AEROSPACE MATERIAL SPECIFICATION

AMS2419™ REV. E

Issued 1966-03
Reaffirmed 2009-06
Revised 2022-03

Superseding AMS2419D

Plating, Cadmium-Titanium

RATIONALE

AMS2419E results from a Five-Year Review and update of this specification with changes to materials (3.1), deleting “ball” as there are other anode types and deleting “filter aid, diatomaceous” as this is not referenced in AMS2419; equipment (3.2.2.1), deleting 300 series and PVC as there are other materials that can be used; deleting 3.2.7 blast cabinet as this is not auditable and the air-line requirement moved to 3.3.5.2; deleting 3.2.8 HE relief oven location as being not necessary; cleaning (3.3.5) has been fully revised; fixture/electrical contact locations (3.3.6 and ordering information) has been updated per GAB19AB; procedure (3.4.1.1) adding double plating as being not allowed as this is standard in all plating specifications; hydrogen embrittlement relief (3.5) added time limit as this is needed for Cd plating; thickness (3.6.1) add direct measurement as this has become a standard option; sampling and testing (4.3) added new wording for lot per GAB16AA; thickness (4.3.1.1) added reference to AS2390 for generic class of alloy; approval (4.4.2) updated wording; notes (Section 8) added notice regarding banned substances, products, or procedures.

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:

- AMS2419E
- Plating thickness desired (see 3.6.1)
- Basis metal to be plated
- Tensile strength or hardness of the basis metal
- If preplate stress relief is to be performed by plating processor and, if different from 3.3.2, time and temperature are to be specified
- If steel parts were machined, ground, cold formed or cold straightened after heat treat (3.3.2.1)
- If steel parts have been shot peened, specify if required stress relief has been completed (3.3.2.1.3)
- Optional: Fixture/electrical contact locations, when not specified (3.3.6)
- Special features, geometry, or processing present on parts that requires special attention by the plating processor

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

For more information on this standard, visit
https://www.sae.org/standards/content/AMS2419E/

- Hydrogen embrittlement relief to be performed by plating processor (parameters or reference document), if different from 3.6.4

- 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 engineering requirements for electrodeposition of cadmium-titanium on metal parts and the properties of the deposit.

1.2 Application

This process has been used typically to provide corrosion resistance to high strength steel for use in fracture critical applications such as aircraft landing gear and naval arrestor hooks at temperatures below 450 °F (232 °C) by limiting the generation of hydrogen and potential hydrogen embrittlement, 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.

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
ARP4992	Periodic Test for Processing Solutions
AS2390	Chemical Process Test Specimen Material
AS7766	Terms Used in Aerospace Metals Specifications

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 B487 Measurement of Metal and Oxide Coating Thicknesses 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 E376 Measuring Coating Thickness by Magnetic Field or Eddy Current (Electromagnetic) Testing Methods

ASTM F326 Electronic Measurement for Hydrogen Embrittlement From Cadmium-Electroplating Processes

ASTM F519 Mechanical Hydrogen Embrittlement Evaluation of Plating/Coating Processes and Service Environments

3. TECHNICAL REQUIREMENTS

3.1 Materials

Materials used in plating cadmium-titanium are as follows:

Cadmium anodes
Cadmium oxide
Sodium cyanide
Sodium hydroxide
Titanium additive compound
Hydrogen peroxide—35% technical grade

3.2 Equipment

3.2.1 The rectifier shall be either generated or rectified DC current. Ripple value shall not exceed 5% as measured by dividing the root mean square of the AC voltage component by the DC voltage (see 8.9).

3.2.2 Tanks shall be resistant to the operating temperature and the chemical environment.

3.2.2.1 Plating tanks shall be made of materials that have been determined to be compatible with cadmium-titanium plating solutions.

3.2.3 The plating tanks to be operated at temperatures other than room temperature shall be equipped with automatic temperature indicating and regulating devices.

3.2.4 An ammeter shall be placed in series with the cadmium-titanium tank cathode. The ammeter shall have sufficient shunts and switches to provide a full-scale reading equal to the maximum capacity of the power source and an accuracy of ±10% of the current being measured.