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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Tel: +1 724-776-4970 (outside USA)
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SAE WEB ADDRESS: **http://www.sae.org**

For more information on this standard, visit
https://www.sae.org/standards/content/AS81703B/

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:

MS3467	L	19	-	50	P	W
Basic Part Number	Class (1.2.3.1)	Shell Size (1.2.3.2)	*	Insert Arrangement (1.2.3.4)	Contact Designator (1.2.3.5)	Insert Position (1.2.3.6)

* 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 1/
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

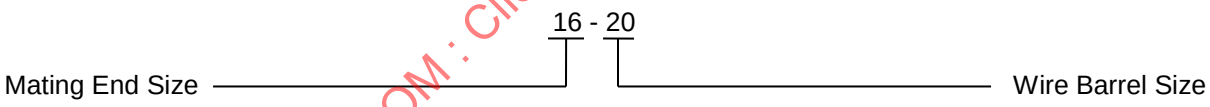
B - Less socket contact

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 125 °C	5000 MΩ 3 MΩ
2	25 °C 175 °C	10000 MΩ 300 MΩ
3 (except class L)	25 °C 200 °C	10000 MΩ 500 MΩ
3 - class L	25 °C 175 °C	10000 MΩ 500 MΩ

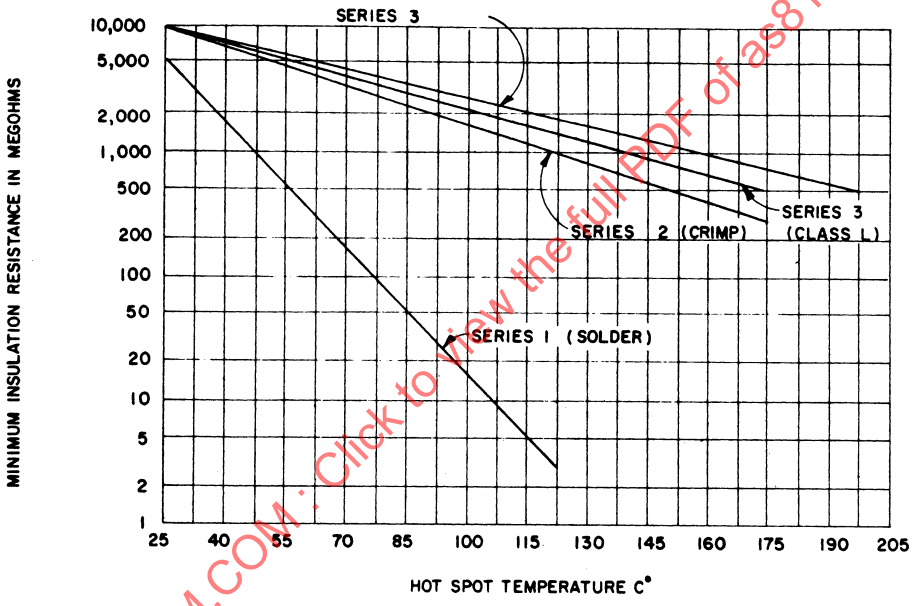


Figure 1 - Minimum insulation resistance versus hot spot temperature

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 125 °C	Continuous 1000 hours
2	25 °C 175 °C	Continuous 1000 hours
3 (except class L)	25 °C 200 °C	Continuous 1000 hours
3 - class L	25 °C 175 °C	Continuous 1000 hours

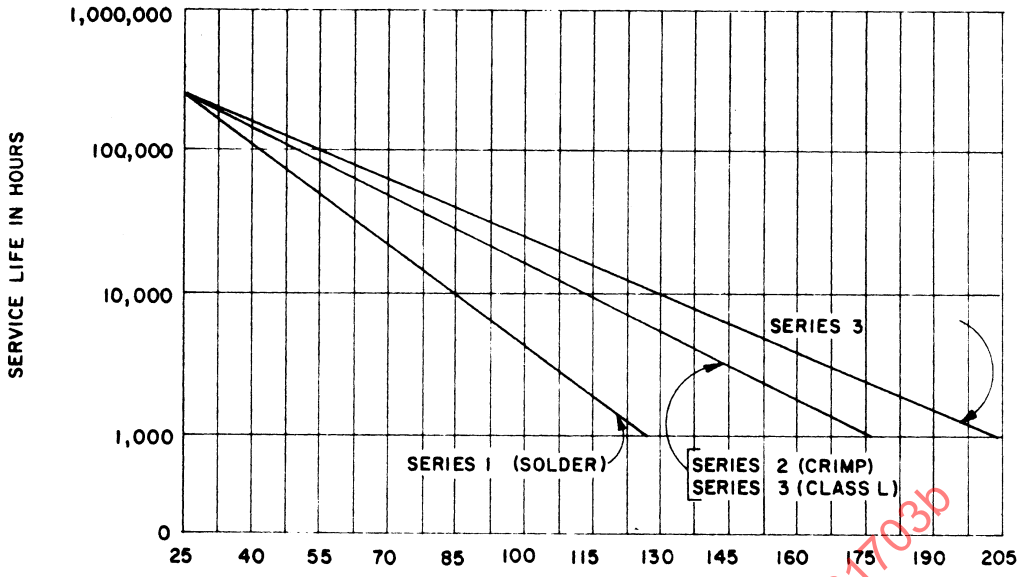


Figure 2 - Service life versus hot spot temperature

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 22 20	0.047 2/	0.085	0.040	0.083
16	20 18 16	0.066	0.109	0.053	0.103
12	14 12	0.097	0.142	0.099	0.158

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

Aircraft Application

AS50881 Wiring, Aerospace Vehicle

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: Silicone-glass fiber Phenolic-nylon fiber	Polyvinylidene chloride
Diallyl phthalate	Silicone resin
Polyacrylonitrile	Siloxane-polyolefin polymer
Polyamide 1/	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).

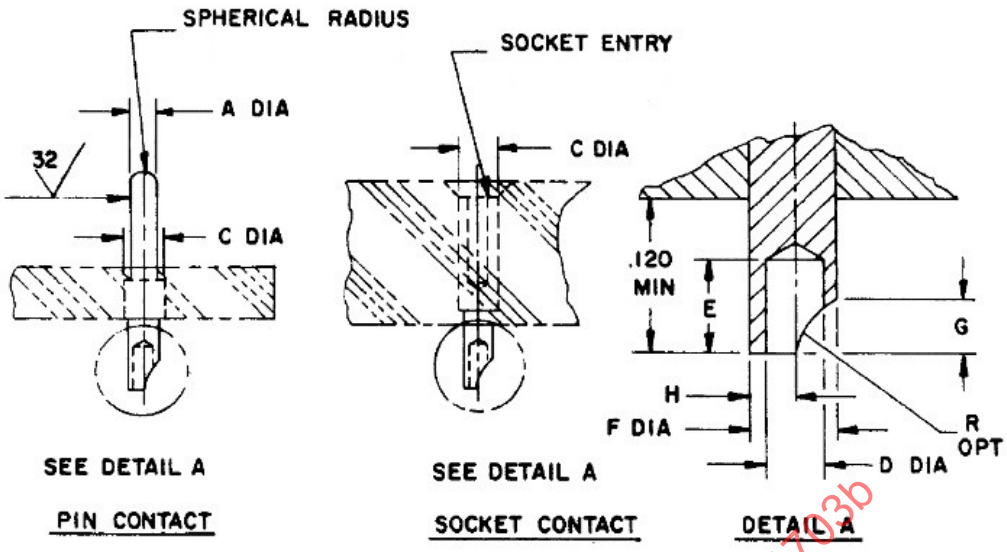


FIGURE 3 A. Contacts, solder type.

