



AEROSPACE STANDARD

AS81582™**REV. C**

Issued 1998-07
Revised 2017-11
Reaffirmed 2023-10

Superseding AS81582B

Connectors, Electrical, Bayonet Coupling, Environment Resisting,
Umbilical, General Specification For

RATIONALE

Revision is required to add AIR1351 reference, to replace MIL-HDBK-454 requirement reference with the applicable information and to update all document references to reflect latest published versions.

AS81582C has been reaffirmed to comply with the SAE Five-Year Review policy.

1. SCOPE

This specification covers environment-resisting, quick disconnect, EMI/RFI shielded and non-shielded umbilical, electric connectors and adapter assemblies with removable crimp or nonremovable solder-type contacts and accessories. Connectors are rated for operation from -55 °C (-67 °F) to 200 °C (392 °F). Adapter assemblies are rated for operation from -55 °C (-67 °F) to 125 °C (257 °F). The upper temperature is the maximum internal hot spot temperature resulting from any combination of electrical load and ambient temperature.

1.1 Classification

1.1.1 Classes

All classes shall be environment resistant and shall include the following features as specified in the applicable specification sheet:

Class E - Grommet seal

Class F - Grommet seal and strain relief clamp

Class P - Potted seal

Class J - Insert seal with gland seal for jacketed cable

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Full document details: SAE AS81582C

For more information on this standard, visit
<https://www.sae.org/standards/content/AS81582C/>

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1.1.2 Contact Designator

Contact style shall be designated by one of the following:

P - Pin contacts

S - Socket contacts

1.1.3 Basic Part Number

The basic part number for qualified items procured in accordance with this specification shall conform to the applicable specification sheet (see 3.1).

1.2 Accessories

This specification also covers the following accessories:

Adapters, Connector to Cable, Straight and 105°, open wiring and shielded cable

Adapter, Connector to Connector, 90°

Connector, Dummy Stowage Receptacle

Caps, Protective

1.3 Insulation Resistance

Minimum insulation resistance versus hot-spot temperature is shown on Figure 1.

1.4 Service Life

Service life is dependent upon hot spot temperature in accordance with Figure 2.

