



AEROSPACE STANDARD

AS81703™**REV. B**

Issued 1998-07
Revised 2018-04
Reaffirmed 2023-05

Superseding AS81703A

(R) Connectors, Electric, Circular, Miniature, Rack and Panel
or Push-Pull Coupling, Environment Resisting

FSC 5935

RATIONALE

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

AS81703B has been reaffirmed to comply with the SAE Five-Year Review policy.

1. SCOPE

1.1 Scope

This specification covers three series of environment resisting, circular, miniature electrical connectors (plugs and receptacles) with removable crimp and/or nonremovable solder contacts, and accessories. The connectors are only recommended for replacement and are not specified for aircraft applications (refer to AS50881).

1.1.1 Series Description

The connectors are identified as series 1, 2, or 3, and are designed to provide contact protection during mating and include the following features:

Series 1 - Push-pull coupling, single key solder type nonremovable contacts (-55 to +125 °C).

Series 2 - Rack and panel or push-pull coupling, single key, removable front release crimp contacts (-55 to +175 °C).

Series 3 - Rack and panel, single key or push-pull coupling, five keys, removable rear release crimp contacts (-55 to +175 °C and +200 °C).

1.2 Classification

Electric connectors shall be of the following classes, sizes, types, insert arrangements, and styles.

1.2.1 Coupling

Coupling shall be push-pull or rack and panel coupling (3.4.4).

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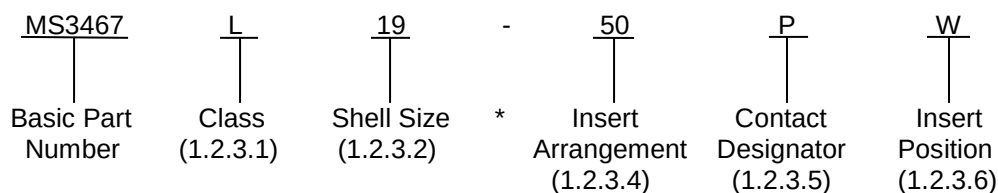
1.2.2 Receptacle Mounting

Mounting shall be as specified on the applicable detail specification.

- a. Flange
- b. Jam nut
- c. Solder

1.2.3 Part Number

The part number for qualified connectors procured in accordance with AS81703 shall conform to the following example:



* For class H, the dash (-) is replaced by the termination type and shell material letter (see 1.2.3.3).

1.2.3.1 Class

The class and series of the connector shall be identified as indicated in Table 1.

Table 1 - Connector class and series

Class	Series 1, 125 °C	Series 2, 175 °C	Series 3, 200 °C
E - Grommet Seal	X	X	X
P - Potting Seal	X		
H - Hermetic Seal	X		X
J - Insert seal with gland seal for jacketed cable	X	X	
L - Fluid resistance			X <u>1/</u>
N - Hermetic Seal, crimp			X
F - Grommet seal with strain relief clamp - obsolescent: Use E with strain relief clamp			

1/ For fluid resistant connectors rating is 175 °C (see Table 3).

1.2.3.2 Shell Size

Shell size shall be as specified on the applicable detail specification.

1.2.3.3 Termination Type and Shell Material, Class H

The type of termination and shell material shall be designated as follows:

Type A - Solder cup termination - stainless steel shell

Type B - Eyelet termination - stainless steel shell

Type C - Solder cup termination - ferrous alloy shell

Type Y - Eyelet termination - ferrous alloy shell

1.2.3.4 Insert Arrangement

The insert arrangement showing number, size, and position of contacts shall be as specified on the applicable detail specification.

1.2.3.5 Contact Designator

1.2.3.5.1 Connector with Contacts

P - Pin contact

S - Socket contact

C - Through-bulkhead contact

The P, S, and C designators are used to indicate a full complement of applicable power contacts.

1.2.3.5.2 Connector Without Contacts (Not Applicable to Series 1 or Series 3, Classes H and N Connectors)

A - Less pin contact

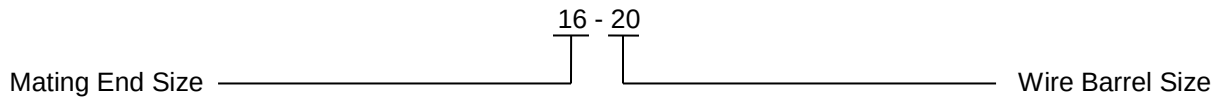
B - Less socket contact

The A and B designators are used to indicate a connector less contacts (see 6.2). This will be used only when other than power contacts are to be used. (Examples are shielded, coaxial, and thermocouple contacts.)