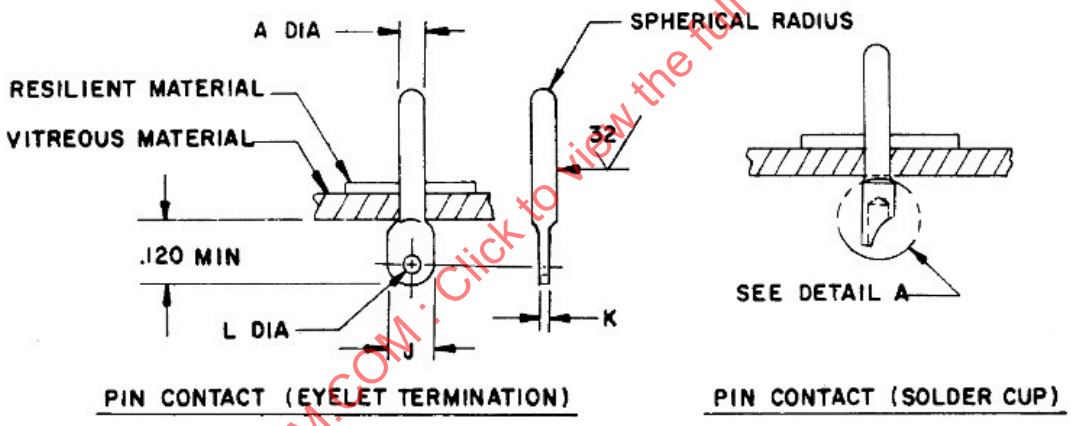


FIGURE 3 B. Contact, solder type, class H.

SIZE	A ±0.001	C MAX	D MIN	E +0.063 -0.016	F		G ±0.031	H ±0.010	J MAX	K MIN	L MIN
					MIN	MAX					
20	0.040	0.100	0.042	0.125	0.061	0.088	0.117	0.037	0.085	0.012	0.042
16	0.0625	0.136	0.069	0.188	0.096	0.116	0.098	0.054	0.115	0.020	0.065
12	0.094	0.190	0.110		0.139	0.156	0.125	0.070	0.190		0.096

NOTES:
Surface finish shall be in accordance with ASME B46.1.
Dimension “A” is measured over plating.
Dimensions are in inches.

Figure 3 - Design for through-bulkhead and solder type contact

3.4.2.2 Contact Arrangement

Contacts shall be arranged in accordance with the applicable insert arrangements. All solder cup openings shall be oriented to face the terminus of the indexing radius indicated on the connector derail specification and shall be at right angles to a center line coinciding with the indexing radius.

3.4.2.3 Contact Spacing

Minimum nominal center-to-center spacing and minimum dielectric thickness, contact to shell, or contact to contact shall be in accordance with the values shown in Table 6.

Table 6 - Minimum nominal contact spacing and minimum dielectric thickness

Connector Classes	Contact Size	Service Rating I			Service Rating II		
		Center-to-Center	Dielectric		Center-to-Center	Dielectric	
			Rigid	Resilient		Rigid	Resilient
E, J, P, L, N	20	0.130	0.006	0.008	0.162	0.008	0.012
	16	0.168	0.006	0.008	0.190	0.008	0.012
	12	0.205	0.006	0.008	0.230	0.008	0,012
H	20	0.130	0.006	0.030	0.162	0.008	0.030
	16	0.168	0.006	0,030	0.190	0.008	0.030
	12	0.205	0.006	0,030	0.230	0.008	0.030

3.4.2.4 Contact Alignment

With all contacts in place, the alignment of pin and socket contacts shall permit engagement regardless of buildup of tolerances on hole locations, distortions of contacts due to crimping, and insert location in the shell.

3.4.2.5 Contacts (Class N and H Connectors)

Contacts shall be fused into the single piece vitreous inserts of referenced connectors. A resilient face shall be permanently bonded to the insert to insure an interfacial seal in mating.

3.4.3 Shell Design (Except Classes H and N)

The connector shall be of single-piece shell design, constructed to positively retain the insert in its specified position in the shell. The shell shall be designed to accept and retain a cable adapter or other accessory.

3.4.3.1 Jam Nut Mounting Receptacle Shell

The jam nut mounting receptacle shall be provided with a mounting nut, an “O” ring and a lock washer.

3.4.3.2 Screw Threads

Screw threads shall be in accordance with MIL-S-7742. Slight out-of-roundness beyond the specification tolerances is acceptable, if threads can be checked without forcing the thread gages.

3.4.4 Coupling

3.4.4.1 Push-Pull

Push-pull connectors shall be coupled to counterpart connectors by means of push-pull coupling rings. Couplings shall be accomplished by a straight axial push of the push-pull rings; uncoupling by axial pull. The push-pull rings shall have concentric rings or shoulders or both to provide a gripping surface and differentiation from bayonet coupling rings.

3.4.4.1.1 Rack and Panel

Rack and panel plugs shall be mated to their appropriate receptacles by securing the mounting panels of both halves in fully mated position. (The securing method shall be a part of the structure.)

3.4.4.1.2 Protective Covers

Protective covers (refer to AS31831) shall be mated to receptacle connectors by means of push-pull coupling rings. Coupling shall be accomplished by a straight axial push on the shell of the protective cover, while its coupling ring is fully pulled back. Uncoupling is accomplished by straight axial pull on the coupling ring.

3.4.4.2 Engagement of Connectors

3.4.4.2.1 Push-Pull

Push-pull connectors of any arrangement, with accessories, shall be capable of being fully engaged and disengaged without the use of tools. Engagement of connectors is defined as full insertion of pins into sockets and proper sealing of the mating insert faces. Full engagement of push-pull connectors shall be indicated by an audible sound at the completion of the coupling cycle. On push-pull connectors and protective covers a positive detent shall be included in the coupling mechanism to lock connectors in the engaged position. Connectors shall have a contrasting stripe under the coupling ring which is uncovered only when the plug is fully engaged, and the coupling ring is in the locked position.

3.4.4.2.2 Rack and Panel

Rack and panel plugs, and applicable receptacles are considered fully mated when their mounting panels are secured to the distance specified on AS34451 or AS34461, as applicable.

3.4.4.3 Shell Polarization

Polarization of connectors shall be accomplished by matched key and keyway 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 socket of the counterpart connector.

3.4.4.4 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 inch minimum (see 6.1(i) for exception).

3.4.4.5 Lubrication

Ball lock mechanisms shall be suitably lubricated. Features which are intended to provide potting compound anchorage shall be free of lubricant.

3.4.4.6 Protective Covers and Stowage Receptacles

When mated to counterpart connectors, the protective covers and stowage receptacles shall maintain the connector free of moisture and prevent air leakage.

3.4.5 Wire Sealing

3.4.5.1 Crimp Contact Connectors (Except Class N)

Crimp contact connectors shall be provided with an integral grommet and insert capable of sealing on wires of the sizes specified in Table 4.

3.4.5.1.1 Solder Contact Connectors

Class E solder contact connectors shall be provided with a removable resilient grommet and retaining feature. The grommet shall be designed to fit firmly against the rear face of the insert and around each contact and wire termination so that any air path between terminations; and between terminations and the shell is interrupted by dielectric material under compression of 0.005 inch minimum.

3.4.5.2 Class P Connectors

Class P connectors shall be provided with a plastic potting form suitable to accept and bond to MIL-PRF-8516 potting material. Inserts of class P connectors shall be designed so that potting material will adhere to the shell and insert.

3.4.5.3 Class N and H Connectors

Class N and H connectors shall not be provided with a wire sealing grommet; however, the shells and inserts shall be designed so that MIL-PRF-8516 potting material will adhere to the insert.

3.4.5.4 Class J Connectors

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

3.4.5.5 Grommet Sealing Plugs

The grommets of all classes (except classes H and N) shall be designed to accept sealing plugs in accordance with MS3187 in lieu of wire where unwired contacts are used. Fifteen percent of the number of contacts, but not less than 1, shall be included in the unit package. For indirect shipments, connectors may be supplied without grommet sealing plugs (see 6.2).

3.4.6 Accessories

The accessory design shall be in accordance with AS85049, free of any sharp edges or other feature that could cause damage to any wire extending through it, for the service life of the connector (see 6.2.1).

3.5 Interchangeability

All connectors and accessories having the same detail specification part number shall be completely interchangeable with respect to physical and functional capabilities.

