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INCH-POUND

MIL-DTL-83733D
23 February 2000
SUPERSEDING
MIL-C-83733C
28 July 1986

DETAIL SPECIFICATION

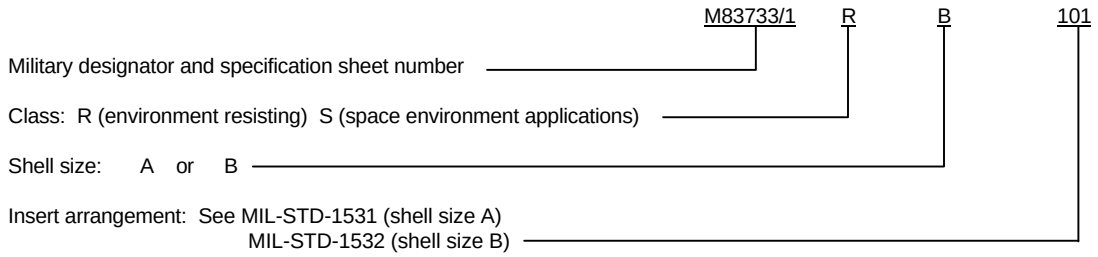
CONNECTORS, ELECTRICAL MINIATURE, RECTANGULAR TYPE, RACK TO PANEL, ENVIRONMENT RESISTING, 200°C TOTAL CONTINUOUS OPERATING TEMPERATURE, GENERAL SPECIFICATION FOR

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers environment and fluid resisting, miniature, rectangular type, rack to panel electrical connectors (plugs and receptacles). These connectors utilize rear release, removable crimp type contacts and are capable of continuous operation from -65°C to +200°C (see 6.1).

1.2.1 Part or Identifying Number (PIN). Unless otherwise specified (see 3.1), the PIN should consist of the letter "M" and the basic number of the specification sheet; the letters for the class and shell size; and the number of the insert arrangement, as shown in the following example:



2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements cited in sections 3 and 4 of this specification, whether or not they are listed.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Defense Supply Center Columbus, Attn: VAI, 3990 East Broad Street, Columbus, Ohio, 43216-5000 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

DEPARTMENT OF DEFENSE

MIL-C-17/94	-	Cables, Radio Frequency, Flexible, Coaxial, 75 Ohms, M17/94-RG179.
MIL-DTL-5624	-	Turbine Fuel, Aviation, Grades JP-4, JP-5, and JP-5/JP-8 ST.
MIL-C-39029/4	-	Contacts Electrical Connector, Pin, Crimp Removable, (For MIL-C-26482 Series 2, MIL-C-81703 Series 3, MIL-C-83733, and MIL-C-83723 Series 3 Connectors).
MIL-C-39029/5	-	Contacts Electrical Connector, Socket, Crimp Removable, (For MIL-C-26482 Series 2, MIL-C-81703 Series 3, MIL-C-83733, and MIL-C-83723 Series 3 Connectors).
MIL-C-39029/9	-	Contacts, Electrical Connector, Pin, Crimp Removable, thermocouple, (For Mil-C-26482 Series 2, Mil-C-81703 Series 3, MIL-C-83723 Series 3, and MIL-C-83733 Connectors).
MIL-C-39029/10	-	Contacts, Electrical Connector, Socket, Crimp Removable, thermocouple, (For Mil-C-26482 Series 2, Mil-C-81703 Series 3, MIL-C-83723 Series 3, and MIL-C-83733 Connectors).
MIL-C-39029/50	-	Contacts Electrical Connector, Pin, Crimp Removable, Shielded, (For MIL-C-83733 Connectors).
MIL-C-39029/51	-	Contacts Electrical Connector, Socket, Shielded, (For MIL-C-83733 Connectors).
MIL-C-39029/57	-	Contacts Electrical Connector, Socket, Crimp Removable, (For MIL-C-24308, MIL-C-55302/68, /71, /72, /75, MIL-C-38999 Series II, and MIL-C-83733 Connectors).
MIL-C-39029/58	-	Contacts, Electrical Connector, Pin, Crimp Removable, (For MIL-C-24038, MIL-C-55302/69, MIL-C-38999 Series I, II, III, IV, and MIL-C-83733 Connectors).
MIL-C-39029/71	-	Contacts, Electrical Connector, Pin, Removable, Solderless Wrap-Post Termination (for MIL-C-38999 series II, MIL-C-24038, MIL-C-83733, and MIL-C-55302/69 connectors).
MIL-C-39029/72	-	Contacts, Electrical Connector, Socket, Removable, Solderless Wrap-Post Termination (for MIL-C-38999 Series I, II, III, and IV, MIL-C-24038, MIL-C-55302/68, /71, and /75 Connectors).
MIL-I-81969/8	-	Installing and Removal Tools, Connector Electrical Contact, Type I, Class I, Composition C.
MIL-I-81969/14	-	Installing and Removal Tools, Connector Electrical Contact, Type I, Class I, Composition A.
MIL-PRF-87257	-	Hydraulic Fluid, Fire Resistant: Low Temperature, Synthetic Hydrocarbon Base, Aircraft and Missile.