1.2.3.5.3 Contact Size Designation

The contact size designation shall consist of mating end size and wire barrel size numbers separated by a dash (-). Mating end and wire barrel sizes shall be as specified in AS39029, as applicable.

Example:



1.2.3.6 Insert Position

The insert position is the angular position of the insert relative to the shell. Insert positions other than normal shall be indicated by the letter shown on the insert arrangement detail specification AS33698 thru AS33704.

1.3 Temperature

The connectors are rated for operation within a temperature range specified for each class. The upper temperature limit is the maximum internal hot-spot temperature resulting from any combination of electrical load and ambient temperature. The connectors are rated for specified operation for 1000 hours at the specified maximum internal hot-spot temperature.

1.3.1 Variation of Insulation Resistance

Insulation resistance varies with temperatures as indicated in Figure 1 and Table 2.

Table 2 - Variation of insulation resistance

Series	Temperature	Minimum Insulation Resistance
1	25 °C	5000 MΩ
	125 °C	3 MΩ
2	25 °C	10000 MΩ
	175 °C	300 MΩ
3 (except class L)	25 °C	10000 MΩ
	200 °C	500 MΩ
3 - class L	25 °C	10000 MΩ
	175 °C	500 MΩ

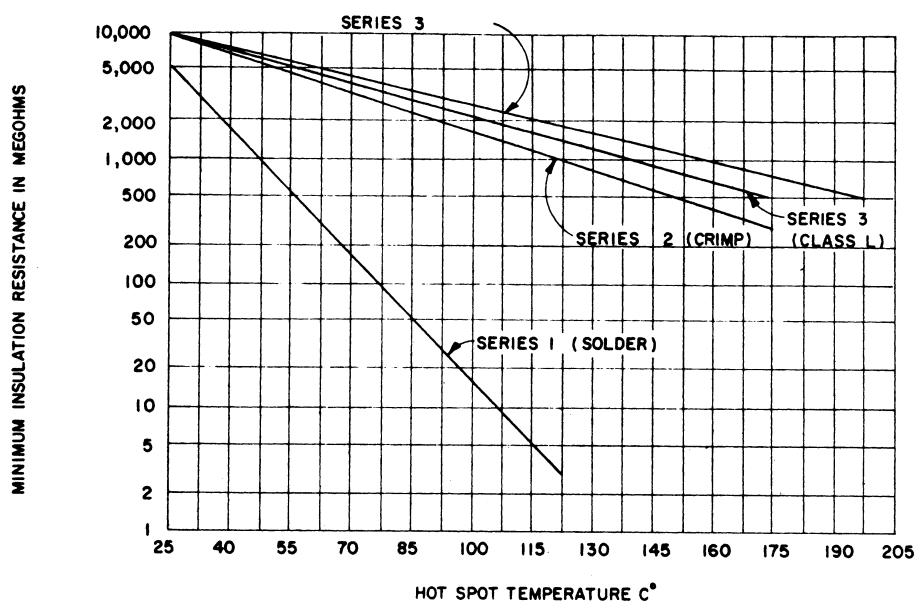


Figure 1 - Minimum insulation resistance versus hot spot temperature

1.3.2 Variation of Service Life

Service life varies with temperature as indicated in Figure 2 and Table 3. After 1000 hour service life requirement, the connector is not required to maintain interfacial sealing.

Table 3 - Variation of service life

Series	Hot Spot Temperature	Service Life
1	25 °C	Continuous
	125 °C	1000 hours
2	25 °C	Continuous
	175 °C	1000 hours
3 (except class L)	25 °C	Continuous
	200 °C	1000 hours
3 - class L	25 °C	Continuous
	175 °C	1000 hours

