



AEROSPACE INFORMATION REPORT

AIR5919™**REV. B**

Issued 2003-09
Revised 2017-10
Reaffirmed 2022-10

Superseding AIR5919A

Alternatives to Cadmium Plating

RATIONALE

Revision required to update publication information, correct editorial errors and any known technical data, and include Tin-Zinc as another alternative replacement for Cadmium.

AIR5919B has been reaffirmed to comply with the SAE Five-Year Review policy.

FOREWORD

General use connectors and associated connector accessories design to operate in severe environments traditionally utilize aluminum alloy as the standard base material and plated with cadmium to protect the base material from corrosion. Due to recent legislation regarding Health and Safety issues, there is an on-going effort to eliminate cadmium from these systems.

INTRODUCTION

The purpose of this document is to provide information and guidelines for evaluating alternate surface treatment finishes, for general use connectors and associated connector accessories, typically associated with military defense electronics, weapon systems and commercial aerospace applications. This Aerospace Information Report (AIR) addresses the essential elements for testing and evaluating alternative surface treatment finishes and the resulting performance capabilities they offer when compared to cadmium plating.

Surface treatment finishes discussed in this document have been tested to the same qualification requirements used to determine acceptability of general connectors and associated connector accessories when tested in accordance with the applicable EIA364 test method for electrical performance and suitability in severe environments.

1. SCOPE

- 1.1 This SAE Aerospace Information Report (AIR) is intended to document and provide access to information obtained by an industry survey. It summarizes and documents data regarding possible alternatives to the use of cadmium plating on general connectors and connector accessories typically used in aerospace and military defense electrical interconnect systems.

2. APPLICABLE DOCUMENTS

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

SAE Executive Standards Committee Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

SAE reviews each technical report at least every five years at which time it may be revised, reaffirmed, stabilized, or cancelled. SAE invites your written comments and suggestions.

Copyright © 2022 SAE International

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of SAE.

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
<http://www.sae.org>

SAE WEB ADDRESS:

Full document details: [SAE AIR5919B](#)

For more information on this standard, visit
<https://www.sae.org/standards/content/AIR5919B/>

Documents

Document Sharing Hub

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.

AMS-C-26074	Electroless Nickel Coatings
AMS-QQ-P-35	Passivation Treatments for Corrosion-Resistant Steel
AMS-QQ-P-416	Plating, Cadmium (Electrodeposited)
AMS2434	Plating, Tin-Zinc Alloy
AIR4789	Aerospace Information Report on Evaluating Corrosion Testing of Electrical Connectors and Accessories for the Purpose of Qualification
AS85049	Connector Accessories, Electrical General Specification For

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 B26/26M	Aluminum Alloy Sand Castings
ASTM B85	Aluminum Alloy Die Castings
ASTM B117	Standard Practice for Operating Salt Spray (Fog) Apparatus
ASTM B209	Aluminum and Aluminum Alloy Plate and Sheet
ASTM B211/221	Aluminum and Aluminum Alloy, Bar, Rod, Wire or Shapes, Rolled, Drawn, Extruded or Cold Finished
ASTM A342	Standard Test Methods for Permeability of Feebly Magnetic Materials
ASTM B733	Autocatalytic Nickel-Phosphorus Coating on Metal
ASTM B841	Electrodeposited Coatings for Zinc Nickel Alloy Deposits
ASTM G85	Modified Salt Spray Testing
ASTM D1654	Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments

2.3 U.S. Government Publications

Copies of these documents are available online at <http://quicksearch.dla.mil>.

MIL-STD-202	Test Methods for Electronic and Electrical Component Parts
MIL-DTL-24308	Connectors, Electric, Rectangular, Miniature, Polarized Shell, Rack and Panel
MIL-DTL-28840	Connectors, Electrical, Circular, Threaded, High Density, High Shock, Shipboard, Class D, General Specification for.
MIL-DTL-38999	Connectors, Electrical, Circular, Miniature, High Density, Quick Disconnect, Bayonet, Threaded & Breech Coupling, Hermetic Solder
MIL-DTL-83488	Coating, Aluminum, High Purity

MIL-DTL-83513	Connectors, Electrical, Rectangular, Microminiature, Polarized Shell, General Specification for
MIL-DTL-83723	Connectors, Electrical, Circular, Environment Resisting, Receptacles & Plugs, General Specification for
MIL-DTL-26482	Connectors, Electrical, (Circular, Miniature, Quick Disconnect, Environment Resisting), Receptacles and Plugs, General Specification for

2.4 ANSI/ISO Accredited Publications

Copies of these documents are available online at <http://webstore.ansi.org/>

ISO 10012-1	Equipment, Quality Assurance Requirements for Measuring - Part 1: Metrological Confirmation System for Measuring Equipment
ISO 21207	Corrosion Tests in Artificial Atmospheres - Accelerated Corrosion Tests Involving Alternate Exposure to Corrosion-Promoting Gases, Neutral Salt Spray and Drying
ANSI Z540-3	Calibration Laboratories and Measuring and Test Equipment - General Requirements

2.5 EIA Publications

Available from Electronic Component Association (ECA), 2500 Wilson Boulevard, Arlington, VA 22201-3834, Tel: 703-907-7500, www.eia.org.

EIA 364	Electrical Connector/Socket Test Procedures Including Environmental Classifications
EIA 364-09	Durability Test Procedure for Electrical Connectors and Contacts
EIA 364-13	Mating & Unmating Force Test Procedure for Electrical Connectors and Sockets
EIA 364-26	Salt Spray Test Procedure for Electrical Connectors, Contacts and Sockets
EIA 364-32	Thermal Shock (Temperature Cycling) Test Procedure for Electrical Connectors and Sockets
EIA 364-83	Shell-to-Shell and Shell-to-Bulkhead Resistance Test Procedure for Electrical Connectors

3. TEST SAMPLE PREPARATION REQUIREMENTS

- 3.1 The test specimens should be representative of products produced under essentially the same condition and processes used during normal production prior to applying the alternative surface treatment finish to be evaluated.
- 3.2 All test specimens should be identified as such and traceable to the base material and the alternative surface treatment finish applied. It is recommended a minimum of two (2) test specimens for each base material and alternative surface treatment finish under evaluation be used. Photographs of the test specimens before and after test conditioning is recommended, but not required.
- 3.3 The test specimens shall be tested in accordance with the test group sequence specified in Table 1A or 1B for general connectors and Table 2 for associated connector accessories.
- 3.4 Testing shall be conducted using the test method specified in either Table 1A, 1B, or Table 2. Alternate test methods may be used provided the alternative test method employed does not significantly depart from the preferred test method and is traceable to an approved industry recognized test method standard.
- 3.5 It is recommended that a controlled sample form a part of the test program for alternative surface treatment finishes under evaluation. The controlled sample should consist of an appropriate base material, such as aluminum alloy, and plated Cadmium – Olive Drab color over a suitable underplate qualified to withstand 500-hour salt spray exposure.