STANDARDS

FEDERAL

FED-STD-H28	-	Screw-Thread Standards for Federal Service.

DEPARTMENT OF DEFENSE

MIL-STD-202	-	Test Method for Electronic and Electrical Component Parts.
MIL-STD-790	-	Standard Practice for Established reliability and High reliability Qualified Products List (QPL) Systems For Electrical, Electronic, and Fiber Optic Parts Specification.
MIL-STD-889	-	Dissimilar Metals.
MIL-STD-1285	-	Marking of Electrical and Electronic Parts.
MIL-STD-1344	-	Test Methods for Electrical Connectors.
MIL-STD-1531	-	Insert arrangements for MIL-C-83733 Rack to Panel Connectors, Shell Size A.
MIL-STD-1532	-	Insert arrangements for MIL-C-83733 Rack to Panel Connectors, Shell Size B.
MS3461	-	Test Gage, MIL-C-26482 Series 2 or MIL-C-81703 Series 3.
MS51848	-	Washer, Lock - Helical Spring, Hi - Collar.

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

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2.2.2 Other Government documents, drawings, and publications. The following other Government; documents, drawings and publications from a part of this document to the extent specified herein. Unless other wise specified, the issues are those cited in the solicitation.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

NBH 8060.1 - Office of Safety and Mission Flammability, Odor and Offgassing Requirements and Test procedures for Materials in Environment that Support Combustion.

(Applications for copies should be addressed to the National Aeronautics and Space Administration, ES-5, Lyndon B Johnson Space Center, Houston, TX 77058.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of documents, which are DoD adopted, are those listed in the issue DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

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

(Applications for copies should be addressed to the American National Standards Institute, Inc., 1430 Broadway, New York, N.Y. 10017).

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A342 - Standard Test Methods for Permeability of Feebly Magnetic Materials.
ASTM B85 Standard Specification for Aluminum-Alloy Die Castings.
ASTM-E-595 - Standard Test Method for Total Mass Loss and Collected Volatile Condensable Materials from Outgassing in a Vacuum Environment.

(Applications for copies should be addressed to the American Society for Testing and Materials, 100 Barr Harbor Dr., West Conshohocken, PA 19428-2959).

ENGINEERING SOCIETY FOR ADVANCING MOBILITY LAND SEA AIR AND SPACE (SAE)

SAE AMS 2404G - Plating, Plating Electroless Nickel.
SAE AMS 4290J - Aluminum Alloy, Die Castings 9.5Si-0.5Mg (360.0-F).
SAE AMS 4291E - Aluminum Alloy, Die Castings 8.5Si-3.5Cu (A380.0-F).

(Applications for copies should be addressed to the Engineering Society for Advancing Mobility Land Sea Air and Space, 400 Commonwealth Drive, Warrendale, PA 15096-0001.)

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO-10012-1 - Quality Assurance Requirement for Measuring Equipment.

(Applications for copies should be addressed to the International Organization for Standardization, i,rue de Varembe, Case postale 56, CH-1211 Geneve 20, Switzerland.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.4 Order of precedence. In the event of a conflict between the text of this document and the 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.

3. REQUIREMENTS

3.1 Specification sheets. The individual item requirements shall be as specified herein and in accordance with the applicable specification sheet. In the event of any conflict between the requirements of this specification and the specification sheet, the latter shall govern. (If a specific requirement specified herein is not required for an item, it shall be so indicated on the specification sheet; for example, "Shock - N/A.").

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3.2 Qualification. Connectors furnished under this specification shall be products that are authorized by the qualifying activity for listing on the applicable qualified products list before contract award (see 4.4 and 6.3).

3.2.1 Reliability. The contractors reliability program for assembled connectors and assembly procedures shall meet the requirements of MIL-STD-790.

3.3 Materials. Reference materials are identified herein (see 6.3). However, when an example reference material is not identified, a material shall be used which will enable the connectors and accessories to meet the performance requirements of this specification. Acceptance or approval of a constituent material shall not be construed as a guaranty of acceptance of the finished product.

3.3.1 Reference materials, plating, and processes. The identified reference material, plating, and processes have been established to provide assurances that connectors manufactured to this specification will properly interface to similar industry standard or government specified connector systems. Alternate materials with approval (see 6.3) may be used as long as the alternate material(s) will not cause problems of electrochemical contamination of critical electrical or mechanical interfaces or generation of incompatible mechanical interface surface wear products. The manufacturer of connectors supplied to this specification are allowed to use alternate recognized industry standard materials, plating, and processes from those identified in paragraph 3.3 of this specification. Alternate materials, plating and processes used must be coordinated with the qualifying activity as part of the qualification process. Use of alternates to those referenced guidance items by the supplier must not result in inferior short or long term performance or reliability of supplied connectors as compared with connectors manufactured using the referenced materials, plating, or processes. Short or long term failures or reliability problems due to use of these alternates shall be the responsibility of the supplier.

3.3.2 Recycled, recovered, or environmentally preferable material. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs (see 6.6).