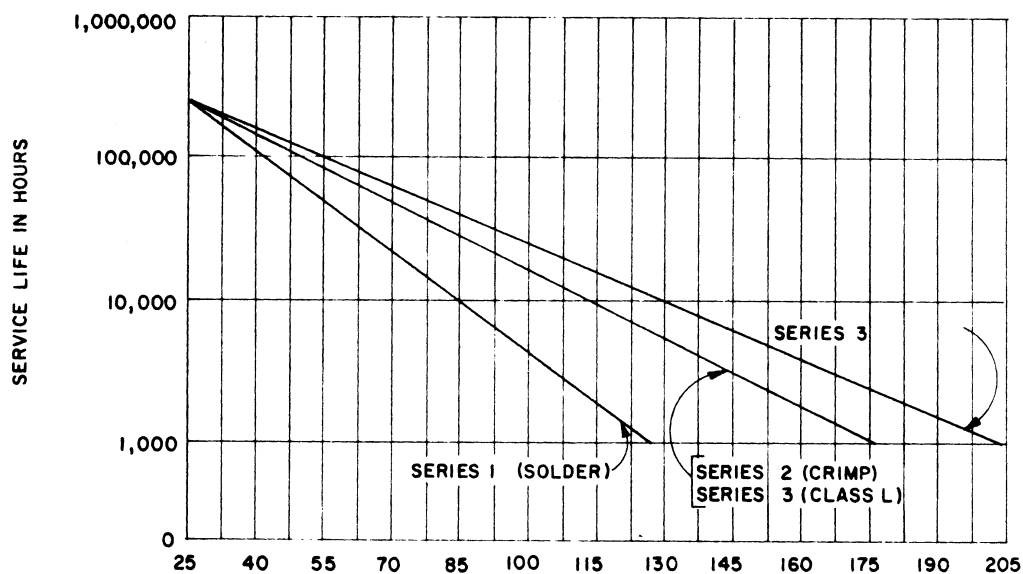


Figure 2 - Service life versus hot spot temperature

1.3.3 Accessories

The specification covers accessories for connectors such as protective covers and stowage receptacles. Strain relief clamps, potting boots, 90-degree end bells and back shell adapters are specified in AS85049.

1.3.4 Wire Range Accommodations

The wire ranges given in Table 4 shall be accommodated by the connectors and contact wire barrels as indicated.

Table 4 - Wire range accommodations

Wire Barrel Size	Wire Size	OD of Finished Wire (inch) ^{1/}			
		Series 1 and 2		Series 3	
		Min	Max	Min	Max
20	24	0.047 ^{2/}	0.085	0.040	0.083
	22				
	20				
16	20	0.066	0.109	0.053	0.103
	18				
	16				
12	14	0.097	0.142	0.099	0.158
	12				

^{1/} Wire reference - AS22759 and MIL-DTL-81381.

^{2/} Minimum OD for solder contact connectors is 0.060 inch.

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.

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.

AMS2700	Passivation of Corrosion Resistant Steel
AMS-QQ-P-416	Plating, Cadmium (Electrodeposited)
AIR1351	Manufacturers' Identification of Aerospace Electrical and Electronic Wiring Devices and Accessories
AS22759	Wire, Electric, Fluorocarbon-insulated, Copper or Copper Alloy
AS31971	Gage Pin, for Socket Contact Engagement Test
AS39029	Contacts, Electric, General Specification For
AS39029/4	Contacts, Electrical Connector, Pin, Crimp Removable (For MIL-DTL-26482 Series 2, AS81703 Series 3, MIL-DTL-83723 SERIES I and III, and MIL-DTL-83733 Connectors)
AS39029/5	Contacts, Electrical Connector, Socket, Crimp Removable (For MIL-DTL-26482 Series 2, AS81703 Series 3, MIL-DTL-83723 Series I and III, MIL-DTL-83733 Connectors, MIL-DTL-12883/40, and /41 Relay Sockets)
AS39029/7	Contacts, Electrical Connector, Pin, Crimp Removable, Shielded (FOR MIL-C-26482 Series 2 and MIL-C-81703 Series 3 Connectors)
AS39029/8	Contacts, Electrical Connector, Socket, Crimp Removable, Shielded (FOR MIL-C-26482 Series 2 and MIL-C-81703 Series 3 Connectors)
AS39029/9	Contacts, Electrical Connector, Pin, Crimp Removable, Thermocouple, (FOR MIL-DTL-26482 Series 2, AS81703 Series 3, MIL-DTL-83723 Series I and III, and MIL-DTL-83733 Connectors)
AS39029/10	Contacts, Electrical Connector, Socket, Crimp Removable, Thermocouple, (FOR MIL-DTL-26482 Series 2, AS81703 Series 3, MIL-DTL-83723 Series I and III, and MIL-DTL-83733 Connectors)
AS39029/31	Contacts, Electrical Connector, Pin, Crimp Removable (for MIL-C-26482 Series 1, MIL-C-26500 and MIL-C-26518 Connectors)
AS39029/32	Contacts, Electrical Connector, Socket, Crimp Removable (for MIL-C-26482 Series 1, MIL-C-26500 and MIL-C-26518 Connectors)
AS81969/8	Installing and Removal Tools, Connector Electrical Contact, Type I & II, Class 2, Composition A
AS81969/14	Installing and Removal Tools, Connector Electrical Contact, Type III, Class 1, Composition B
AS81969/17	Installing and Removal Tools, Connector Electrical Contact, Type I, Class 1, Composition C
AS81969/19	Installing and Removal Tools, Connector Electrical Contact Type II, Class 1, Composition C