3.5.1 Intermateability

All connectors within the same series shall be completely intermateable.

a. Series 1 push-pull plugs will intermate with all series 1, 2, and 3 receptacles.

b. Series 3 push-pull plugs will not intermate with series 1 and 2 receptacles or AS31821 protective covers (due to five key provisions).

c. Rack and panel plugs will mate with square flange receptacles or solder mount receptacles and the series 3 single hole mount receptacles. Rack and panel plugs do not mate with the series 1 and 2 single hole mount receptacles.

3.6 Performance

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

3.6.1 Maintenance Aging

When tested as specified in 4.6.6, all crimp-contact connectors shall be capable of conforming to the requirements herein. Contact retention shall be performed on contacts subjected to the maintenance aging test.

3.6.2 Operation Forces

When tested as specified in 4.6.2, mating and unmating of connectors and protective covers shall meet the force requirements of Table 7.

Table 7 - Coupling - force, axial (pounds)

Shell Size	Maximum Engagement and Disengagement Forces		Minimum Disengagement Forces	
	Push-Pull	Rack and Panel	Push-Pull	Rack and Panel 1/
3	15	18	1.2	0.14
7	20	20	1.5	0.33
12	34	38	2.0	0.56
19	38	46	3.0	0.89
27	40	46	4.0	1.27
37	44	50	6.0	1.74
61	49	68	7.0	2.12

1/ Minimum disengagement values for rack and panel connectors apply when all mounting components and panel locking devices are relaxed.

3.6.3 Contact Resistance

Contacts in the mated condition shall meet the contact resistance requirements of Table 7A and AS39029 as applicable.

Table 7A - Contact resistance limits

Connector Class	Mating and Size	Wire Size	Test Current (amperes)	Millivolt Drop (Maximum)			
				Initial		After Corrosion	
E, L, J, P	20	24 22 20	3.0 5.0 7.5	45 45 55		55 55 65	
	16	18 16	10.0 13.0	45 50		55 60	
	12	14 12	17.0 23.0	45 50		55 60	
H, N				Ave.	Indiv.	Ave.	Indiv.
	20 16 12	20 16 12	5.0 10.0 17.0	70 65 65	105 95 95	90 80 80	165 165 165

3.6.4 Insulation Resistance

Insulation resistance versus temperature shall be as shown on Figure 1 and Table 2.

3.6.4.1 Insulation Resistance at Room Temperature

When tested as specified in 4.6.4.1, insulation resistance at room temperature shall be greater than 5000 MΩ for series 1 connectors, and greater than 10000 MΩ for series 2 and 3 connectors.

3.6.4.2 Insulation Resistance at Elevated Temperature - Short Time

When tested as specified in 4.6.4.2, the requirement shall be as follows:

a. Series 1 (solder). After an exposure for 250 hours at 125 °C, the insulation resistance shall be greater than 3 MΩ.

b. Series 2 (crimp). After an exposure for 250 hours at 175 °C, the insulation resistance shall be greater than 300 MΩ.

c. Series 3 (class L). After an exposure for 250 hours at 175 °C, the insulation resistance shall be greater than 500 MΩ.

d. Series 3 (class E, H, and N). After an exposure for 250 hours at 200 °C, the insulation resistance shall be greater than 500 MΩ.

3.6.4.3 Insulation Resistance at Elevated Temperature - Long Time

When tested as specified in 4.6.4.3, the requirement shall be as follows:

a. Series 1 (solder). After an exposure for 1000 hours at 105 °C, the insulation resistance shall be greater than 12 MΩ.

b. Series 2 (crimp). After an exposure for 1000 hours at 175 °C, the insulation resistance shall be greater than 300 MΩ.

c. Series 3 (class L). After an exposure for 1000 hours at 175 °C, the insulation resistance shall be greater than 500 MΩ.

d. Series 3 (classes E, H, and N). After an exposure for 1000 hours at 200 °C, the insulation resistance shall be greater than 500 MΩ.

3.6.5 Dielectric Withstanding Voltage

When tested as specified in 4.6.5.1 and 4.6.5.2, connectors shall show no evidence of breakdown or flashover. Corona shall not be considered as breakdown.

3.6.5.1 Working Voltage

Maximum working voltages shall be as shown in Table 8.

Table 8 - Working voltage (ac, rms)

Condition	Service Rating I	Service Rating II
Sea Level	600	1000
70000 feet	300	450

3.6.6 Contact Insertion and Removal Forces (Crimp Contact Connectors Only)

When tested as specified in 4.6.6, the contact insertion and removal forces shall meet the requirements of Table 9.

Table 9 - Contact insertion and removal forces

	Force Pounds Maximum			
	Series 2		Series 3	
Contact Size	Insertion	Removal	Insertion	Removal
20-20	20	20	15	10
16-16	20	20	15	10
12-12	30	30	15	10

3.6.7 Thermal Shock

When tested as specified in 4.6.7 using the extreme temperature of Table 10, there shall be no damage detrimental to the operation of the connector.

Table 10 - Temperature extremes

Low Temperature All Classes	High Temperatures		
	Series 1	Series 2 and 3 Crimp and Class L	Series 3 Classes E, H, and N
-55 °C ± 3 °C	125 °C ± 3 °C	175 °C ± 3 °C	200 °C ± 3 °C

3.6.8 Water Pressure (Class J Only)

When tested as specified in 4.6.8, connectors shall show no evidence of water leakage and there shall be no evidence of moisture at the interface and cable housing. The insulation resistance subsequent to exposure shall be greater than 100 MΩ.

3.6.9 Air Leakage

3.6.9.1 Connectors, Nonremovable Contacts and Accessories (Except Classes N and H)

When tested as specified in 4.6.9.1, the air leakage rate shall not be greater than 1 in^3/h (4.55×10^{-3} cm^3/s), including the flange “O” ring seal of all jam-nut receptacles.

3.6.9.2 Connectors, Classes N and H

When tested as specified in 4.6.9.2, the air leakage rate shall not exceed 0.1 µm ft^3/h (1×10^{-6} cc/s). The specified leakage rate shall apply only through the connector and not through the flange and mounting surface area, unless solder mounted.

3.6.10 Durability

When tested as specified in 4.6.10, counterpart connectors shall show no mechanical or electrical defects detrimental to the operation of the connector.

3.6.11 Salt Spray (Corrosion)

When tested as specified in 4.6.11, unmated connectors, stowage receptacles, protective covers, mating shells, and accessories shall show no exposure of basic metal due to corrosion which will affect performance.

3.6.12 Vibration

When tested as specified in 4.6.12, mated connectors shall not be damaged and there shall be no loosening of parts due to vibration. Connectors shall be retained in full engagement, and there shall be no interruption of electrical continuity.

3.6.13 Shock (Specified Pulse)

When tested as specified in 4.6.13, mated connectors shall not be damaged and there shall be no loosening of parts, nor shall there be an interruption of electrical continuity.

3.6.14 Moisture Resistance

When tested as specified in 4.6.14, mated connectors shall have an insulation resistance of more than 100 MΩ at 25 °C.

3.6.15 Fluid Immersion

When tested as specified in 4.6.15, connectors shall meet the requirements of the subsequent tests specified in the applicable sequence.

3.6.16 Insert Retention (Except Classes N and H)

When tested as specified in 4.6.16.2, inserts shall not be dislocated from the specified insert position as shown on the applicable detail specification drawing when an effective pressure differential of 75 ft-lb/in^2 is applied.

3.6.16.1 Insert Retention (Classes N and H)

When tested as specified in 4.6.16.2, class N and H inserts shall not be dislocated from the specified position when an effective pressure differential of 200 ft-lb/in^2 is applied.

3.6.17 Gage Location and Retention (Crimp Type Contacts)

The axial location of series 2 pin contacts and series 3 pin and socket contacts shall be measured as specified in 4.6.17, using test gages conforming to MS3460 or MS3461, as applicable. Gage location measurements shall fall within the range specified on the applicable detail specification drawing. Test gages conforming to MS3460, MS3461, or MS3462, as applicable, shall be retained in the pin and socket cavities of series 2 and series 3 connectors, and in the rear termination cavities of class N connectors, with the axial loads specified in Table 11 applied. The axial displacement of the test gages while under load shall not exceed 0.012 inches.