3.3.2 Nonmagnetic materials. All parts, with the exception of screws, washers, and mounting hardware, shall be made from materials, which are classified, as nonmagnetic and the permeability of the basic connector shall be of 2.0μ or less. The permeability shall be checked by the instrument described in ASTM A 342 or equivalent.

3.3.2.1 Class S nonmagnetic materials. All nonmetallic materials for class S connectors shall meet the outgassing, flammability, odor, and toxicity requirements see 3.6.24 and 3.6.25. Materials capable of emitting vacuum condensable gases-conductive, noxious or toxic gasses when exposed to low pressure of high temperature shall not be used.

3.3.3 Dissimilar metals. When dissimilar metals are used in intimate contact with each other, protection against electrolysis and corrosion shall be provided as specified in MIL-STD-889.

3.3.4 Shells . The shells for classes R and S connectors shall be of high grade aluminum die casting alloy conforming to ASTM B85, AMS 4290, AMS 4291.

3.4 Finishes.

3.4.1 Finish for class R connectors. Aluminum parts shall be electroless nickel plated in accordance with SAE AMS 2402, class 3 or 4, with .001 (24.5μm) inch minimum plating thickness. All other metal parts shall be made of corrosion-resistant materials or shall be protected to meet the performance requirements of this specification.

3.4.2 Finish for class S connectors. All aluminum parts for class S connectors shall be electroless nickel plated in accordance with SAE AMS 2404, class 3 or 4, 500 microinches (12700 μm) thick minimum. Finish shall be dull. Use of a suitable underplate is permissible. A silver underplate shall not be used.

3.5 Design and construction. Connectors shall be in accordance with the applicable specification sheet and shall be constructed to withstand normal handling incident to installation and maintenance in service. Mating and back-end configuration and dimensions to insure intermateability shall be in accordance with figures 1 and 2.

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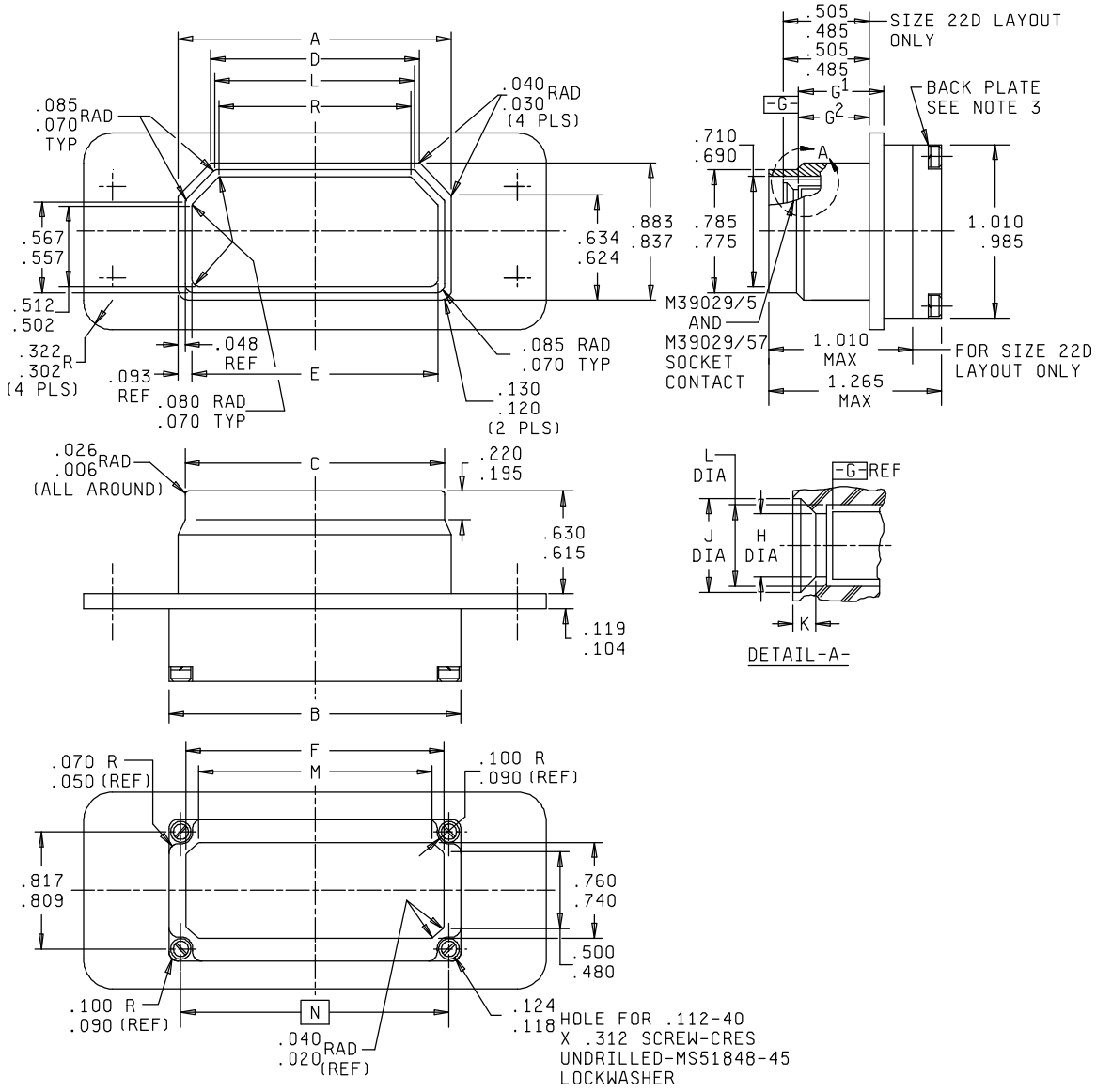

Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm
.006	0.15	.090	2.29	.220	5.59	.512	13.00	.760	19.30
.020	0.51	.093	2.36	.302	7.67	.557	14.15	.776	19.69
.026	0.64	.100	2.54	.322	8.18	.567	14.40	.785	19.94
.030	0.76	.104	2.64	.480	12.19	.615	15.62	.809	20.55
.040	1.02	.118	3.00	.485	12.32	.624	15.85	.817	20.75
.048	1.22	.119	3.02	.490	12.45	.630	16.00	.873	22.17
.050	1.27	.120	3.05	.500	12.70	.634	16.10	.883	22.43
.070	1.78	.124	3.15	.502	12.75	.690	17.53	.985	25.02
.080	2.03	.130	3.30	.505	12.83	.710	18.03	1.010	25.65
.085	2.16	.195	4.95	.510	12.95	.740	18.80	1.265	32.13

FIGURE 1. Connector, receptacle, interface and backend dimensions.

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Interface and backend dimensions.

Shell size	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	M (mm)	N (mm)	L (mm)	R (mm)
A	1.959 (49.76)	2.086 (52.98)	1.864 (47.34)	1.460 (37.08)	1.780 (45.21)	1.825 (46.35)	1.585 (40.26)	1.890 (48.01)	1.426 (36.22)	1.386 (35.20)
	1.946 (49.43)	2.055 (52.20)	1.853 (47.07)	1.450 (37.83)	1.763 (44.78)	1.815 (46.10)	1.560 (39.62)		1.412 (35.86)	1.373 (34.87)
B	3.259 (82.78)	3.386 (86.00)	3.164 (80.36)	2.760 (70.10)	3.080 (78.23)	3.125 (79.37)	2.875 (73.02)	3.186 (80.92)	2.726 (69.24)	2.686 (68.22)
	3.246 (82.45)	3.355 (85.22)	3.153 (80.08)	2.750 (69.85)	3.063 (77.80)	3.115 (79.12)	2.865 (72.77)	3.194 (81.13)	2.712 (68.88)	2.673 (67.89)

Contact entry dimensions

Contact size	G^1 (mm)	G^2 (mm)	H Dia (mm)	J Dia (mm)	K Dia (mm)	L Diz (mm)
22D	.591 (9.73)	.472 (6.78)	.038 (0.96)	.065 (1.65)	.016 (4.06)	.066 (1.77)
	.533 (8.53)	.429 (5.84)	.035 (0.89)	.063 (1.60)	.012 (0.30)	.064 (1.62)
20	.537 (10.57)	.419 (7.62)	.053 (1.34)	.118 (2.99)	.048 (1.22)	.085 (2.16)
	.497 (9.50)	.392 (6.81)	.051 (1.29)	.114 (2.90)	.040 (1.01)	.083 (1.10)
16	.537 (10.57)	.419 (7.62)	.075 (1.90)	.150 (3.81)	.048 (1.22)	.120 (3.04)
	.497 (9.50)	.393 (6.81)	.073 (1.85)	.146 (3.71)	.040 (1.01)	.118 (2.99)
12	.537 (10.57)	.419 (7.62)	.102 (2.59)	.210 (5.33)	.048 (1.22)	.172 (4.37)
	.497 (9.50)	.393 (6.81)	.100 (2.54)	.206 (5.23)	.040 (1.01)	.170 (4.32)

NOTES:
1. Dimensions are in inches.
2. All dimensions are after plating.
3. Back plate is not applicable to -131 and -185 layouts.
4. Dimensions are symmetrical about C_L within .006 (0.15 mm) T.I.R.

FIGURE 1. Connector, receptacle, interface and backend dimensions - Continued.

