C): Such parts and assemblies, inclusing carburized parts, which will decrease in hardness or be otherwise deleteriously affected by heating to 375 F (190.6 C) shall be heated to 275 F ± 10 (135 C ± 5.6) and held at heat for not less than 5 hr except that parts requiring special handling shall be treated as agreed upon by purchaser and vendor.

3.7 The finished thickness of plate shall be as specified on the drawing.

3.8 The plate shall be substantially uniform in thickness on significant surfaces, except that slight build-up at exterior corners or edges will be permitted provided finished drawing dimensions are met.

3.9 No requirements are established for minimum thickness of plate for holes, recesses, contact areas of parts plated all over, and other areas where a controlled deposit cannot be obtained under normal plating conditions, but such areas shall not be masked to prevent plating. Unless otherwise noted on drawings, the resulting thickness shall be considered only when such surfaces of parts can be touched by a sphere 0.75 in. in diameter but such surfaces shall show no film of copper after being immersed in a solution containing 4 g $CuSO_4.5H_2O$, 10 g H_2SO_4 (sp gr 1.84), and 90 ml distilled water for 6 min. at room temperature.

3.9.1 If internal surfaces as defined in 3.9 are required to be plated, the drawing will so specify.

3.10 Thickness of plate shall be determined on representative parts or specimens by microscopic method, micrometer measurement, magnetic test, or dropping method, as agreed upon by purchaser and vendor.

3.11 Stress in the plate shall be in the range 0 - 15,000 psi in tension, as determined at plate thickness of 0.0003 in. by calculation from spiral contractometer reading (Ref. 35th Annual Proceedings, American Electroplaters Society, p. 53 - 78) or other instrument agreed upon by purchaser and vendor.

3.12 Plate shall be firmly bonded to the basis metal, and shall be smooth, uniform in appearance, and free from frosty areas, pin holes, nodules, blisters, and other imperfections detrimental to performance of parts. The method of determining satisfactory adhesion shall be as agreed upon by purchaser and vendor.

3.13 Plate on steel parts or on test panels representing parts shall be capable of being heated in air, preferably in a circulating air furnace, at 700 F ± 10 (371.1 C ± 5.6) for 23 hr followed by heating at 1000 F ± 10 (537.8 C ± 5.6) for 1 hr without blistering or cracking.

3.14 Steel parts or test panels representing parts shall show no appreciable corrosion of significant surfaces after being subjected to continuous salt spray corrosion test conducted in accordance with ASTM B117-49T for 48 hr when plate is in the following conditions.