3.6.18 Contact Retention (see 4.6.18)

Contacts shall be retained in the inserts with the axial loads specified in Table 11 applied. The axial displacement of the crimp contacts shall not exceed 0.012 inches while under load with the accessory rear hardware removed. The axial displacement of solder contacts shall not exceed 0.012 after the load has been removed.

Table 11 - Axial loads for contact retention

Mating End Size	Axial Load (pounds-minimum)
20-20	15
16-16	25
12-12	25

3.6.19 Contact Engaging and Separating Forces (Series 1 Only)

When tested as specified in 4.6.19, the contact engaging and separating forces shall not exceed the applicable values specified in Table 12.

3.6.20 Probe Damage (Series 1 Only)

When tested as specified in 4.6.20, socket contacts shall conform to the requirements in 3.6.19.

Table 12 - Contact engaging and separating forces (ounces) (series 1)

AS31971 Probe	Mating End Size		
	20	16	12
Minimum (with min. dia. pin)	0.75 oz	2 oz	3 oz
Maximum Average (with max. dia. pin)	12 oz	12 oz	24 oz
Maximum (with max. dia. pin)	18 oz	30 oz	30 oz

3.6.21 Cover Chain Tensile Strength

When tested as specified in 4.6.21, protective covers with chains shall withstand a 25-pound tensile test without damage.

3.6.22 Magnetic Permeability

When tested as specified in 4.6.22, the relative magnetic permeability (Mu) of connector assemblies and accessories (except classes N and H, and rack and panel connectors) shall be less than 2.0.

3.6.23 External Bending Moment

When testing as specified in 4.6.23 using the applicable bending moment shown in Table 13, there shall be no evidence of physical damage detrimental to the operation of the connector nor shall there by any interruption of electrical continuity.

Table 13 - External bending moment

Plug Shell Size	Bending Moment (inch-pounds)
3	25
7	45
12	45
19	45
27	40
37	40
61	40

3.7 Marking

Each connector shall be legibly and permanently marked on the shell or on the coupling ring in accordance with MIL-STD-1285. The detail specification part number shall be as shown in 1.2.3. In addition, all rear release crimp type connectors (series 3) and backshell accessories shall be marked around the periphery of the shell with a blue color band in accordance with EIA - RS359 to identify the connectors as having the wire side release contact system. The location of the blue band shall be in accordance with the applicable detail specification drawings. Suppliers' symbols or trademarks shall be listed in AIR1351.

3.7.1 Inserts

Inserts shall be marked in contrasting colors as illustrated on the applicable detail specification. Raised or depressed characters shall not be used on mating faces, except for series 1 connector. (See Figure 4 for series 3 insert marking.)

3.7.2 Contact Designations

Contact locations shall be designated by identifiable characters of contrasting color on the front and rear faces of the insert-grommet assembly. Positioning and arrangement of the characters shall be such that the appropriate contact cavities are identifiable and remain identifiable after completion of tests specified in Table 13.

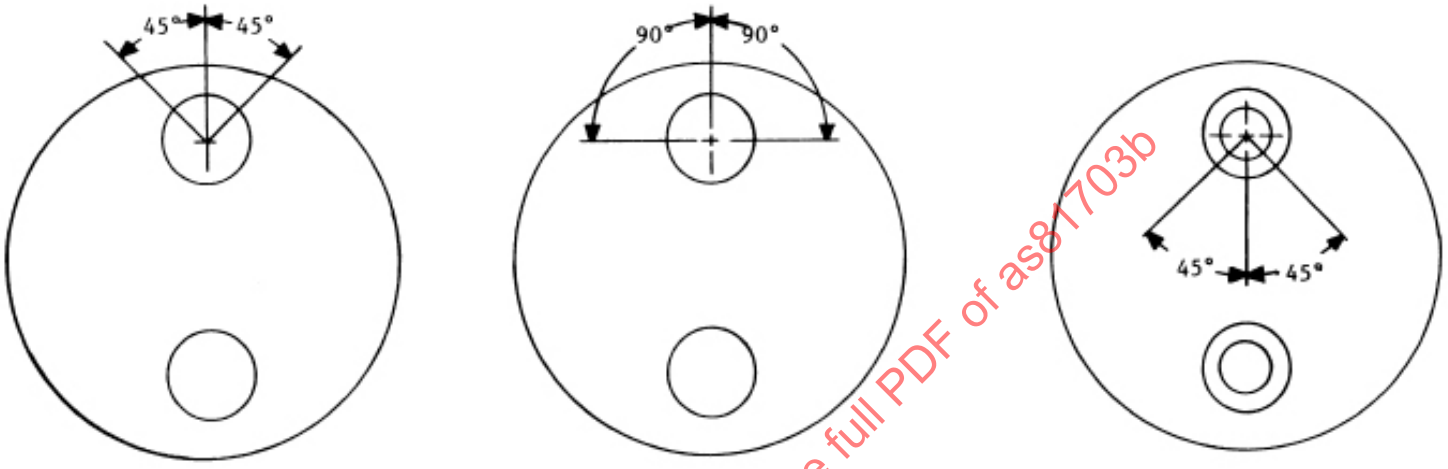
3.8 Workmanship

Connectors shall be processed in such a manner as to be uniform in quality and shall be free from pits, corrosion cracks, rough edges, chips, and other defects that will affect life, serviceability, or appearance.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all contract inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the supplier shall use the qualifying activity laboratory or qualifying activity approved facilities with witness oversight suitable for the performance of the initial qualification inspection requirements specified herein. The qualifying activity has the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.



NOTES:

1. Contact identification numbers on the rear grommet face of the socket and pin insert shall be within 45 degrees either side of the vertical centerline above the contact cavity.

2. Numbers shall be placed on the socket insert engaging face as shown. The numbers shall be above the horizontal centerline of the chamfered lead-ins. Where space precludes the application of numbers, an ever-expanding orbital line is permissible.

3. Numbers on the engaging face of the pin insert shall be on the raised seal barrier above or elongated beside the pin contact cavity. Numbers shall not extend into the lower sector of the raised seal barrier which extends 45 degrees either side of the vertical centerline.

4. On outer row of contacts, individual cavity identification may be deleted from those cavities where space precludes its application.

Figure 4 - Insert cavity identification locations (series 3)

Table 14 - Sequence for qualification
For series 1 and 2 connectors (classes E, P, H, and J)