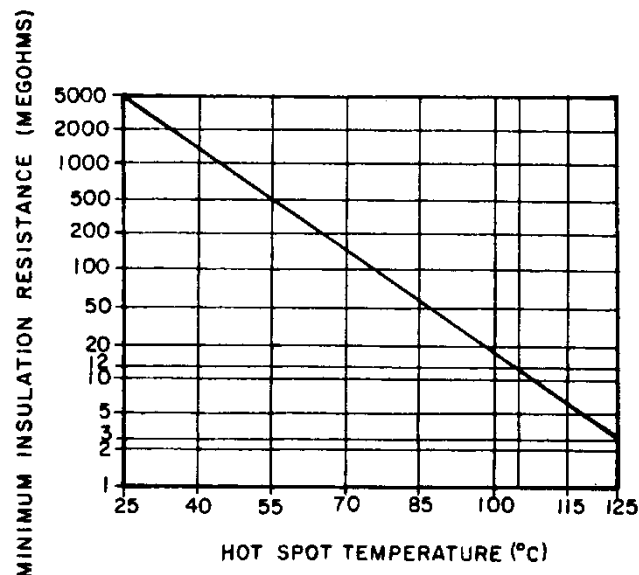


Figure 1A - Adapter assemblies

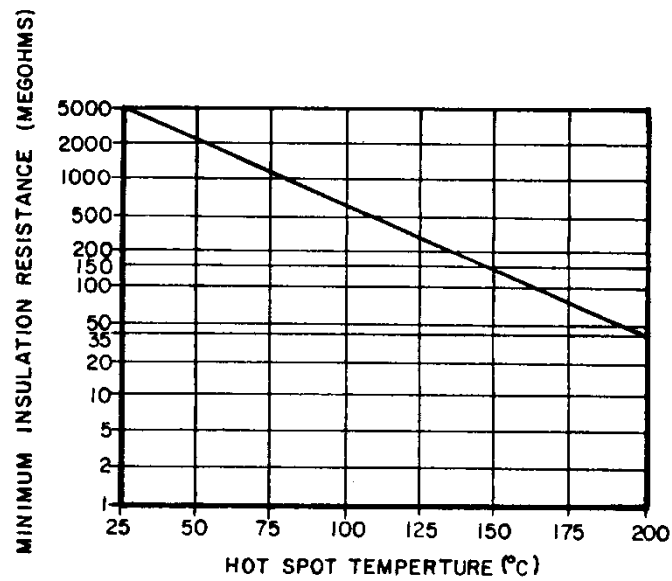


Figure 1B - Connectors

Figure 1 - Minimum insulation resistance versus hot spot temperature

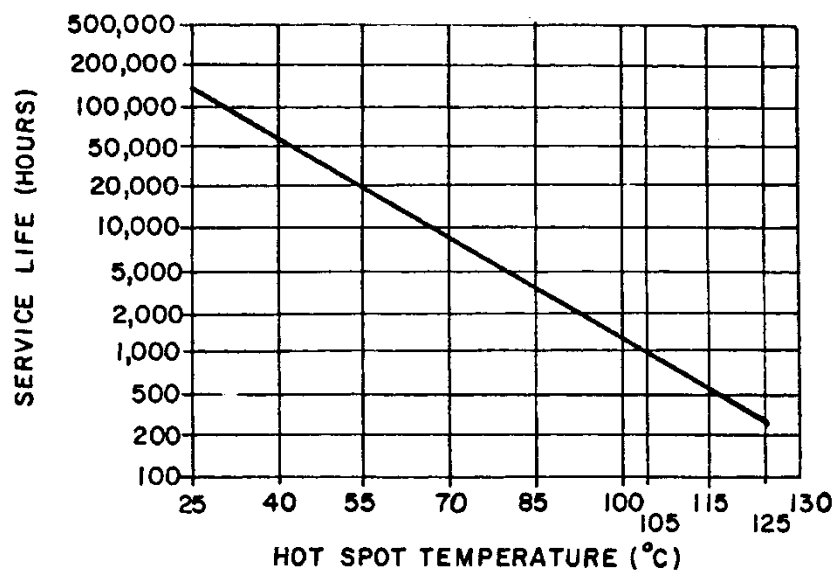


Figure 2A - Adapter assemblies

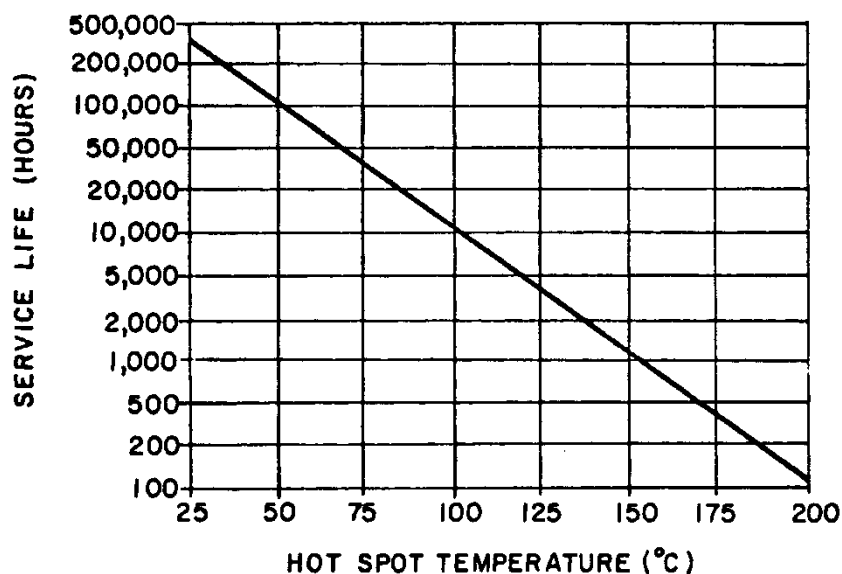


Figure 2B - Connectors

Figure 2 - Service life versus hot spot temperature

2. REFERENCES

2.1 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.

2.1.1 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.