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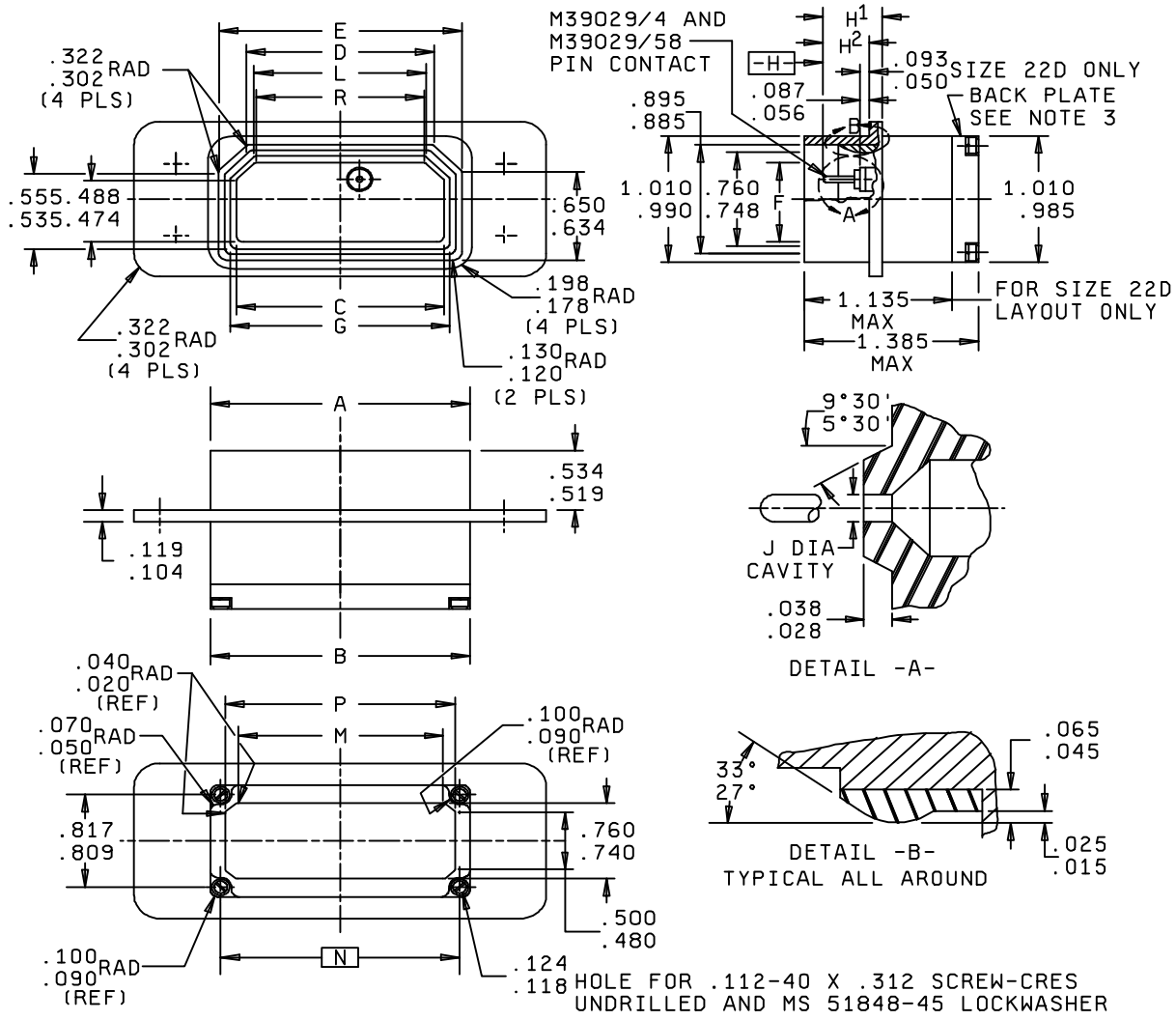

Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm
.015	0.38	.056	1.42	.120	3.05	.500	12.70	.760	19.30
.020	0.51	.065	1.65	.124	3.15	.519	13.18	.809	20.55
.025	0.64	.070	1.78	.130	3.30	.534	13.56	.817	20.75
.026	0.66	.087	2.21	.178	4.52	.535	13.59	.885	22.48
.028	0.71	.090	2.29	.198	5.03	.555	14.10	.895	22.73
.036	0.91	.093	2.36	.302	7.67	.634	16.10	.988	25.10
.038	0.97	.100	2.54	.322	8.18	.650	16.51	.990	25.15
.040	1.02	.104	2.64	.474	12.04	.700	17.78	1.010	25.65
.045	1.14	.118	3.00	.480	12.19	.740	18.80	1.135	28.83
.050	1.27	.119	3.02	.488	12.40	.748	19.00	1.185	30.10

FIGURE 2. Connector, plug, interface and backend dimensions.

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Interface and backend dimensions.

Shell size	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	M (mm)	N (mm)	P	L	R
A	2.085 (52.96) 2.072 (52.63)	2.086 (52.98) 2.055 (52.20)	1.758 (44.65) 1.725 (43.81)	1.485 (37.72) 1.460 (37.08)	1.976 (50.19) 1.961 (49.81)	.687 (17.45) .667 (16.94)	1.845 (46.86) 1.825 (46.35	1.580 (40.13) 1.560 (39.62)	1.890 (46.35)	1.825 (46.35) 1.815 (46.10)	1.420 (36.07) 1.400 (35.56)	1.370 (34.80) 1.330 (33.78)
B	3.385 (85.98) 3.372 (85.65)	3.386 (86.00) 3.355 (85.22)	3.058 (77.67) 3.025 (76.83)	2.785 (70.74) 2.760 (70.10)	3.281 (83.33) 3.261 (82.83)	.687 (17.45) .667 (16.94)	3.145 (79.88) 3.112 (79.04)	2.880 (73.15) 2.860 (72.64)	3.194 (81.13) 3.186 (80.92)	3.125 (79.37) 3.115 (79.12)	2.720 (69.09) 2.700 (68.8)	2.670 (67.82) 2.630 (66.80)