Title	Requirement Paragraph	Test Paragraph	Test Group					
			1	2	3	4	5	6
Visual and Mechanical Examination	3.1, 3.3 thru 3.4.5.5, 3.5, 3.7, and 3.8	4.6.1	X	X	X	X	X	X
Magnetic Permeability	3.6.22	4.6.22	X	X	X	X	X	X
Maintenance Aging	3.6.1	4.6.6	X	-	-	-	-	-
Contact Insertion/Removal Forces	3.6.6	4.6.6	X	-	-	-	-	-
Gage Location and Retention (crimp type)	3.6.17	4.6.17	X	-	-	-	-	-
Operating Forces	3.6.2	4.6.2	X	X	X	X	X	X
Insulation Resistance at Room Temperature	3.6.4.1	4.6.4.1	X	X	X	X	X	X
Dielectric Withstanding Voltage (sea level)	3.6.5	4.6.5.1	X	X	X	X	X	X
Dielectric Withstanding Voltage (altitude)	3.6.5	4.6.5.2	X	X	X	X	X	X
Contact Resistance	3.6.3	4.6.3	-	X	X	-	X	X
Thermal Shock	3.6.7	4.6.7	X	-	-	X	-	-
Air Leakage	3.6.9.1	4.6.9.1	X	-	-	-	-	-
Air Leakage (hermetic)	3.6.9.2	4.6.9.2	-	-	-	X	-	-
Insulation Resistance at Elevated Temperature								
Short Time	3.6.4.2	4.6.4.2	-	X	-	-	-	-
Long Time	3.6.4.3	4.6.4.3	-	-	X	-	-	-
Durability	3.6.10	4.6.10	X	-	-	X	-	-
Vibration	3.6.12	4.6.12	X	-	-	X	-	-
Shock (specified pulse)	3.6.13	4.6.13	X	-	-	X	-	-
Moisture Resistant	3.6.14	4.6.14	X	-	-	X	-	-
Insulation Resistant	3.6.4	4.6.4.1	X	-	-	X	-	-
Salt Spray (corrosion)	3.6.11	4.6.11	X	-	-	X	-	-
Operating Forces	3.6.2	4.6.2	X	-	-	X	-	-
Contact Resistance	3.6.3	4.6.3	X	-	-	X	-	-
Fluid Immersion, Lubricating Oil	3.6.15	4.6.15.1(b)	-	X	-	-	X	-
Fluid Immersion, Hydraulic Fluid	3.6.15	4.6.15.1(a)	-	-	X	-	-	X
Operating Forces	3.6.2	4.6.2	-	X	X	-	X	X
Dielectric Withstanding Voltage (sea level)	3.6.5	4.6.5.1	-	X	X	-	X	X
Contact Retention (solder type and class N)	3.6.18	4.6.18.1	X	X	X	X	-	-
Contact Retention (crimp type, except class N)	3.6.18	4.6.18.2	X	X	X	-	-	-
Insert Retention	3.6.16	4.6.16.1	X	X	X	-	-	-
Insert Retention (hermetic)	3.6.16.1	4.6.16.2	-	-	-	X	X	X
Visual and Mechanical Examination	3.1, 3.3 thru 3.4.5.5, 3.5, 3.7, and 3.8	4.6.1	X	-	X	X	-	X

Table 14 - Sequence for qualification (continued)
For series 3, classes L, H, and N connectors

Title	Requirement Paragraph	Test Paragraph	Test Group					
			1	2	3	4	5	6
Visual and Mechanical Examination	3.1, 3.3 thru 3.4.5.5, 3.5, 3.7, and 3.8	4.6.1	X	X	X	X	X	X
Magnetic Permeability	3.6.22	4.6.22	X	X	X	X	X	X
Maintenance Aging	3.6.1	4.6.6	X	-	-	-	-	-
Contact Insertion/Removal Forces	3.6.6	4.6.6	X	-	-	-	-	-
Gage Location and Retention (crimp type)	3.6.17	4.6.17	X	-	-	X	-	-
Operating Forces	3.6.2	4.6.2	X	X	X	X	X	X
Insulation Resistance at Room Temperature	3.6.4.1	4.6.4.1	X	X	X	X	X	X
Dielectric Withstanding Voltage (sea level)	3.6.5	4.6.5.1	X	X	X	X	X	X
Dielectric Withstanding Voltage (altitude)	3.6.5	4.6.5.2	X	X	X	X	X	X
Contact Resistance	3.6.3	4.6.3	-	X	-	-	X	X
Thermal Shock	3.6.7	4.6.7	X	-	X	X	-	-
Air Leakage (hermetic)	3.6.9.2	4.6.9.2	-	-	-	X	-	-
Insert Retention	3.6.16	4.6.16.1	X	-	X	-	-	-
Vibration	3.6.12	4.6.12	X	-	X	X	-	-
Shock (specified pulse)	3.6.13	4.6.13	X	-	X	X	-	-
Insulation Resistance at Elevated Temperature								
Short Time	3.6.4.2	4.6.4.2	-	X	-	-	-	-
Long Time	3.6.4.3	4.6.4.3	X	-	X	-	-	-
Durability	3.6.10	4.6.10	-	X	-	X	-	-
Moisture Resistance	3.6.14	4.6.14	X	-	X	X	-	-
Insulation Resistant	3.6.4	4.6.4.1	X	-	X	X	-	-
Salt Spray (corrosion)	3.6.11	4.6.11	-	X	-	X	-	-
Operating Forces	3.6.2	4.6.2	X	X	-	X	-	-
Contact Resistance	3.6.3	4.6.3	X	-	-	X	-	-
Fluid Immersion, Lubricating Oil	3.6.15	4.6.15.1(b)	-	X	-	-	X	-
Fluid Immersion, Hydraulic Fluid	3.6.15	4.6.15.1(a)	-	-	X	-	-	X
Operating Forces	3.6.2	4.6.2	-	X	X	-	X	X
Dielectric Withstanding Voltage (sea level)	3.6.5	4.6.5.1	-	-	-	-	X	X
Dielectric Withstanding Voltage (altitude)	3.6.5	4.6.5.2	X	X	X	-	-	-
Contact Retention (solder type and class N)	3.6.18	4.6.18.1	-	-	-	X	-	-
Contact Retention (crimp type, except class N)	3.6.18	4.6.18.2	X	X	X	-	-	-
Insert Retention	3.6.16	4.6.16.1	X	X	X	-	-	-
Insert Retention (hermetic)	3.6.16.1	4.6.16.2	-	-	-	X	X	X
Air Leakage (hermetic)	3.6.9.2	4.6.9.2	-	-	-	X	-	-
Visual and Mechanical Examination	3.1, 3.3 thru 3.4.5.5, 3.5, 3.7, and 3.8	4.6.1	X	X	X	X	X	X

Table 14 - Sequence for qualification (continued)
For series 3, class E connectors

Title	Requirement Paragraph	Test Paragraph	Test Group 1/		
			1	2	3
Visual and Mechanical Examination	3.1, 3.3 thru 3.4.5.5, 3.5, 3.7, and 3.8	4.6.1	X	X	X
Magnetic Permeability	3.6.22	4.6.22	X	X	X
Maintenance Aging	3.6.1	4.6.6	X	-	-
Contact Insertion/Removal Forces	3.6.6	4.6.6	X	-	-
Gage Location and Retention (crimp type)	3.6.17	4.6.17	X	-	-
Operating Forces	3.6.2	4.6.2	X	X	X
Insulation Resistance at Room Temperature	3.6.4.1	4.6.4.1	X	X	X
Dielectric Withstanding Voltage (sea level)	3.6.5	4.6.5.1	X	X	X
Dielectric Withstanding Voltage (altitude)	3.6.5	4.6.5.2	X	X	X
Contact Resistance	3.6.3	4.6.3	-	X	-
Thermal Shock	3.6.7	4.6.7	X	-	X
Insert Retention	3.6.16	4.6.16.1	X	-	X
Vibration	3.6.12	4.6.12	X	-	X
Shock (specified pulse)	3.6.13	4.6.13	X	-	X
Insulation Resistance at Elevated Temperature					
Short Time	3.6.4.2	4.6.4.2	-	X	-
Long Time	3.6.4.3	4.6.4.3	X	-	X
Durability	3.6.10	4.6.10	-	X	-
Moisture Resistance	3.6.14	4.6.14	X	-	X
Insulation Resistant	3.6.4	4.6.4.1	X	-	X
Salt Spray (corrosion)	3.6.11	4.6.11	-	X	-
Operating Forces	3.6.2	4.6.2	X	X	-
Contact Resistance	3.6.3	4.6.3	X	-	-
Fluid Immersion, Lubricating Oil	3.6.15	4.6.15.1(b)	-	X	-
Operating Forces	3.6.2	4.6.2	-	X	X
Dielectric Withstanding Voltage (altitude)	3.6.5	4.6.5.2	X	X	X
Contact Retention (crimp type, except class N)	3.6.18	4.6.18.2	X	X	X
Insert Retention	3.6.16	4.6.16.1	X	X	X
Insert Retention (hermetic)	3.6.16.1	4.6.16.2	-	-	-
Visual and Mechanical Examination	3.1, 3.3 thru 3.4.5.5, 3.5, 3.7, and 3.8	4.6.1	X	X	X
1/ Test Groups 4, 5, and 6 not applicable					
Group 7 – Solder Contacts					
Probe Damage	3.6.20	4.6.20			
Contact Engagement and Separation	3.6.19	4.6.19			
Group 8 – Protective Covers and Stowage Receptacles					
	3.1, 3.3 thru 3.4.5.5,				
Visual and Mechanical Examination	3.5, 3.7, and 3.8	4.6.1			
Magnetic Permeability	3.6.22	4.6.22			
Operating Forces	3.6.2	4.6.2			
Moisture Resistance	3.6.14	4.6.14			
Cover Chains, Tensile Strength	3.6.21	4.6.21			
Air Leakage	3.6.9.1	4.6.9.3			
Group 9 – Crimp Contact Retention Feature					
	3.1, 3.3 thru 3.4.5.5,				
Visual and Mechanical Examination	3.5, 3.7, and 3.8	4.6.1			
Maintenance Aging (contacts only)	3.6.1	4.6.6			