AIR1351	Manufacturer's Identification of Aerospace Electrical and Electronic Wiring Devices and Accessories
AMS1424	Deicing/Anti-Icing Fluid, Aircraft, SAE Type I
AMS4290	Aluminum Alloy, Die Castings 9.5Si - 0.50Mg (360.0-F), As Cast
AMS4291	Aluminum Alloy, Die Castings, 8.5Si - 3.5Cu (A380.0-F), As Cast
AMS-QQ-A-225	Aluminum and Aluminum Alloy, Bar, Rod, Wire, or Special Shapes; Rolled, Drawn, or Cold Finished; General Specification For
AMS-QQ-A-367	Aluminum Alloy Forgings
AMS-QQ-P-416	Plating, Cadmium (Electrodeposited)
AS16721	Connector Umbilical, Insert Arrangements for AS81582

AS22520/1	Crimping Tool, Contact, Electric, Hand for Contact Size 12 Through 20
AS22520/2	Crimping Tool, Contact, Electric, Hand for Contact Size 20 Through 28
AS22759/4	Wire, Electric, Fluoropolymer-Insulated, TFE-Glass-FEP, Medium Weight, Silver-Coated Copper Conductor, 600-Volt
AS22759/5	Wire, Electrical, Fluoropolymer-Insulated, Abrasion Resistant Extruded PTFE, Silver-Coated Copper Conductor, 600 Volt
AS22759/7	Wire, Electric, Fluoropolymer-Insulated, Abrasion Resistant Extruded PTFE, Medium Weight, Silver-Coated Conductor, 600 Volt
AS22759/9	Wire, Electrical, Fluoropolymer-Insulated, Extruded TFE, Silver-Coated Copper Conductor, 1000 Volt
AS22759/11	Wire, Electrical, Fluoropolymer-Insulated, Extruded TFE, Silver-Coated Copper Conductor, 600 Volt
AS22759/12	Wire, Electrical, Fluoropolymer-Insulated, Extruded TFE, Nickel-Coated Copper Conductor, 600 Volt
AS39029	Contacts, Electrical Connector, General Specification For
AS81582/1	Connectors, Electric, Bayonet, Coupling, Umbilical Receptacle, Jam Nut Mounting, RFI Shielded, Crimp Contact, Class E
AS81582/2	Connector, Plug, Electric, Bayonet Coupling, Lanyard Release, RFI Shielded, Crimp-Type Contacts, Class E
AS81582/4	Connector Adapter, RFI Shielded, Cable to Electric Connector
AS81582/5	Connector Adapter, Right Angle, RFI Shielded, Electric Connector to Electric Connector
AS81582/9	Connector, Electrical, Bayonet Coupling, Environment Resisting, Umbilical, Caps, Protective
SAE J452	General Information-Chemical Compositions, Mechanical and Physical Properties of SAE Aluminum Casting Alloys

2.1.2 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 A342	Standard Test Methods for Permeability of Feebly Magnetic Materials
ASTM A484	Specification for General Requirements for Stainless Steel Bars, Billets and Forgings
ASTM A582	Specification for Free Machining Stainless Steel Bars
ASTM B26	Standard Specification for Aluminum Alloy Sand Castings
ASTM B85	Standard Specification for Aluminum Alloy Die Castings
ASTM B108	Standard Specification for Aluminum Alloy Permanent Mold Castings
ASTM B211	Standard Specification for Aluminum and Aluminum Alloy Bar, Rod, and Wire
ASTM B339	Standard Specification for Pig Tin

ASTM B545	Standard Specification for Electrodeposited Coatings of Tin
ASTM D471	Standard Test Method for Rubber Property - Effect of Liquids
ASTM D957	Standard Practice for Determining Surface Temperatures of Molds and Plastics
ASTM D4066	Standard Classification System for Nylon Injection and Extrusion Materials (PA)
ASTM D5948	Standard Specification for Molding Compounds, Thermosetting