AS81969/30 Installing and Removal Tools, Connector Electrical Contact, Type II, Class 2, Composition C

AS85049 Connector Accessories, Electrical, General Specification for

2.1.1 AS81703 Detail Specifications (Subject to Qualification)

Connectors, Solder Contact, Push-Pull Coupling, Series 1

AS31301 Connector, Receptacle, Electric, Solder Type, Wall Mounting Flange, Push-Pull Coupling, Series 1 (Class E, P, and J)

AS31321 Connector, Receptacle, Electric, Solder Type, Box Mounting Flange, Push-Pull Coupling, Series 1 (Class E and H)

AS31341 Connector, Receptacle, Electric, Solder Type, Jam Nut Mounting, Push-Pull Coupling, Series 1 (Class E, P, J, and H)

AS31351 Connector, Receptacle, Electric, Dummy Stowage, Wall Mounting Flange, Push-Pull Coupling, Series 1 and 2 Connectors

AS31371 Connector, Plug, Electric, Solder Type, Push-Pull Coupling, Series 1 (Class E, P, and J)

AS31381 Connector, Plug, Electric, Solder Type, Lanyard, Push-Pull Coupling, Series 1 (Class E, P, and J)

AS31391 Connector, Receptacle, Electric, Through-Bulkhead, Wall Mounting Flange, Series 1 (Class E) Connectors, Crimp Contact, Push-Pull Coupling, Series 2

AS31401 Connector, Receptacle, Electric, Crimp Type, Wall Mounting Flange, Push-Pull Coupling, Series 2 (Class E and J)

AS31441 Connector, Receptacle, Electric, Crimp Type, Jam Nut Mounting, Push-Pull Coupling, Series 2 (Class E and J)

AS31451 Connector, Receptacle, Electric, Hermetic, Crimp Type, Box Mounting, Push-Pull Coupling, Series 3 (Class N)

AS31461 Connector, Receptacle, Electric, Hermetic, Crimp Type, Solder Mounting, Push-Pull Coupling, Series 3 (Class N)

AS31471 Connector, Plug, Electric, Crimp Type, Push-Pull Coupling, Series 2 (Class E and J)

AS31481 Connector, Plug, Electric, Crimp Type, Lanyard, Push-Pull Coupling, Series 2 (Class E and J)

AS31491 Connector, Receptacle, Electric, Hermetic, Crimp Type, Single Hole Mounting, Push-Pull Coupling, Series 3 (Class N)

AS31821 Cover, Protective, Electric Connector, Plug, Push-Pull Coupling

AS31831 Cover, Protective, Electric Connector, Receptacle, Push-Pull Coupling

AS34241 Connector, Receptacle, Electric, Crimp Type, Wall Mounting Flange, Push-Pull Coupling, Series 3 (Class L and E)

AS34451 Connector, Plug, Electric, Crimp Type, Rack and Panel, Series 2 (Class E) Connectors, Solder Contact, Push-Pull Coupling, Series 3

AS34461 Connector, Plug, Electric, Crimp Type, Rack and Panel, Series 3 (Class L and E)

AS34631	Connector, Receptacle, Electric, Hermetic, Solder Type, Solder Mounting, Push-Pull Coupling, Series 3 (Class H)
AS34641	Connector, Receptacle, Electric, Crimp Type, Jam Nut Mounting, Push-Pull Coupling, Series 3 (Class L and E)
AS34661	Connector, Receptacle, Electric, Hermetic, Solder Type, Box Mounting, Push-Pull Coupling, Series 3 (Class H)
AS34671	Connector, Plug, Electric, Crimp Type, Push-Pull Coupling, Series 3 (Class L and E) Accessory Protective Covers
AS34691	Connector, Receptacle, Electric, Hermetic, Solder Type, Jam Nut Mounting, Push-Pull Coupling, Series 3 (Class H) Connectors, Crimp Contact, Push-Pull Coupling, Series 3

