

Plating, Cadmium

**RATIONALE**

AMS 2400W is a Five Year Review and update of this specification.

**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:

- AMS 2400W
- Plating thickness desired (see 3.4.1)
- Basis metal to be plated
- Tensile strength or hardness of the basis metal
- Pre-plate stress relief to be performed by plating processor (time and temperature) if different from 3.1.2
- 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 (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)
- 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.

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**TO PLACE A DOCUMENT ORDER:** Tel: 877-606-7323 (inside USA and Canada)  
Tel: 724-776-4970 (outside USA)  
Fax: 724-776-0790  
Email: [CustomerService@sae.org](mailto:CustomerService@sae.org)  
<http://www.sae.org>

## 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 application.

### 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 document includes 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 724-776-4970 (outside USA), [www.sae.org](http://www.sae.org).

AMS 2759/9	Hydrogen Embrittlement Relief (Baking) of Steel Parts
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](http://www.astm.org).

ASTM B 117	Operating Salt Spray (Fog) Apparatus
ASTM B 253	Preparation of Aluminum Alloys for Electroplating
ASTM B 487	Measurement of Metal and Oxide Coating Thicknesses by Microscopical Examination of a Cross Section
ASTM B 499	Measurement of Coating Thicknesses by the Magnetic Method; Nonmagnetic Coatings on Magnetic Basis Metals
ASTM B 504	Measurement of Thickness of Metallic Coatings by the Coulometric Method
ASTM B 567	Measurement of Coating Thickness by the Beta Backscatter Method
ASTM B 568	Measurement of Coating Thickness by X-Ray Spectrometry
ASTM B 571	Adhesion of Metallic Coatings
ASTM E 376	Measuring Coating Thickness by Magnetic-Field or Eddy-Current (Electromagnetic) Test Methods
ASTM F 519	Mechanical Hydrogen Embrittlement Evaluation of Plating 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 Steel parts having hardness 36 HRC or higher and which have been ground after heat treatment shall be cleaned to remove surface contamination and suitably stress-relieved before preparation 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 but, unless otherwise specified, not less than 275 °F (135 °C) for not less than five hours for parts having hardness of 55 HRC or higher or not less than 375 °F (191 °C) for not less than four hours for other parts.

3.1.3 Any specified residual compressive stress-inducing operations, such as shot peening, shall follow stress-relieving but precede plating.

3.1.4 The plating shall be applied over a surface free from waterbreaks. 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 anodic current, but steel parts over 36 HRC shall not be cathodically cleaned.

3.1.5 Except for barrel plating, electrical contact points shall be as follows. For parts which are to be plated all over, locations shall be acceptable to the cognizant engineering organization, for parts which are not to be plated all over, locations shall be in areas on which plating 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 B 253 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 3.5.2.2. See 8.5. 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 chromic acid or chromate solution, thoroughly rinsed, and dried.