Table 14 - Sequence for qualification (Continued)

	Requirement Paragraph	Test Paragraph
Group 10 – Solder Connector Assemblies, Class J		
Visual and Mechanical Examination	3.1, 3.3 thru 3.4.5.5, 3.5, 3.7, and 3.8	4.6.1
Magnetic Permeability	3.6.22	4.6.22
Thermal Shock	3.6.7	4.6.7
Water Pressure	3.6.8	4.6.8
Air Leakage	3.6.9.1	4.6.9.1
Group 11 – Connector Receptacle Strength		
External Bending Moment	3.6.23	4.6.23
Group 12 – Fluid Immersion, Series 3 (Classes L, H, and N)		
Visual and Mechanical Examination	3.1, 3.3 thru 3.4.5.5, 3.5, 3.7, and 3.8	4.6.1
Operating Forces	3.6.2	4.6.2
Thermal Shock	3.6.7	4.6.7
Fluid Immersion	3.6.15	4.6.15.2
Operating Forces	3.6.2	4.6.2

Table 15 - Test cylinder OD sizes

Shell Size	Diameter (0.016 inch)
3	0.194
7	0.397
12	0.428
19	0.538
27	0.616
37	0.678

4.1.1 Test Equipment and Inspection Facilities

Test and measuring equipment and inspection facilities of sufficient accuracy, quality and quantity to permit performance of the required inspection shall be established and maintained by the qualifying activity. The establishment and maintenance of a calibration system to control the accuracy of the measuring and test equipment shall be in accordance with ANSI/NCSL Z540-3 or 10012.

4.2 Classification of Inspection

The inspections specified herein are classified as follows:

a. Qualification Inspection (4.4).

b. Quality Conformance Inspection (4.5).

c. Qualification Verification Inspection (4.5.2).

4.3 Inspection Conditions

Unless otherwise specified herein, all inspections shall be made in accordance with the test conditions specified in EIA 364.

4.3.1 Preparation of Samples

Connectors, except class J, shall be wired with approximately 3 feet of wire as specified in Table 4. Termination of wires to crimp contacts shall be made in accordance with AS22520; solder contacts shall be made in accordance with J-STD-001. See IPC-HDBK-001 for additional guidance.

4.4 Qualification Inspection

Initial qualification inspection shall be performed by the qualifying activity in accordance with Table 14. A supplier request for qualification shall be made to the qualifying activity prior to initiating testing. Testing cannot begin until the supplier has received the authorization letter. The qualifying activity is recommended to provide the supplier a test plan based on the authorization letter to ensure the supplier and qualifying activity maintain communication and document changes as needed. For each component tested, the supplier shall use the same materials, manufacturing procedures, and methods of inspection as would be used to provide the component to a purchaser (see 4.5 Group A and B requirements). The supplier shall provide a test report as specified in 4.4.7. When requested by the supplier, the qualifying activity will provide the results of the testing as a certified data package. Any significant change in the supplier's process control inspections, quality conformance inspections, or manufacturing control drawings (editorial changes are acceptable) without the express approval of the qualifying activity may result in loss of qualification for that product. The qualifying activity has the authority to modify the specification test requirements to resolve test failures/discrepancies and to wave testing to verify specific product manufacturing changes or qualifications by similarity.

4.4.1 Samples

Samples of each item for which qualification is desired shall be tested in the sequence specified in Table 14, as applicable. Specific details shall be as follows:

a. A sufficient number of crimp contact connectors (series 2 and 3) shall be supplied to provide a minimum of 110 contact cavities of the size of contacts for which qualification of the crimp contact retention feature is desired.

b. Each connector (series 1, 2, and 3) subjected to qualification testing shall be provided with a counterpart connector for those tests requiring mating assemblies. Separate samples are required for crimp contact connectors and solder contact connectors. The counterpart connectors provided shall be new, previously qualified connectors or new connectors submitted for qualification testing. Suppliers not producing mating connectors shall submit qualified counterpart connectors.

4.4.1.1 Connector Assemblies (Classes E, P, and L)

Six complete connector assemblies class E or L, wall mount receptacles and straight push-pull or rack and panel plugs, per contact size for which qualification is requested shall be provided.

a. Two samples shall have pin contacts in the plug and socket contacts in the receptacle. Both halves of the samples shall be wired with approximately 3 feet of wire approaching the minimum OD specified in Table 4. These samples shall be subjected to the tests of Table 14, group 1.

b. Four samples shall have socket contacts in the plug and pin contacts in the receptacle. Both halves of each sample shall be wired with approximately 3 feet of wire approaching the maximum OD specified in Table 4. These samples shall be divided into two equal groups and subjected to all the tests of Table 14, groups 2 and 3 respectively. In addition, all group 3 samples shall be subjected to the test specified in Table 14, group 11.

c. When class L connectors are being tested, an additional seven complete connector assemblies shall be subjected to the tests specified in Table 14, group 12. These connectors shall be wired with nominal OD wire selected from Table 4.

d. Qualification of class L connectors shall admit qualification of class E connectors and vice versa (except the requirements of (c) above shall be met by class L connectors in either case).

e. Qualification of these samples shall admit qualification of other types and the balance of insert patterns containing contact sizes previously qualified, in respective classes, by similarity. If qualification of class E is not sought, samples of class P shall be submitted for class E in the foregoing, except that nominal gage wire shall be used.

4.4.1.2 Connector Assemblies (Classes N and H)

Three receptacles of each classes N and H shall be provided together with counterpart class E or L straight push-pull plugs.

a. All halves shall be wired with approximately 3 feet of wire of nominal gage.

b. The samples shall be divided into three equal groups and subjected to all the tests of Table 14, groups 4, 5, and 6. One group of connectors shall be assigned to each test sequence.

c. An additional seven class N and seven class H receptacles together with counterpart class L straight push-pull plugs shall be subjected to the tests specified in Table 14, group 12. These connectors shall be wired with nominal OD wire.

d. Qualification of these samples shall admit qualification of other types, mounting, and the balance of insert patterns in each respective class by similarity.

4.4.1.3 Connector Assemblies (Class J)

One mated pair of class J connector assemblies, in each shell size, shall be subjected to the tests of Table 14, group 10. The connectors need not be wired but shall be assembled using a solid polycholoprene cylinder of suitable length and OD in accordance with Table 15. The Shore A Durometer of the test cylinder shall be from 75 to 85. Qualification of these samples will admit qualification of all class J assemblies if class E is being qualified at the same time or has been previously qualified to this specification. If not, class J assemblies shall be subjected to all of the tests of Table 14, groups 1 and 2.

4.4.1.4 Socket Contacts (Except Crimp Type)

Fifty of each socket contact configuration shall be subjected to the probe damage test (4.6.20). Solder type sockets or sockets that are not completely assembled before installing in the insert (e.g., class H, socket style), may be provided and tested in connectors, group 7, Table 14.

4.4.1.5 Protective Covers and Stowage Receptacles

Two each protective covers and stowage receptacles of each shell size, with mating class E and L connectors, shall be subjected to the tests of group 8, Table 14.

4.4.1.6 Crimp Connectors

Connectors supplied in accordance with 4.4.1 shall be subjected to the tests specified in group 9, Table 14.

4.4.1.7 Receptacles

Two receptacles for each size shell shall be subjected to the test specified in group 11, Table 14.