2.1.2 AS81703 Supporting Specifications

Insert Arrangements

AS33698	Insert Arrangements, Electric Connector, Shell Size 3
AS33699	Insert Arrangements, Electric Connector, Shell Size 7
AS33700	Insert Arrangements, Electric Connector, Shell Size 12
AS33701	Insert Arrangements, Electric Connector, Shell Size 19
AS33702	Insert Arrangements, Electric Connector, Shell Size 27
AS33703	Insert Arrangements, Electric Connector, Shell Size 37
AS33704	Insert Arrangements, Electric Connector, Shell Size 61

Dust Caps

AS85049/138	Connector Accessories, Electrical, Cap, Dust, Plastic, Category 9
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Aircraft Application

AS50881	Wiring, Aerospace Vehicle
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2.2 U.S. Government Publications

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

J-STD-001	Requirements for Soldered Electrical and Electronic Assemblies
IPC-HDBK-001	Handbook and Guide to Supplement J-STD-001
MIL-DTL-45204	Gold Plating, Electrodeposited
MIL-DTL-5624	Turbine Fuel, Aviation, Grades JP-4 and JP-5
MIL-DTL-81381	Wire, Electric, Polyamide-insulated, Copper and Copper Alloy

MIL-HDBK-454	General Guidelines for Electronic Equipment
MIL-PRF-5606	Hydraulic Fluid, Petroleum Base, Aircraft, Missile and Ordinance
MIL-PRF-7808	Lubricating Oil, Aircraft Turbine Engine Synthetic Base
MIL-PRF-8516	Sealing Compound, Synthetic Rubber, Electric Connectors and Electric Systems, Accelerator Required
MIL-PRF-23699	Lubricating Oil, Aircraft Turbine Engines, Synthetic Base
MIL-S-7742	Screw Threads, Standard, Optimum Selected Series: General Specification For
MIL-STD-129	Military Marking for Shipment and Storage
MIL-STD-147	Palletized Unit Loads
MIL-STD-202	Test Methods for Electronic and Electrical Component Parts
MIL-STD-454	Standard General Requirements for Electronic Equipment
MIL-STD-1285	Marking of Electrical and Electronic Parts
MIL-STD-2073-1	Standard Practice for Military Packaging
MS3187	Plug, End Seal, for MIL-DTL-26482, SAE-AS50151, SAE-AS81703 and MIL-DTL-83723 Electrical Connectors
MS3460	Test Gage, MIL-C-0026482 Series 1 or MIL-C-81703 Series 2 Contact Retention Feature
MS3461	Test Gage, MIL-C-0026482 Series 2 or MIL-C-81703 Series 3 Contact Retention Feature
MS3462	Test Gage, MIL-C-0026482 Series 2 (Class N) or MIL-C-81703 Series 3 (Class N) Contact Retention Feature
PPP-B-566	Box, Folding, Paperboard
PPP-B-676	Boxes, Setup
SD-6	Provisions Governing Qualification

2.3 Other Publications

The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply:

2.3.1 ANSI Accredited Publications

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

ANSI/ISO 10012-1 Quality Assurance Requirements for Measuring Equipment

USASI B46.1 (ANSI) Surface Texture (Surface roughness, waviness and lay)

2.3.2 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 B85/B85M	Standard Specification for Aluminum-Alloy Die Castings
ASTM B339	Pig Tin
ASTM A342/A342M	Materials, Feebly Magnetic, Permeability of, Standard Test Methods For
ASTM B545	Tin, Electrodeposited Coatings of
ASTM D948	Compounds, Molding, Thermosetting
ASTM A967	Chemical Passivation Treatments for Stainless Steel Parts
ASTM D1974	Fiberboard Boxes, Methods of Closing, Sealing, and Reinforcing
ASTM D4066	Nylon Injection and Extrusion Materials (Pa)
ASTM D5486/D5486M	Standard Specification for Pressure-Sensitive Tape For Packaging, Box Closure, And Sealing

2.3.3 ASQ Publications

Available from American Society for Quality, 600 North Plankton Avenue, Milwaukee, WI 53203, Tel: 800-248-1946 (United States or Canada) or +1-414-272-8575 (International), www.asq.org.