2.1.3 U.S. Military Specifications and Standards

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

MIL-DTL-5624	Turbine Fuel, Aviation Grades JP-4 and JP-5
MIL-DTL-45204	Gold Plating, Electrodeposited
MIL-DTL-55330	Connectors, Electrical and Fiber Optic, Packaging of
MIL-PRF-5606	Hydraulic Fluid, Petroleum Base; Aircraft, Missile, and Ordnance
MIL-PRF-8516	Sealing Compound, Polysulfide Rubber, Electric Connectors and Electric Systems, Chemically Cured
MIL-PRF-23699	Lubricating Oil, Aircraft Turbine Engines, Synthetic Base
MIL-PRF-46010	Lubricant, Solid Film, Heat Cured
MIL-PRF-87937	Cleaning Compound, Aircraft Surface, Alkaline Waterbase
MIL-S-7742	Screw Threads, Standard, Optimum Selected Series, General Specification for
MIL-STD-104	Limits for Electrical Insulation Color
MIL-STD-130	Identification Marking of US Military Property
MIL-STD-202	Test Methods for Electronic and Electrical Component Parts
MIL-STD-810	Environmental Engineering Considerations and Laboratory Tests
MIL-STD-1285	Marking of Electrical and Electronic Parts
MIL-STD-2073-1	Standard Practice for Military Packaging

2.2 Other Publications

2.2.1 ANSI Publications

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

ANSI Y14.5-1973	Dimensioning and Tolerancing for Engineering Drawings
ANSI/ISO 10012-1	Quality Assurance Requirements for Measuring Equipment

2.2.2 ASQ Publications

Available from American Society for Quality, 600 North Plankinton Avenue, Milwaukee, WI 53203, Tel: 800-248-1946 (United States or Canada)), 001-800-514-1564 (Mexico) or +1-414-272-8575 (all other locations), www.asq.org.

ASQC Z1.4 Sampling Procedures and Tables for Inspection by Attributes

2.2.3 National Conference of Standards Laboratories (NCSL) Publications

Available from NCSL International, 2995 Wilderness Place, Suite 107, Boulder, CO 80301, Tel: 303-440-3339, www.ncsli.org.

NCSL Z540-1 General Requirements for Calibration Laboratories and Measuring and Test Equipment

2.2.4 Miscellaneous Publications

Application for copies should be addressed to the McGraw-Hill Book Co., Inc. New York, New York.

IPC/EIA J-STD-001 Requirements for Soldered Electrical and Electronic Assemblies

MIT Radiation Laboratory Series

Volume 10, The Waveguide Handbook

2.3 Definitions

See MIL-STD-1353 and the following:

2.3.1 GLAND CLAMP

A gland clamp, also called a cable sealing clamp, is a device intended to seal around a single-jacketed cable and is composed of a gland nut and sealing member.

2.3.2 INSULATION SPACER

An insulating spacer is a device intended to separate individual wires attached to the contacts of the connector.

2.3.3 LANYARD

A loop of wire rope or other flexible material whereby a force may be applied to a plug connector to disengage it from the receptacle in a "break-away action".

2.3.4 CRITICAL DEFECTS

A critical defect is a defect that judgment and experience indicate would result in hazardous or unsafe conditions for individuals using, maintaining, or depending upon the product, or a defect that judgment and experience indicate is likely to prevent performance of the actual function of a major end item such as a ship, aircraft, tank, missile, or space vehicle.

2.3.5 DEFECT

A defect is any nonconformance of the unit of product with specified requirements.

2.3.6 MAJOR DEFECT

A major defect is a defect, other than critical, that is likely to result in failure, or to reduce the usability of the unit of product for its intended purpose.

2.3.7 MINOR DEFECT

A minor defect is a defect that is not likely to reduce materially the usability of the unit of product for its intended purpose, or is a departure from established standards having little bearing on the effective use or operation of the unit.

3. REQUIREMENTS

3.1 Specification Sheets

All requirements herein apply to all the connectors and accessories covered by the applicable specification sheet. Detail requirements or exceptions applicable to the individual types shall be as specified herein or on the applicable specification sheet. In the event of any conflict between the requirements of this specification and the specification sheet, the latter shall govern.

3.2 Qualification

Connector assemblies and accessories furnished under this specification and the applicable specification sheet shall be products which are qualified for listing on the applicable Qualified Products List (QPL) at the time set for the opening of bids (see 4.4 and 6.3).

3.2.1 Use of Basic Part Number Identification

The basic part number identification shall not be applied to a product, except for qualification test samples (see 6.3), until notification has been received from the activity responsible for qualification that the product has been approved for listing on the Qualified Products List (QPL).