4.4.2 Inspection Routine

The sample shall be subjected to the inspection specified in Table 14 in the order shown.

4.4.3 Failures

One or more failures shall be cause for refusal to grant qualification approval.

4.4.4 Retention of Qualification

At 36-month intervals, the qualifying activity shall authorize the supplier to begin retention of qualification. The qualifying activity shall perform the Table 18 tests on samples that pass the Group A and B inspections performed by the supplier. The qualifying activity may establish an alternate due date to accommodate testing schedules. The supplier shall provide a Retention of Qualification test report as specified in 4.4.7. The qualifying activity will provide certified data to the supplier upon request. Failure to submit to Retention of Qualification shall result in loss of qualification for that product.

4.4.5 Assembly Plants

Assembly plants must be listed on or approved for listing on the applicable qualified products list. The connector supplier listed on the QPL shall certify that the assembly plant is approved for the distribution of the supplier's parts. The assembly plant shall use only piece parts supplied by the connector supplier. No testing other than visual examination is required of certified piece parts obtained from the connector supplier, except when there is cause for rejection. All assemblies produced at the assembly plant shall be subjected to the quality assurance provisions specified herein. Quality control requirements shall be the same as required for the connector supplier.

4.4.6 Qualification of Additional Connectors Performed by the Qualifying Activity

For connectors of the same series which have identical contacts and differ only in shell size and/or configuration from those which have been previously qualified (or are concurrently being qualified), the qualifying activity with concurrence from the supplier need only perform the tests necessary to validate the differing feature(s). In addition, connectors which differ in shell size shall be subjected to the following tests:

Test	Requirement Para.	Test Para.
Visual and Mechanical Examination	3.1, 3.3 thru 3.4.5.5, 3.5, 3.7, and 3.8	4.6.1
Operating Forces	3.6.2	4.6.2
Visual and Mechanical Examination	3.1, 3.3 thru 3.4.5.5, 3.5, 3.7, and 3.8	4.6.1
External Bending Moment (Series 3, Class E and L only)	3.6.23	4.6.23

4.4.7 Supplier Initial and Retention Qualification Test Reports

The supplier shall furnish the qualifying activity one certified test report containing the following information:

a. Material certifications (see 3.3)

b. A summary of results for tests specified in 4.5 for Group A and B

c. A tabulated comparison of the dimensions specified herein and each manufacturing control drawing for components qualified by similarity

4.5 Quality Conformance Inspection

4.5.1 Inspection of Product for Delivery

Inspection of product for delivery shall consist of groups A and B inspection.

4.5.1.1 Inspection Lot

An inspection lot shall consist of connectors covered by the same detail specification, produced under essentially the same conditions and offered for inspection at one time. Identical connectors, except for variations in insert arrangements, may be grouped in a lot, but representative specimens of all insert positions shall be selected proportionally where possible, from the lot for examination.

4.5.1.2 Group A Inspection

Group A inspection shall consist of the examinations and test specified in Table 16, in the order shown. The supplier shall furnish the certification for fungus resistance material (see 3.3.8) with each lot of connectors.

4.5.1.2.1 Sampling Plan

Statistical sampling and inspection shall be in accordance with ANSI/ASQC Z1.4 for general inspection level II. The acceptable quality level (AQL) shall be as specified in Table 16. Major and minor defects shall be as defined herein (see 6.8).

4.5.1.2.2 Rejected Lots

If an inspection lot is rejected, the supplier may rework it to correct the defects, or screen out the defective units, and resubmit for re-inspection. Resubmitted lots shall be inspected using tightened inspection. Such lots shall be separate from new lots, and shall be clearly identified as re-inspected lots.

4.5.1.2.3 Disposition of Sample Units

If the lot is accepted, samples may be delivered on the contract or order.

Table 16 - Group A inspection

Examination or Test	Requirement Paragraph	Method Paragraph	AQL % Defective Major	Minor
Visual and Mechanical Examination	3.1, 3.3 thru 3.4.5.5, 3.5, 3.7, and 3.8	4.6.1	0.25	1.0
Electrical 1/ Insulation Resistance	3.6.4.1	4.6.4.1	1.0	1.0
Dielectric Withstanding Voltage (sea level) 2/	3.6.5	4.6.5.1	1.0	1.0

1/ All electric defects are considered major defects. (Connectors are not required to be wired for these tests.)
2/ Test voltage application time shall be 5 second minimum.

4.5.1.3 Group B Inspection

Group B inspection shall consist of the examinations and tests specified in Table 17, in the order shown, and shall be made on sample units which have been subjected to and have passed the group A inspection. The supplier shall supply counterpart receptacles or plugs for inspection purposes.

Table 17 - Group B inspection

Examination or Test 1/	Requirement Paragraph	Method Paragraph
Gage Location and Retention (crimp type)	3.6.17	4.6.17
Contact Retention (solder type and Class N)	3.6.18.1	4.6.18.1
Operating Forces	3.6.2	4.6.2
Air Leakage (Classes H and N only)	3.6.9	4.6.9.2
Insert Retention	3.6.16	4.6.16

1/ Connectors are not required to be wired for these tests.

4.5.1.3.1 Sampling Plan

The sampling plan shall be in accordance with ASQC Z1.4 for special inspection level S-3. The sample size shall be based on the inspection lot size from which the sample was selected for group A inspection. The AQL shall be 4% defective.

4.5.1.3.2 Rejected Lots

If an inspection lot is rejected, the supplier may rework it to correct the defects, or screen out the defective units, and resubmit for re-inspection. Resubmitted lots shall be inspected using tightened inspection. Such lots shall be separate from new lots and shall be clearly identified as re-inspected lots.

4.5.1.3.3 Disposition of Sample Units

Sample units which have been subjected to group B inspection may be delivered on the contract or order.

4.5.2 Retention of Qualification Verification Inspection (see 4.4.4)

Retention of Qualification verification inspection shall consist of group C. Except where the results of these inspections show noncompliance with the applicable requirements (see 4.5.4.2), delivery of products which have passed groups A and B shall not be delayed pending the results of these qualification verification inspections.

4.5.2.1 Sampling Plan

Every 36 months, the following specified samples shall be subjected to the tests in Table 18, in the order shown. The sample shall be drawn from lot which have passed A and B inspection. Group C inspection may be made on test specimens which were used for and passed A and B inspection. Class E mated with class L plugs shall satisfy requirements for classes E and L. Class H and class N receptacles may be mated with either class E or class L plugs. When both class H and class N have been produced, the sample may consist of three class H and three class N receptacles. Separate samples shall be required for crimp contact and solder contact connectors (except class H and N). When more than one shell size is produced, the sample shall consist of a variety of sizes representative of those in production; or samples of the largest shell size produced with the maximum density shall be tested and shall satisfy requirements for all smaller shell sizes and contact densities.

a. Four mated samples (except hermetic connectors) shall be wired with approximately 3 feet of wire specified in Table 4 in each connector sample. One connector of each mated pair shall be wired with wire approaching the minimum OD and the other mated connector shall be wired with wire approaching the maximum OD. Class H, N samples, and mating plugs shall be wired with approximately 3 feet or nominal gage wire (see Table 4). Periodic testing of the samples in classes E and L shall be sufficient to demonstrate control of class P. If, however, no class E or L connectors were produced during the control period, samples of class P shall be tested with nominal gage wire.

b. Two each, class J connectors, protective covers, and stowage receptacles, representative of production of any shell size, shall be selected and tested as specified in 4.4.1.4.

c. Socket contacts, except crimp type, shall be selected and tested as specified in 4.4.1.6.