Contact entry dimensions

Contact size	Pin length H[1] (mm)	Pin length H[2] (mm)	J Dia (mm)	K Dia mm)
22D	.383 (9.73) .336 (8.53)	.267 (6.78) .230 (5.84)	.028 (0.71) .025 (0.63	.077 (1.95) .071 (1.80)
20	.416 (10.56) .374 (9.50)	.300 (7.62) .268 (6.80)	.039 (0.99) .036 (0.91)	.112 (2.844) .106 (2.69)
16	.416 (10.56) .374 (9.50)	.300 (7.2) .268 (6.80)	.061 (1.55) .058 (1.47)	.144 (3.66) .138 (3.50)
12	.416 (10.56) .374 (9.50	.300 (7.62) .268 (6.80)	.093 (2.36) .090 (2.28)	.204 (5.18) .198 (5.03)

NOTES:
1. Dimensions are in inches.
2. All dimensions are after plating.
3. Back plate is not applicable to -31 and -85 layouts.
4. Dimensions are symmetrical about G_L within .006 T.I.R.
5. Interfacial seal dimensions = C-E-R.
6. Peripheral seal dimensions = G&L.

FIGURE 2. Connector, plug, interface and backend dimensions - Continued.

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3.5.1 Contacts. A quantity of power contacts consisting of the normal complement plus 1 spare contact of each applicable size for connector arrangements having 26 contacts or less, and 2 spare contacts where the number of contacts exceed 26, shall be included in each unit package. No spares shall be furnished for shielded contacts. For indirect shipments, connectors may be supplied without contacts (see 6.2). Thermocouple contacts shall be qualified on the Qualified Product List (QPL) for MIL-C-39026/9 and /10. Shielded contacts shall be qualified on the QPL for MIL-C-39029/50 and 51. Solderless wrap post contact shall be qualified for listing on the QPL for MIL-C-39029/71 and /72. Power contacts shall be qualified for listing on the QPL for:

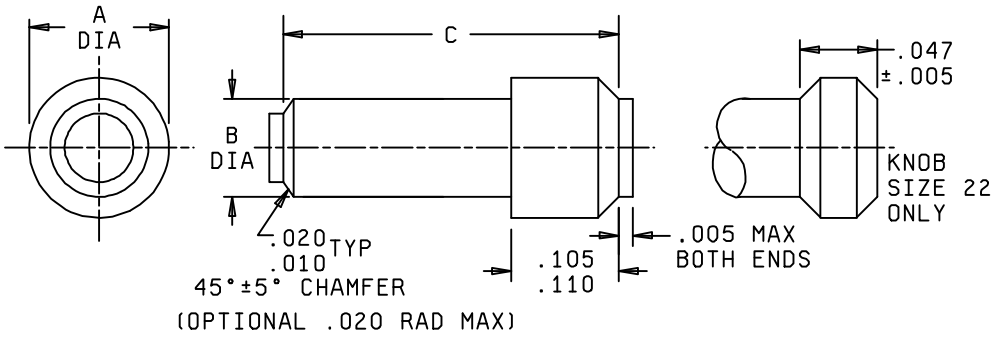
Size 22D in accordance with MIL-C-39029/57 or /58.

Size 20, 16, and 12 in accordance with MIL-C-39029/4, /5, /50, or /51.

3.5.1.1 Insertion and removable tools. The class R and S connector designs shall permit individual insertion and removal of the contacts without removing the insert or sealing members. Insertion of the contacts into and removal of the contacts from the insert shall be accomplished with the applicable tools as shown in MIL-I-81969/8 for size 22D contacts and MIL-I-81969/14 for sizes 20, 16, and 12.

3.5.1.2 Insert arrangement. Insert arrangement shall be in accordance with MIL-STD-1531 (shell size A) and MIL-STD-1532 (shell size B), as specified (see 3.1).

3.5.2 Sealing plugs. Insulated plugs shall be provided for sealing spare contact holes. Ten percent of the number of contacts, but not less than one sealing plug, shall be encased in the unit package. The sealing plugs shall as specified on figure 3.



Inches	mm
.010	0.51
.020	0.25
.047	1.19
.105	2.67
.110	2.79

Contact size (grommet cavity size)	Color code	A dia (mm)	B dia (mm)	C (mm)
22	Black	.068 (1.73) .058 (1.47)	.045 (1.14) .035 (0.89)	.500 (12.70) .438 (11.13)
20	Red	.100 (2.54) .085 (2.16)	.065 (1.65) .045 (1.14)	.584 (14.83) .544 (13.82
16	Blue	.138 (3.51) .128 (3.25)	.093 (2.36) .073 (1.85)	.584 (14.83) .544 (13.82
12	Yellow	.176 (4.47) .166 (4.22)	.131 (3.33) .111 (2.82)	.584 (14.83) .544 (13.82

FIGURE 3. Sealing plug.