3.3 Materials

Materials shall be as specified herein. However, when a definite material is not specified, a material shall be used which will enable the connectors to meet the performance requirements of this specification and the applicable specification sheet. Acceptance or approval of any constituent material shall not be construed as a guaranty for acceptance of the finished product.

3.3.1 Dissimilar Metals

When dissimilar metals are used in intimate contact with each other, protection against electrolysis and corrosion shall be provided. The use of dissimilar metal in contact, which tends toward active electrolytic corrosion (particularly brass, copper, or steel used in contact with aluminum or aluminum alloy), is not acceptable. However, metal spraying or metal plating of dissimilar base metals to provide similar or suitable abutting surfaces is permitted. Dissimilar metals shall be as defined in 6.6 through 6.6.4 inclusive, and Table 22 in hermetic seals, the 0.25 V difference between the header material and the housing material is not applicable.

3.3.2 Nonmagnetic Materials

The relative permeability of the connector assembly shall be less than 2.0, when measured with an indicator conforming to ASTM A342.

3.3.3 Contact Materials

Contacts shall be made from suitably conductive materials protected from corrosion.

3.3.3.1 Contact Plating

Contact plating shall be in accordance with AS39029.

3.3.4 Dielectric Materials

3.3.4.1 Insert and Grommet

Insert and grommet materials shall be high grade dielectric having hardness, electrical, and mechanical characteristics suitable for the purpose intended.

3.3.4.1.1 Rigid Dielectric Material

Rigid dielectric materials shall be in accordance with ASTM D5948, or ASTM D4066.

3.3.4.1.2 Resilient

Unless otherwise specified (see 3.1), the mating face of pin inserts shall be a resilient material within a Shore A Durometer range of 40 to 68.

3.3.4.1.3 Insert Faces

Insert faces shall be as specified in the applicable specification sheet (see 3.1).

3.3.5 Shells and Metallic Accessories Material

Shells and metal accessories (see 1.3), shall be fabricated of high grade aluminum such as alloy 6061, temper T6 in accordance with AMS-QQ-A-367. Connectors shall have a grounding spring member as specified (see 3.1).

3.3.5.1 Component Parts

Other metal component parts may be fabricated from aluminum conforming to ASTM B211 or AMS-QQ-A-225 or passivated stainless steel in accordance with QQ-S-764.

3.3.5.2 Bayonet Pins

Bayonet pins shall be made of stainless steel.

3.3.5.3 Finish

Unless otherwise specified (see 3.1) aluminum parts shall be cadmium plated to withstand 500 h salt spray (see 4.6.19). A preliminary plating of another metal is permissible. The resultant finish shall be olive drab (light to dark) and shall be electrically conductive.

3.3.5.4 Grounding Spring Member

The grounding spring shall be made of an electrically conductive metal suitable for the intended purpose.

3.4 Design and Construction

Connectors shall be of the design, construction, and physical dimensions specified (see 3.1). Connectors shall be so designed that neither the pins nor the sockets will be damaged during normal mating of counterpart connectors. True position dimensions shown herein and on the specification sheets are in accordance with ASME Y14.5M-1994.

3.4.1 Contact Design

Contacts shall conform to AS39029, except as otherwise specified herein for solder contacts and thru-bulkhead contacts. When specified in the contract or order, connectors may be supplied less crimp type contacts to permit procurement of these items in bulk.

3.4.1.1 Solder Contacts

Solder contacts shall be as specified (see 3.1), and shall be non-removable from the insert. Solder cups shall be such that during soldering no components will be damaged and no liquid solder shall escape.

3.4.1.2 Crimp Contacts

Crimp contacts shall be qualified as specified (see 3.1).

3.4.2 Insert Design and Construction

Inserts shall be of void-less construction and shall be secured to prevent rotation within the shell. The inserts shall be non-removable from the shell and shall be installed in the position specified in the applicable specification sheet. The insert shall be designed and constructed to eliminate all air paths between contacts by permanently attaching the dielectric members to each other. The socket insert shall be designed to prevent a bent pin in a mating counterpart insert from penetrating the insert alongside the socket contact. Inserts shall be so designed that MIL-S-8516 potting material will adhere to the insert without treatment by the user. Insert details shall be as specified in AS16721.

