



AEROSPACE RECOMMENDED PRACTICE

ARP6903™**REV. A**Issued 2017-03
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Superseding ARP6903

Guide for Achieving Plating/Finishing Compatibility with Connectors and
Accessories used in Electrical Wiring Interconnect Systems (EWIS)

RATIONALE

This document provides users a means to identify and select compatible galvanic couples to achieve the best connector and accessory plating/finish performance. Individual component specifications do not address finish selection for different plating configurations affecting the entire EWIS performance as a system (Backshell to Connector Plug to Connector Receptacle to Backshell).

1. SCOPE

The intent of this ARP is to provide guidance to assist users in choosing compatible component finishes/platings to achieve the best corrosion resistance performance for compatible components/couples. This SAE Recommended Practice is intended as a guide toward standard practice and is subject to change to keep pace with experience and technical advances. A galvanic compatibility table is provided to assist with the compatible plating/finish selection. Specific plating performance parameters for each individual plating and each connector/accessory specification have also been provided to assist the product user with compatible plating/finish selection.

1.1 Purpose

This SAE Recommended Practice (ARP) serves as a guide to assist users in choosing compatible connector/accessory finish/plating combinations to achieve the best corrosion resistance performance. Failure to select and employ suitable finish/plating combinations, may negatively impact reliability (service life) and performance of individual EWIS components, and the entire system in which it is installed.

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.

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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.

AS29600	Connectors, Electrical, Circular, Miniature, Composite, High Density, Quick Coupling, Environment Resistant, Removable Crimp Contacts, Associated Hardware General Specification For
AS50151	Connectors, Electrical, Circular Threaded, AN Type, General Specification For
AS81511	Connectors, Electrical, Circular, High Density, Quick Disconnect, Environment Resisting and Accessories, General Specification for
AS81582	Connectors, Electrical, Bayonet Coupling, Environment Resisting, Umbilical, General Specification For
AS81659	Connectors, Electrical, Rectangular Crimp Contacts, General Specification For
AS81703	Connectors, Electric, Circular, Miniature, Rack and Panel or Push-Pull Coupling, Environment Resisting
AS85028	Connector, Electrical, Rectangular, Individual Contact Sealing, Polarized Center Jackscrew, General Specification For
AS85049	Connector Accessories, Electrical General Specification For
AS95234	Connectors, Electrical, Reverse Bayonet, General Specification For

2.2 Military Specification and Standards

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

MIL-DTL-38999	Connectors, Electrical, Circular, Miniature, High Density, Quick Disconnect (Bayonet, Threaded, or Breech Coupling), Environment Resistant with Crimp Removable Contacts or Hermetically Sealed with Fixed, Solderable Contacts, General Specification for
MIL-DTL-83723	Connectors, Electrical (Circular, Environment Resisting and Hermetically Sealed), Receptacles and Plugs, General Specification for
MIL-DTL-26500	Connectors, General Purpose, Electrical, Miniature, Circular, Environment Resisting or Hermetically Sealed, General Specification for
MIL-DTL-26482	Connectors, Electrical, (Circular, Miniature, Quick Disconnect, Environment Resisting), Receptacles and Plugs, General Specification for
MIL-PRF-39012	Connectors, Coaxial, Radio Frequency, General Specification for
MIL-DTL-24308	Connectors, Electric, Rectangular, Nonenvironmental, Miniature, Polarized Shell, Rack and Panel, General Specification for
MIL-PRF-28876	Connectors, Fiber Optic, Circular, Plug and Receptacle Style, Multiple Removable Termini, General Specification for
MIL-STD-889	Dissimilar Metals

3. COMPATIBILITY DETAILS

Proper selection of finish/plating combinations in the design of EWIS will result in fewer intermetallic interface (galvanic) problems. For example, silver has an anodic index of 15 and tin 65, the EMF generated as a couple is 0.50 V, which is not allowable as specified in Table 1. Compatible couples are deemed as having a maximum potential difference of 0.25 V between groups. In this case, other finish/plating combinations will be required. It should be noted that, in intermetallic couples, the member with the higher anodic index is anodic to the member with the lower anodic index and will be susceptible to corrosion in the presence of an electrolytic medium. Table 1 provides metal, finish/plating compatibility information. Table 2 provides a reference of the most common aerospace connector family finish/plating and performance requirements and defines its applicable compatibility group. MIL-STD-889 provides additional metal compatibility and chart with applicable reactance values for typical metals when subjected to electrolysis in water with 2% salt.

3.1 Connector to Structure (e.g., Box Mount, Jam Nut, or Wall Mount)

Use Table 1 to identify the Group Number for the structure to which the connector will be mounted. Use Table 2 to identify the compatible connector plating/finish based on its applicable Group Number. The best compatible couples are ones which use the same Group Number. If different, use the most anodic material (for the connector) and look for the Group Number with the most compatible couple with the structure's Group Number. Compatible couples are deemed as having a maximum potential difference of 0.25 V between groups. Material selection for intermetallic contact parts, should establish the smaller part (connector) be the anodic, replaceable member of the couple, whenever practical.

3.2 Connector to Connector

Use Table 2 to identify the connector plating/finish and its applicable Group Numbers for both the plug and receptacle sides. Use Table 1 to select compatible mating connector couples based on the Group Numbers. The best compatible couples are ones which use the same Group Number. If different, start with the most anodic material based on the compatible couples by Group Number. Compatible couples are deemed as having a maximum potential difference of 0.25 V between groups.

3.3 Connector to Accessory

Use Table 2 to identify the applicable plating/finish and its associated Group Number for the connector. Identify compatible couple choices for the accessory based on the Connector Group Number. The best compatible couples are ones which use the same Group Number. If different, start with the most anodic material based on the compatible couples by Group Number. Compatible couples are deemed as having a maximum potential difference of 0.25 V between groups. Use Table 1 to identify the accessory plating/finish by Group Number. Use accessory detail sheet (i.e., AS85049) to identify suitable finish/plating configurations. For optimum performance, the plating material selected for the connector should match that plating material selected for the accessory. Note that plating/finish code letters may differ between connector and accessory specifications (e.g., MIL-DTL-38999 finish "T" is the same as "X" in AS85049).