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3.5.3 Inserts. The inserts shall be designed and constructed with proper sections and radii so they will not readily chip, crack, or break in assembly or normal service. The inserts shall be nonremovable, mechanically retained, and bonded in the shell. The inserts shall be designed and constructed so as to eliminate all air paths between contacts and between contacts and shell. The insert engaging faces shall be designed and constructed so as to eliminate all air paths between contacts and between contacts and shells when the contact is mated. The pin insert face shall be resilient and shall have individual raised sealing barriers around each pin contact with dimensions as shown on figure 1. The socket insert face shall be rigid dielectric and shall have individual chamfered holes at each location with dimensions as shown on figure 2, to provide seats for the pin insert individual sealing barriers and guidance for centering misaligned pin contacts, when mating the connectors.

The insert and wire sealing members of class R connectors shall be essentially one integral part, consisting of one or more parts bonded together so as to form essentially one integral piece and shall provide suitable sealing around the wires having diameters within the range shown in table I. The insert shall be designed so as to provide positive locking of individual contacts.

TABLE I. Contact size and wire range accommodations.

Contact size	Wire size Accommodation	Wire range accommodation (diameter over insulation)	
		Min (mm)	Max (mm)
22D	28	.030 (0.76)	.060 (1.52)
22D	26	.030 (0.76)	.060 (1.52)
22D	24	.030 (0.76	.060 (1.52)
22D	22	.031 (0.79)	.060 (1.52)
20	24	.040 (1.02)	.083 (2.11)
20	22	.040 (1.02)	.083 (2.11)
20	20	.040 (1.02)	.083 (2.11)
16	20	.063 (1.60)	.103 (2.62)
16	18	.063 (1.60)	.103 (2.62)
16	16	.063 (1.60)	.103 (2.62)
16	14	.081 (2.06)	.158 (4.01)
12	12	.081 (2.06)	.158 (4.01)
12 (shielded)	M17/094-RG179	- - -	- - -

3.5.4 Shell design. The connector shall be of the solid shell design and shall be constructed to positively retain inserts. The configuration shall be essentially rectangular as shown (see 3.1). The engaging skirts shall provide a keystone shape to preclude mating when either connector is rotated 180° from the correct mating position. The engaging surfaces shall be configured to align the shells while mating to provide proper guidance for engagement of the pin and socket contacts.

3.5.4.1 Rack and panel mounting. Rack and panel connector shells shall be capable of being interchangeably mounted in a fixed or floating position as shown (see 3.1). Fixed mounted connectors shall mate properly with float mounted counterpart connectors. Shells shall be provided either with captive clinch nuts for fixed mounting, or shall be provided with or have provisions to allow installation of spring mounts, bushings, or guide pins as specified (see 3.1).

3.5.4.2 Shell peripheral seal. A nonremovable integral resilient peripheral seal shall be provided in the receptacle shell. The seal shall engage the mating plug shell before mating is complete.

3.5.5 Backplate. When compressed about the wires and contacts by the backplate, the sealing member shall not distort or bind any of the contacts to cause improper operation of the connector.

3.5.6 Screw threads. Screw threads shall be in accordance with FED-STD-H28.

3.5.7 Contact identification. The contact positions shall be designed on the front and rear of the inserts as shown in MIL-STD-1531 (shell size A) or MIL-STD-1532 (shell size B). Designators shall be legible. Where space limitations render legibility or proper functioning of the connector impossible, or where such designations may render possible confusion between contacts, contact position designations may be omitted after the grid pattern has been established. Location of identifying characters shall be in close proximity to the holes but need not be placed exactly where indicated on the standard.

3.6 Performance. Connectors shall be designed to meet the performance requirements specified herein.

3.6.1 Class R and S connectors. Class R and S connectors shall be mounted and mated as shown on figure 4 unless otherwise specified, and shall perform as follows when subjected to the environments and test specified.

3.6.2 Maintenance aging. When tested as specified in 4.7.3, connectors shall meet the requirements of 3.6.4 (mating and unmating forces), 3.6.23 (contact insertion and removal forces), and all subsequent required tests.

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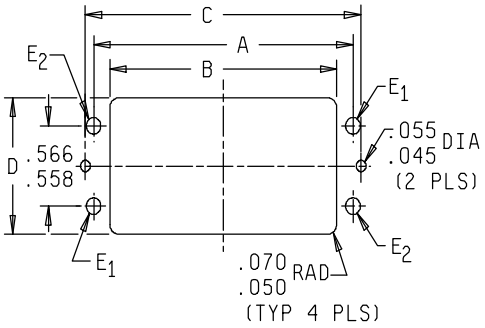

FIGURE 4a. Panel cut-out dimensions.