Table 18 - Group C inspection

Title	Requirement Paragraph	Test Paragraph
Visual and mechanical examination	3.1, 3.3 thru 3.4,5.5, 3.5, 3.7, and 3.8	4.6.1
Maintenance aging (crimp contacts)	3.6.1	4.6.6
Contact insertion and removal force (crimp contacts)	3.6.6	4.6.6
Insulation resistance at short time elevated temperature (crimp type)	3.6.4.2	4.6.4.2
Insulation resistance at long time elevated temperature (crimp type)	3.6.4.3	4.6.4.3
Durability	3.6.10	4.6.10
Moisture resistance	3.6.14	4.6.14
Salt spray (corrosion)	3.6.11	4.6.11
Operating forces	3.6.2	4.6.2
Contact resistance	3.6.3	4.6.3
Dielectric withstanding voltage at altitude (crimp type)	3.6.5	4.6.5.2
Gage location and retention (crimp type)	3.6.17	4.6.17
Contact retention (solder type and class N)	3.6.18	4.6.18.1
Insert retention (crimp type)	3.6.16	4.6.16.1
Insert retention (hermetic)	3.6.16.1	4.6.16.2

4.5.2.2 Noncompliance

If a sample unit fails to pass group C inspection, the supplier shall take corrective action on the material or processes, or both, warranted, and on all units of product that can be corrected and were manufactured under essentially the same conditions, with essentially the same materials, processes, etc.; and that are considered subject to the same failure. Acceptance of the product shall be discontinued until corrective action, acceptable to the qualifying activity, has been taken. After the corrective action has been taken, group C inspection shall be repeated on additional sample units (all inspections or the inspection that the original sample failed, at the option of the qualifying activity). Groups A and B inspections may be reinstituted; however, final acceptance shall be withheld until the group C re-inspection has shown that the corrective action was successful. In the event of failure after re-inspection, information concerning the failure and the corrective action taken shall be furnished to the cognizant inspection activity and the qualifying activity.

4.5.3 Inspection of Preparation for Delivery

Sample packages and packs and the inspection of the preservation and packaging, packing and marking for shipment and storage shall be in accordance with the requirements of Section 5 and the documents specified therein.

4.6 Methods of Examination and Tests

4.6.1 Visual and Mechanical Examination

Connectors shall be examined to verify that the materials, design and construction, interchangeability, marking and workmanship are in accordance with the applicable requirements (see 3.1, 3.3 through 3.4.5.5, 3.5, and 3.8). In process control of component parts, unrelated to lot sizes of finished connectors, may be utilized in lieu of examination of these components in the finished connectors to assure conformance of these component parts.

4.6.2 Operating Force (see 3.6.2)

Receptacles, plugs, dummy stowage receptacles, and protective covers shall be engaged and disengaged from counterpart connectors; the forces must be applied to the coupling rings of push-pull connectors and to the shells of rack and panel connectors or protective covers. Coupling and uncoupling forces shall be measured and recorded.

4.6.3 Contact Resistance (see 3.6.3)

The contact resistance shall be measured in accordance with the contact resistance test of AS39029.

4.6.4 Insulation Resistance

4.6.4.1 Insulation Resistance at Room Temperature (see 3.6.4.1)

Unmated connectors shall be tested in accordance EIA 364-21. The resistance shall be measured between all, but not more than six pairs of adjacent contacts and between all, but not more than six contacts closest to the shell and the shell. The contacts selected shall be those having the closest spacing between measurement points. For group A inspection, simulated contacts may be used at room ambient conditions.

4.6.4.2 Insulation Resistance at Elevated Temperature (Short-Time) (see 3.6.4.2)

The insulation resistance shall be measured in accordance with 4.6.4.1, except the connectors shall be exposed for 250 hours at the temperature specified in 3.6.4.2. During the test sequence, measurements shall be recorded at least eight times; the interval between each series of measurements shall be not less than 24 hours. After completion of the 250 hours and while at the specified temperature in 3.6.4.2, measurements shall be recorded on all samples.

4.6.4.3 Insulation Resistance at Elevated Temperature (Long-Time) (see 3.6.4.3)

The insulation resistance shall be measured in accordance with 4.6.4.1, except the connectors shall be exposed for 1000 hours at the temperatures specified in 3.6.4.3. The measurements shall be at the end of 1000 hours while the connectors are at elevated temperatures.

4.6.5 Dielectric Withstanding Voltage

4.6.5.1 Dielectric Withstanding Voltage, Sea Level (see 3.6.5)

Unmated connectors shall be tested in accordance with EIA 364-20. The applicable test voltages of Table 19 shall be applied between all adjacent contacts and between the shell and each contact closest to the shell. If an insert possesses more than one service rating, similar connections shall be made for the different test voltages as necessary. For group A inspection simulated contacts may be used at room ambient conditions.

Table 19 - Dielectric withstanding voltage

Altitude (feet)	Minimum Test Voltage ac (rms)	
	Service Rating I	Service Rating II
Sea Level	1500	2300
70000	350	500

4.6.5.2 Dielectric Withstanding Voltage, Altitude (see 3.6.5)

The connectors shall be tested in accordance with method 105, test condition C, MIL-STD-202. After 30 minutes at the simulated altitude, the connectors shall be tested as specified in 4.6.5.1. Only the engaging faces of classes H and N shall be subjected to the high altitude. Rear faces shall be suitably protected.

4.6.6 Maintenance Aging for Crimp Contact Connectors Only (see 3.6.1)

With the grommet relaxed, each contact shall be removed and reinserted once, using the specified tools. Counterpart connectors shall then be mated and unmated 10 times (mating and unmating is not required for class N connectors). A minimum of 20%, but not less than three of the contacts, shall be removed and reinserted nine more times. The contact insertion and removal forces shall be measured during the first and ninth insertion cycle on half, but on not less than three, of the contacts being test. The forces shall be recorded and shall not exceed the requirements of Table 9.

4.6.7 Thermal Shock (see 3.6.7)

Unmated connectors shall be tested in accordance with EIA 364-32 test condition B, except that the minimum temperature shall be -55 °C and the maximum temperature shall be 175 °C for series 2 crimp type connectors and for class L, series 3 connectors, and 200 °C for class E, series 3 connectors. At the completion of the last cycle, the connectors shall be returned to room temperature for inspection.

4.6.8 Water Pressure Test (Class J Only) (see 3.6.8)

Receptacles shall be mounted on the water tank bulkhead so that the mating end projects out of the tank. The cable end of the receptacle shall be immersed in tap water to a depth of 6 feet for 48 hours. The receptacle flange shall be sealed so that no water leaks through the connector mounting. Jam-nut mounting receptacle flanges shall be sealed only with the “O” ring seal provided.

4.6.9 Air Leakage

4.6.9.1 Connectors with Solder Contacts and Environmental Sealing Adapters (see 3.6.9.1)

Connectors with solder contacts and sealing adapters shall be mounted in a manner suitable for application of a 30 ft-lb/in^2 pressure differential across the connectors. The leakage rates shall be measured in both directions after 30 minutes of exposure to the low temperature extremes of Table 11 and while at the low temperature.

4.6.9.2 Connectors, Classes N and H (see 3.6.9.2)

Connectors shall be mounted in a manner suitable for application of a pressure differential of one atmosphere across the connectors and tested in accordance with procedure I, method 112, test condition C of MIL-STD-202. The leakage rate shall be determined while air or gas, containing not less than 10% of helium by volume, is applied to the connector.

4.6.9.3 Stowage Receptacles and Protective Covers (see 3.6.9.1)

Stowage receptacles and protective covers shall be mated to connectors having either contacts or inserts removed so that a pressure of 5 ft-lb/in^2 can be applied against the insides of the protective covers or stowage receptacles.

4.6.10 Durability (see 3.6.10)

Counterpart connectors shall be mated and unmated 500 times at a maximum rate of 300 cycles per hour with the coupling mechanism operated in a manner simulating actual service.

4.6.11 Salt Spray (Corrosion) (see 3.6.11)

Unmated connectors, storage receptacles, and protective covers shall be subjected to a salt spray test in accordance with EIA 364-26 test condition B. The salt concentration shall be 20%. The specimens shall then be dried in a circulating air oven at a temperature of 38 °C ± 3 °C for not less than 12 hours, then shall be removed and inspected. Prior to all subsequent testing, corrosion tested connectors shall be engaged and disengaged for one cycle to remove free salt deposits. Classes H and N shall have rear end suitably protected.