3.4.3 Shell Design

Connector shells shall be seamless and shall retain their inserts in a positive manner.

3.4.3.1 Screw Threads

Screw threads shall conform to MIL-S-7742. Slight out-of-roundness beyond the specification tolerance is acceptable if threads can be checked without forcing the thread gages.

3.4.4 Coupling

Unless otherwise specified (see 3.1), the coupling type shall be a 3-pin bayonet design with a lanyard release mechanism. Coupling shall be accomplished by clockwise rotation of the coupling ring; uncoupling shall be accomplished by the application of a force to the lanyard. The design shall also permit uncoupling by counterclockwise rotation of the coupling ring. The coupling rings shall be fluted or knurled to provide a gripping surface.

3.4.4.1 Engagement of Connectors

Counterpart connectors of any arrangement and accessories shall be capable of being fully engaged and disengaged without the use of tools. Engagement of connectors shall be defined as full insertion of pins into sockets and proper sealing of the mating insert faces. Full engagement shall be indicated by an audible sound at the completion of the coupling cycle, and a positive detent shall be included in the coupling mechanism to lock connectors in the engaged position.

3.4.4.1.1 Bayonet Pins

Unless otherwise specified (see 3.1), bayonet pins on connector shells shall have surfaces whose color is yellow. The color shall be within the limits described in MIL-STD-104. The ends of the pins shall be visible through suitable holes in the coupling ring when the connectors are engaged and the coupling ring is in the locked position.

3.4.4.2 Shell Polarization

Polarization of connectors shall be accomplished by matched integral key(s) and keyway(s) of counterpart connectors. The polarization of counterpart connectors shall take place before coupling rings are engaged, and before any pin contacts can touch the opposing insert face or sockets of the counterpart connector.

3.4.4.3 Engagement Seal

Connectors shall contain sealing means so that engaged connectors comply with the requirements specified herein. The design of the seal shall be such that in mated connectors all air paths between adjacent contacts and between contacts and shells are eliminated. There shall be interfacial mating of the engaged connector insert to provide dielectric under compression of 0.005 in minimum.

3.4.4.4 Lubrication

Bayonet coupling slots, including the inside diameter in the bayonet coupling slot area shall be coated with a lubricant conforming to MIL-PRF-46010, form B to aid in mating connectors. Features which are intended to provide potting compound anchorage shall be free of lubricant.

3.4.4.5 Protective Covers and Stowage Receptacles

When mated to counterpart connectors, the protective covers and stowage receptacles shall maintain the connector free of moisture, prevent air leakage, and comply with the applicable requirements of Table 17. Protective covers and stowage receptacles shall be provided with an EMI/RFI shielding feature where required (see 3.1).

3.4.4.6 Lanyard

Mounting of the lanyard to the connector shall be such that rotation of the connector for engagement will not shorten the effective length of the lanyard.

3.4.5 Wire Sealing

3.4.5.1 Classes E and F Connectors

Classes E and F connectors shall be provided with a wire sealing resilient grommet and gland nut capable of sealing the wire sizes as specified in Tables 1A and 1B.

3.4.5.2 Class P Connectors

Class P connectors shall be provided with a potting form suitable to accept and bond to MIL-S-8516 potting material. Inserts of class P connectors shall be so designed that potting material will adhere to the shell and insert without treatment by the user.

3.4.5.3 Class J Connectors

Class J connectors shall be provided with a resilient gland and gland nut capable of sealing on appropriate single-jacketed multi-conductor cables.

Table 1

Table 1A - Adapter assemblies - wire range accommodations

WIRE BARREL SIZE	WIRE SIZE	O.D. OF FINISHED WIRE (INCH) 1/		WIRE NUMBER (REF) 2/
		CRIMP CONTACT CONNECTORS	SOLDER CONTACT CONNECTORS	
20	24	0.046 (min)	0.060 (min)	AS22759/7-24
	22	0.047 (min)	0.060 (min)	AS22759/11-22, /7-22
	20	0.085 (max)	0.085 (max)	AS22759/4-20
16	18	0.066 (min)	0.066 (min)	AS22759/11-18
	16	0.109 (max)	0.109 (max)	AS22759/4-16
12	14	0.097 (min)	0.097 (min)	AS22759/9-14
	12	0.142 (max)	0.142 (max)	AS22759/12-10

1/ For outside diameters smaller than that specified, see 6.1h.