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

2.3.4 EIA Publications

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

ECA EIA 359 Standard Colors for Color Identification and Coding

ECA EIA 364 Electrical Connector/Socket Test, Procedures Including Environmental Classifications

2.3.5 NCSL Publications

Available from National Conference of Standards Laboratories, 2995 Wilderness Place, Suite 107, Boulder, CO 80301-5404, Tel: 303-404-3339, www.ncsli.org.

NCSL Z540-3 General Requirements for Calibration Laboratories and Measuring and Test Equipment

3. REQUIREMENTS

3.1 Detail Specification (see 2.1)

The product requirements shall be as specified herein and in accordance with the applicable detail specification. In the event of any conflict between the requirements of this specification and the detail specification, the latter shall govern.

3.2 Qualification

The components shall be a product that has been tested and has passed the qualification tests specified herein and has been listed on or approved for listing on the applicable Qualified Products List (see 4.4 and 6.3).

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. Acceptance or approval of any material shall not be construed as a guaranty for acceptance of the finished product.

3.3.1 Dissimilar Metals

When dissimilar metals are employed in contact with each other, suitable protection against electrolytic corrosion shall be provided as specified in requirement 16 of MIL-HDBK-454.

3.3.2 Nonmagnetic Materials (Except Rack and Panel Connectors and Classes H and N)

All parts shall be made from materials that are classed as nonmagnetic (3.6.22).

3.3.3 Contact Materials

Contacts shall be made of suitable conductive copper alloys protected from corrosion. Class N and H contacts may be ferrous alloy.

3.3.3.1 Contact Plating, Classes E, P, and J (Series 1 and 2)

Contacts shall be gold plated to a minimum of 50 µin, over a suitable thickness of copper. Surface plating shall be type II, except 99% purity, grade C or D in accordance with MIL-DTL-45204. A soft gold underplating, type I, grade A, in accordance with MIL-DTL-45204 is permitted between the copper and hard gold. Accessory members of the socket contacts need not be plated but shall comply with the requirements for dissimilar metals specified in 3.3.1.

3.3.3.2 Contact Plating, Class H

Unless otherwise specified (see 3.1), contact plating for class H contacts shall be 50 µin, minimum, of electro-tin (no organic brightener) in accordance with ASTM B545 or B339 as applicable. Preliminary plating of another metal is permissible.

3.3.3.3 Contact Plating, Classes E, L, and N (Series 3)

Contacts shall be plated as specified on the applicable military specification sheet (refer to AS39029).

3.3.3.4 Ductility of Materials - Plating

There shall be no cracks in the parent material or in the plating of either pin or socket contacts after crimp termination of wire (with the appropriate crimp tool) which could have deleterious effect on the performance of the contacts.

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. The hermetic sealing of class H and N connectors shall be accomplished by use of a single piece vitreous material.

3.3.4.1.1 Rigid (Except Classes H and N)

Rigid dielectric material shall be in accordance with ASTM D4066, or D948 as applicable.

3.3.4.1.2 Resilient

Resilient dielectric material shall conform to the requirements specified herein.

3.3.4.1.3 Insert Faces (Series 1 and 2)

Insert faces or sealing members to a minimum depth of 0.080 inches (0.033 inches on class H) shall be resilient within a shore A range of 30 to 85 for crimp connectors and class H connectors and 65 to 85 for solder contact connectors.

3.3.4.1.4 Insert Faces (Series 3)

The mating face of socket inserts shall be a hard non-resilient material. The mating face of pin inserts shall be a resilient material. The mating face of pin inserts shall be a resilient material within a Shore A Durometer range of 30 to 60.

3.3.5 Potting Form

Potting forms shall be made of translucent nylon. The form shall incorporate a means for attachment to the connector and shall accept and bond to MIL-PRF-8516 potting material without treatment by the user.

3.3.6 Shells (Except Classes H and N) Coupling Ring, and Metallic Accessories Material

Shells, coupling rings, and protective covers shall be made of high grade aluminum alloys. Die castings, if used, shall conform to ASTM B85/B85M, composition No. 13, 218, 380, or 384.

3.3.6.1 Finish

Aluminum parts and external screws of series 1 and 2 connectors shall be plated in accordance with AMS-QQ-P-416, type II, class 3, except that finish shall be olive drab (light to dark) and shall be electrically conductive. Aluminum parts of series 3 connectors shall be plated with a conductive finish. Cadmium plating shall not be used.

