



AEROSPACE MATERIAL SPECIFICATION	AMS2400™	REV. Y
	Issued 1940-01 Revised 2020-07	
Superseding AMS2400X		
Plating, Cadmium		

RATIONALE

AMS2400Y results from a Five-Year Review and update of this specification with changes to Ordering Information, Stress Relief Treatment (3.1.2, 3.1.2.2, 3.1.2.3), alkaline cleaning (3.1.4.1), Fixture/Electrical Contact Locations (3.1.5), Procedure (3.2.3), Thickness (3.4.1), Acceptance Tests (4.2.1), Periodic Tests (4.2.2), Sampling for Testing (4.3), Adhesion Testing (4.3.1.3), Acceptance Tests (Table 2), Periodic Tests (4.3.3), control factors (4.4.3), and Rejections (7).

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:

- AMS2400Y
- Plating thickness desired (see 3.4.1)
- Basis metal to be plated
- Tensile strength or hardness of the basis metal
- For parts 36 HRC and above, any work performed after heat treatment as stated in 3.1.2
- Pre-plate stress relief to be performed by plating processor (time and temperature) if different from 3.1.2
- Pre-plate stress relief temperature for peened parts if it is to be above 375 °F (3.1.2.3)
- Special features, geometry or processing present on parts that requires special attention by the plating processor
- Color if different than that in 3.5.2
- Hydrogen embrittlement relief to be performed by plating processor (parameters or reference document) if different from 3.4.4
- Minimum thickness on internal surfaces, if required (see 3.4.1.4.1)
- Optional: Periodic testing frequency (4.2.2) and sample quantity (4.3.3)
- Optional: Fixture/Electrical contact locations, when not specified (3.1.5)

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<https://www.sae.org/content/AMS2400Y/>

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SAE WEB ADDRESS:

- Quantity of pieces to be plated
- 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.

1. SCOPE

1.1 Purpose

This specification covers the requirements for electrodeposited cadmium on metal parts.

1.2 Application

This process has been used typically to provide corrosion resistance to metal parts, but usage is not limited to such applications.

1.3 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 sole 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.

1.4 Warning

This process uses cadmium as a plating material. The use of cadmium has been restricted and/or banned for use in many countries due to environmental and health concerns. The user should consult with local officials on applicable health and environmental regulations regarding its use.

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.

AMS2750	Pyrometry
AMS2759/9	Hydrogen Embrittlement Relief (Baking) of Steel Parts
ARP1917	Clarification of Terms Used in Aerospace Metals Specifications
ARP4992	Periodic Test for Processing 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 B253 Preparation of Aluminum Alloys for Electroplating
- ASTM B374 Terminology Relating to Electroplating
- ASTM B487 Measurement of Metal and Oxide Coating Thickness by Microscopical Examination of Cross Section
- ASTM B499 Measurement of Coating Thicknesses by the Magnetic Method: Nonmagnetic Coatings on Magnetic Basis Metals
- ASTM B504 Measurement of Thickness of Metallic Coatings by the Coulometric Method
- 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 D3359 Rating Adhesion by Tape Test
- ASTM E376 Measuring Coating Thickness by Magnetic-Field or Eddy-Current (Electromagnetic) Testing Methods
- ASTM F519 Mechanical Hydrogen Embrittlement Evaluation of Plating/Coating Processes and Service Environments

3. TECHNICAL REQUIREMENTS

3.1 Preparation

3.1.1 Parts shall be within drawing dimension limits before plating, except as specified in 3.1.1.1.

3.1.1.1 Parts having part numbers with the prefix AN, MA, MS, or AS, and required to be plated in accordance with this specification, or parts where the drawing specifies that dimensions apply after plating, shall be made to such dimension that parts will be within drawing limits after plating. Undercutting before plating shall not be permitted unless specifically authorized by specifications referenced on the applicable drawing.

3.1.2 Stress Relief Treatment

All steel parts having a hardness of 36 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 electrofinishing.) Furnaces used for stress relief shall be in accordance with AMS2750; minimum requirements shall be Class 5 and Type D Instrumentation. Temperatures to which parts are heated shall be such that maximum 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:

3.1.2.1 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.

3.1.2.2 For parts having a hardness less than 55 HRC, and for nitrided parts, stress relieve at 375 °F ± 25 °F (191 °C ± 14 °C) for a minimum of 4 hours. Higher temperatures shall be used only when specified or approved by the cognizant engineering organization.

3.1.2.3 For peened parts: If stress relief temperatures above 375 °F (191 °C) are specified, the stress relieve shall be performed prior to peening.

- 3.1.3 Any specified residual compressive stress-inducing operations, such as shot peening, shall precede plating.
- 3.1.4 The plating shall be applied over a surface free from water breaks. The cleaning procedure shall not produce pitting or intergranular attack of the basis metal and shall preserve dimensional requirements.
- 3.1.4.1 Alkaline cleaning of steel parts may be done with reverse (anodic) current. Steel parts over 36 HRC shall not be cathodically cleaned.
- 3.1.5 Fixture/Electrical Contact Locations
- 3.1.5.1 Except for barrel plating, for parts that are to be electroplated all over, and contact locations are not specified, contact locations shall be at the discretion of the processor.
- 3.1.5.2 For parts that are not to be electroplated all over, and contact locations are not specified, locations shall be in areas on which coating is not required.
- 3.2 Procedure
- 3.2.1 Parts shall be plated by electrodeposition of cadmium from a suitable cadmium plating solution.
- 3.2.1.1 The cadmium shall be deposited directly on the basis metal without a prior strike coating of other metal, such as copper or nickel underneath, except in the case of parts, assemblies, and weldments made wholly or in part of corrosion-resistant steel or similarly passive materials, on which a preliminary strike of nickel or other suitable metal is permissible.
- 3.2.1.2 Aluminum alloys shall be zincate treated in accordance with ASTM B253 or other method acceptable to the cognizant engineering organization prior to plating.
- 3.2.1.3 Brightening agents or other additives to the plating solution shall not be permitted for use on parts heat treated to a hardness of 36 HRC or tensile strength of 160 ksi (1103 MPa) or higher.
- 3.2.2 After rinsing in water, and without allowing parts to dry, plated parts shall be given a supplementary coating, using a commercial chromate treatment; such parts shall meet the color requirements of 3.5.2.1. In lieu of the commercial chromate treatment, when permitted by the cognizant engineering organization, parts may be dipped, with agitation in a 3 to 5% solution of chromic acid to which small quantities of other inorganic acids may be added; such parts shall meet the color requirements of 3.5.2.2 (see 8.4). When plated parts require hydrogen embrittlement relief as in 3.3, surface reactivation and the supplementary treatment shall follow the hydrogen relief bake unless otherwise specified by the cognizant engineering organization.
- 3.2.3 The plated parts shall be removed from the supplementary coating solution, thoroughly rinsed, and dried.

3.3 Hydrogen Embrittlement Relief (Baking)

Treatment of steel parts shall be in accordance with AMS2759/9, except that all parts plated per this specification that are HRC 36 and higher shall be baked.

3.4 Properties

3.4.1 Thickness

Shall be as specified on the drawing, determined on representative parts or, when permitted by the cognizant engineering organization, on specimens in accordance with any of the following methods as applicable: ASTM B487, ASTM B499, ASTM B504, ASTM B567, ASTM B568, ASTM E376, direct dimensional inspection provided the resolution of the measuring instrument is ten times more precise than the attribute being measured, or other method permitted by the cognizant engineering organization.