2/ Wire numbers are for reference only and are not intended to restrict the use of acceptable wire-types with these adapter assemblies.

Table 1B - Connectors - wire range accommodations

WIRE BARREL SIZE	WIRE SIZE	O.D. OF FINISHED WIRE (INCH)	WIRE NUMBER (REF) 1/
20	24	0.041 (min)	AS22759/11-24
	22	0.047 (min)	AS22759/11-22
	20	0.090 (max)	AS22759/5-20
16	18	0.068 (min)	AS22759/9-18, /11-18
	16	0.130 (max)	AS22759/5-16
12	14	0.107 (min)	AS22759/5-12
	12	0.170 (max)	

1/ Wire numbers are for reference only and are not intended to restrict the use of acceptable wire-types with these adapter assemblies.

3.4.5.4 Grommet Sealing Plugs

The grommets of classes E and F connectors shall be designed to accept sealing plugs as specified (see 3.1), in lieu of wire where unused contacts are employed. When specified in the contract or order, connectors may be supplied less grommet sealing plugs to permit procurement of these items in bulk.

3.4.6 Grounding Spring Member

When specified (see 3.1), the grounding spring member shall have a minimum of six fingers per inch. The spring fingers shall be shaped in a manner which will ensure proper engagement of the mating shell. The grounding spring shall be permanently fixed to the shell periphery and the attachment of the grounding spring to the shell shall not impede spring flexing. The spring fingers shall engage the mating shell at a minimum of 0.090 in prior to the pin-socket engagement.

3.5 Interchangeability

All connectors and accessories having the same military part number shall be completely interchangeable with each other with respect to installation (physical) and performance (function) as specified herein. Solder and crimp contact connectors shall be intermateable (see 6.1(f)).

3.6 Performance

Connectors shall perform as follows when subjected to the conditions and tests specified.

3.6.1 Contact Protection, Connector Mating

Connectors equipped with pin contacts shall not permit the edge of the shell of the counterpart mating connector to touch the pin contacts (see 4.6.2).

3.6.2 Resistance to Test Probe Damage (size 12 and smaller socket contacts)

Socket contacts shall withstand the bending moment and depth of test probe insertion without evidence of visible damage (see 4.6.3). Contacts shall meet the requirements of 3.6.4 after test.

3.6.3 Contact Insertion and Removal Force (crimp removable contact connectors only)

Contacts shall meet the insertion and removal forces specified in Table 2, when tested as specified (see 4.6.4).

Table 2 - Contact insertion and removal forces

Contact Size	Insertion and Removal Force (pounds max)
20-20	20
16-16	20
12-12	20

3.6.4 Contact Engaging and Separating Force

The contact engaging and separating force shall not exceed the applicable values specified in Table 3 (see 4.6.5).

Table 3 - Contact engaging and separating forces (ounces)

Mating Size	Minimum Separation Force (ounces)	Maximum Average Engagement Force (ounces)	Maximum Engagement Force (ounces)
20	0.7	12	18
16	2	24	30
12	3	24	30

3.6.5 Mating and Un-Mating Forces

The coupling torque for mating and un-mating of counterpart connectors shall meet the torque requirements of Table 4. The connectors used in this test shall have the complete complement of contacts. The dummy stowage receptacles and protective covers, when mated with their applicable connector, shall also comply with the torque requirement of Table 4 (see 4.6.6).

Table 4 - Mating and unmating forces

Shell Size	Torque (pound-inches)	
	Maximum Mating and Unmating Forces	Minimum Unmating Force
8	8	1
10	12	1
12	16	2
14	20	4
16	24	4
18	28	4
20	32	6
22	50	20
24	60	25

3.6.6 Contact Retention

Contacts shall be retained in their inserts when subjected to the contact retention test in accordance with the axial loads of Table 5. The axial displacement of crimp contacts shall not exceed 0.012 in while under load with the accessory tightened or 0.015 in while under load with the accessory removed. The axial displacement of solder contacts shall not exceed 0.012 in after the load has been removed (see 4.6.7).