3.3.7 Shells (Classes H and N)

Shell material for referenced classes of connectors shall be as specified (3.1).

3.3.7.1 Finish Ferrous Alloy

Shells shall be tin plated. Preliminary plating of another metal is permissible. The resulting finish shall be suitable for soft soldering to a mounting surface. Plating shall be in accordance with ASTM B545 or B339 as applicable.

3.3.7.2 Finish, Corrosion Resistant Steel

The finish for corrosion resistant steel shells shall be passivated in accordance with AMS2700 or ASTM A967.

3.3.8 Fungus-Resistance Material

All connectors, except series 1, shall be made of fungus-resistance material listed in Table 5.

Table 5 - Fungus inert materials

Acrylics	Polycarbonate
Acrylonitrile-styrene	Polyester-glass fiber laminates
Acrylonitrile-vinyl-chloride copolymer	Polyethylene, high density (above 0.940)
Asbestos	Polyethylene terephthalate
Ceramics	Polyimide
Chlorinated polyester	Polymonochlorotrifluoroethylene
Fluorinated ethylenepropylene copolymer (FEP)	Polypropylene
Glass	Polystyrene
Metals	Polysulfone
Mica	Polytetrafluoroethylene
Plastic laminates:	Polyvinylidene chloride
Silicone-glass fiber Phenolic-nylon fiber	
Diallyl phthalate	Silicone resin
Polyacrylonitrile	Siloxane-polyolefin polymer
Polyamide <u>1</u> /	Siloxane polystyrene

1/ Literature shows that under certain conditions polyamides may be attacked by selective micro-organisms. However, for military applications, they are considered fungus-inert. For additional information regarding military usage, see MIL-HDBK-454.

3.4 Design and Construction

Connector assemblies and protective covers shall be designed and constructed to withstand normal handling incident to installation and maintenance in service.

3.4.1 Contacts

Contacts shall be designed so that neither the pins nor the sockets will be damaged during mating of counterpart connectors. A quantity of crimp contacts consisting of the normal complement, plus one spare contact for connector arrangements having 26 contacts or less and two spares for arrangements over 26 contacts, shall be included in the unit package. For indirect shipments, crimp contact connectors may be supplied without contacts.

3.4.1.1 Solder Contacts

Solder contacts shall conform to the dimensions of Figure 3A and shall be nonremovable from the insert. Solder cups shall be so designed that during soldering no components will be damaged. A vent hole or equivalent may be provided to prevent air entrapment during soldering.

3.4.1.2 Crimp Contacts

3.4.1.2.1 Crimp Contacts (Series 2)

Crimp contacts for series 2 connectors shall conform to AS39029/31 or AS39029/32 and shall be qualified to AS39029.

3.4.1.2.1.1 Insertion and Removal Tools (Series 2)

Tools required for assembly or disassembly of pin and sockets into their connector inserts shall be in accordance with AS81969/17 or /19.

3.4.1.2.2 Crimp Contacts (Series 3)

Crimp contacts for series 3 connectors shall conform to AS39029/4 through /10, as applicable, and shall be qualified to AS39029.

3.4.1.2.2.1 Insertion and Removal Tools (Series 3)

Tools required for assembly or disassembly of pin and sockets into their connector inserts shall be in accordance with AS81969/8 and AS81969/14. For removal of unwired (spare) contacts, use applicable AS81969/30.

3.4.1.3 Shielded Contacts

The shielded contacts shall conform to AS39029/7 or AS39029/8 and shall be capable of being inserted and removed from size 12 contact cavities using the same insertion/removal tool as specified for the size 12 contact (see 6.1m).

3.4.1.4 Through-Bulkhead Contacts

The engaging ends of contacts in through-bulkhead connectors shall conform dimensionally to corresponding details of Figures 3A and 3B (refer to AS39029/31 and /32 for more details). Contacts shall be non-removable.

3.4.2 Insert Design and Construction

Inserts shall be of voidless 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 on the applicable detail specification.

3.4.2.1 Inserts for Crimp Contact Connectors

In crimp contact connectors, the insert and wire sealing grommet shall be one integral part. The design shall permit the removal and reinsertion of individual contacts without damage to any part of the insert, including contact retention members or the sealing members, using the applicable tools. The individual contacts shall be positively retained when installed in the insert. Reference to wire sealing members does not apply to class N connectors (see 6.1b).