



AEROSPACE MATERIAL SPECIFICATION	AMS2404™	REV. J
	Issued 1957-09 Revised 2018-03	
	Superseding AMS2404H	
Plating, Electroless Nickel		

RATIONALE

AMS2404J corrects an error in in the Ordering Information.

NOTICE

ORDERING INFORMATION: The following information shall be provided to the plating processor by the purchaser.

1. Purchase order shall specify not less than the following:

- AMS2404J and Class (1.3)
- Plating thickness desired (3.4.1 and 8.13)
- Basis metal to be plated
- Tensile strength or hardness of the basis metal (steel alloys only)
- Pre-plate stress relief to be performed by plating processor (time and temperature) if different from 3.1.1
- Special features, geometry or processing present on parts that requires special attention by the plating processor
- Hydrogen embrittlement relief to be performed by plating processor if different from 3.3.1
- Optional: Composition (3.4.7)
- Optional: Hydrogen embrittlement acceptance testing requirements (4.3.1.4)
- Optional: Periodic testing frequency (4.2.2) and sample quantity (4.3.2)
- Quantity of pieces to be plated
- Shot peening, if required, on steel parts having a hardness of 40 HRC or above (8.11)
- Special processing, when required, to avoid or remove discoloration (see 3.5)

2. Parts manufacturing operations such as heat treating, forming, joining and media finishing can affect the condition of the substrate for plating, or if performed after plating, could adversely affect the plated part. The sequencing of these types of operations should be specified by the cognizant engineering organization or purchaser and is not controlled by this specification.

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Technical Report, please visit
<http://standards.sae.org/AMS2404J>**

1. SCOPE

1.1 Purpose

This specification covers the requirements for electroless nickel deposited on various materials.

1.2 Application

This deposit has been used typically to provide a uniform build-up on intricate shapes, to improve wear and/or corrosion resistance, or to improve solderability on or for selected materials, but usage is not limited to such applications. The deposit has been used in service up to 1000 °F (538 °C) although wear and/or corrosion resistance may degrade as service temperature increases.

1.2.1 Application of electroless nickel plating to steel parts having a hardness of 46 HRC (ultimate tensile strength of 220 ksi (1517 MPa)) or higher shall not be performed unless authorized by the design documentation or specific approval has been received from the cognizant engineering organization.

1.3 Classification

Plating covered by this specification is classified as follows:

Class 1: Except for hydrogen embrittlement relief, no post plating thermal treatment.

Class 2: Thermal treatment at 450 °F (232 °C) or above to harden the deposit.

Class 3: Thermal treatment at 375 °F (191 °C) to improve adhesion for nonheat-treatable aluminum alloys and beryllium alloys.

Class 4: Thermal treatment at 250 °F (121 °C) to improve adhesion for heat-treatable aluminum alloys.

Unless a specific class is specified, Class 1 shall be supplied.

1.4 Safety - Hazardous Materials

While the materials, methods, applications, and processes described or referenced in this specification may involve the use of hazardous materials, this specification does not address the hazards which may be involved in such use. It is the responsibility of the user to ensure familiarity with the safe and proper use of any hazardous materials and to take necessary precautionary measures to ensure the health and safety of all personnel involved.

2. APPLICABLE DOCUMENTS

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS2759/9 Hydrogen Embrittlement Relief (Baking) of Steel Parts

ARP1917 Clarification of Terms Used in Aerospace Metals Specifications

ARP4992 Periodic Test for Process Solutions

AS2390 Chemical Process Test Specimen Material

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM B117	Operating Salt Spray (Fog) Apparatus
ASTM B487	Measurement of Metal and Oxide Coating Thicknesses by Microscopical Examination of a Cross Section
ASTM B499	Measurement of Coating Thicknesses by the Magnetic Method: Nonmagnetic Coatings on Magnetic Basis Metals
ASTM B567	Measurement of Coating Thickness by the Beta Backscatter Method
ASTM B568	Measurement of Coating Thickness by X-Ray Spectrometry
ASTM B571	Qualitative Adhesion Testing of Metallic Coatings
ASTM B636	Measurement of Internal Stress of Plated Metallic Coatings with the Spiral Contractometer
ASTM B748	Measurement of Thickness of Metallic Coatings by Measurement of Cross Section with a Scanning Electron Microscope
ASTM B764	Simultaneous Thickness and Electrode Potential Determination of Individual Layers in Multilayer Nickel Deposit (STEP Test)
ASTM E384	Microindentation Hardness of Materials
ASTM F519	Mechanical Hydrogen Embrittlement Evaluation of Plating/Coating Processes and Service Environments

3. TECHNICAL REQUIREMENTS

3.1 Preparation

3.1.1 Stress Relief Treatment

All steel parts having a hardness of 40 HRC and above and that are machined, ground, cold formed or cold straightened after heat treatment shall be cleaned to remove surface contamination and thermally stress relieved before plating. (Residual tensile stresses have been found to be damaging during electroplating.) Furnaces used for stress relief shall be controlled per AMS2750. The minimum requirements shall be Class 5, with Type D Instrumentation. Temperatures to which parts are heated shall be such that stress relief is obtained while still maintaining hardness of parts within drawing limits. Unless otherwise specified, the following treatment temperatures and times shall be used:

- 3.1.1.1 For parts, excluding nitrided parts, having a hardness of 55 HRC and above, including carburized and induction hardened parts, stress relieve at 275 °F ± 25 °F (135 °C ± 14 °C) for 5 to 10 hours.
- 3.1.1.2 For parts having a hardness less than 55 HRC, stress relieve at 375 °F ± 25 °F (191 °C ± 14 °C) for a minimum of 4 hours. Nitrided parts fall into this category. Higher temperatures shall be used only when specified or approved by the cognizant engineering organization.
- 3.1.1.3 For peened parts: If stress relief temperatures above 375 °F (191 °C) are elected, the stress relieve shall be performed prior to peening or the cognizant engineering organization shall be consulted and shall approve the stress relief temperature.