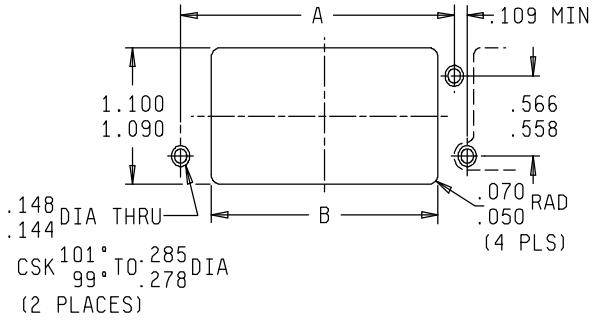

FIGURE 4c. Panel cut-out dimension.

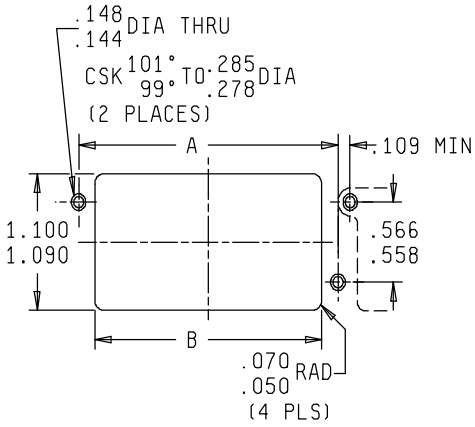

FIGURE 4b. Panel cut-out dimensions.

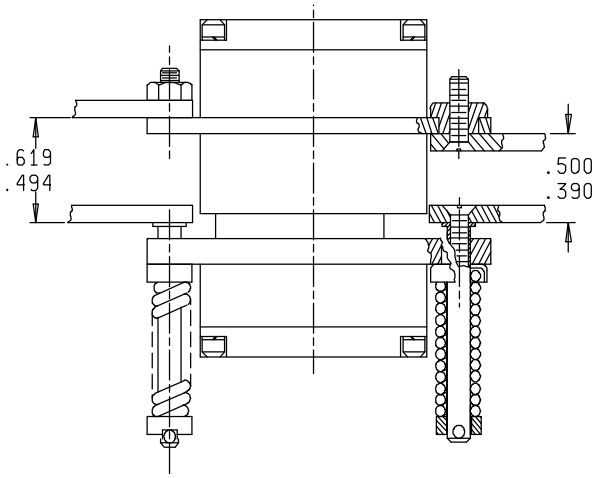

FIGURE 4d. Recommended panel spacing (MIL-DTL-83733/4, 5, 6, 7, and 10).

Inches	mm	Inches	mm
.045	1.14	.390	9.91
.050	1.27	.494	12.55
.055	1.40	.500	12.70
.070	1.78	.558	14.17
.109	2.77	.566	14.38
.144	3.66	.619	15.72
.148	3.76	1.090	27.69
.278	7.06	1.100	27.94
.288	7.32		

FIGURE 4. Panel cut-out dimensions and recommended panel spacing.

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Specification sheet No.	Figure	Dimensions (mm)											
		A ±.004 (0.10)		B ±.005 (0.13)		C ±.005 (0.13)		D ±.005 (0.13)		E_1		E_2	
MIL-DTL-83733	ref.	Shell size A	Shell Size B	Shell size A	Shell Size B	Shell Size A	Shell Size B	Shell size A	Shell Size B	Shell size A	Shell Size B	Shell size A	Shell Size B
/1, /5, /6	4a	2.578 (65.48)	3.875 (98.43)	2.103 (53.42)	3.400 (86.36)	2.765 (70.23)	4.062 (103.17)	1.022 (25.96)	1.022 (25.96)	.148 .144	.148 .144	.148 .144	.148 .144
/2	4a	---	3.875 (98.43)	---	3.465 (88.01)	---	4.062 (103.17)	---	1.095 (27.81)	---	.148 .144	---	.260 .250
/3	4a	---	3.875 (98.43)	---	3.465 (88.01)	---	4.062 (103.17)	---	1.095 (27.81)	---	.320 .315	---	.148 .144
/4	4a	2.578 (65.48)	3.875 (98.43)	2.167 (55.04)	3.465 (88.01)	2.765 (70.23)	4.062 (103.17)	1.095 (27.81)	1.095 (27.81)	.148 .144	.148 .144	.148 .144	.148 .144
/7	4a	2.578 (65.48)	3.875 (98.43)	2.167 (55.04)	3.465 (88.01)	2.765 (70.23)	4.062 (103.17)	1.095 (27.81)	1.095 (27.81)	.148 .144	.148 .144	.430 .420	.430 .420
/8	4a	---	3.875 (98.43)	---	3.465 (88.01)	---	4.062 (103.17)	---	1.095 (27.81)	---	.380 .370	---	.148 .144
/9, /10, /11	4c	2.578 (65.48)	3.875 (98.43)	2.167 (55.04)	3.465 (88.01)	---	---	1.095 (27.81)	1.022 (25.96)	---	---	---	---
/12	4b	2.578 (65.48)	3.875 (98.43)	2.095 (53.21)	3.400 (86.36)	---	---	1.095 (27.81)	1.095 (27.81)	---	---	---	---

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for information only.

FIGURE 4. Panel cut-out dimensions and recommended panel spacing - Continued.

3.6.3 Temperature cycling. When connectors are tested as specified in 4.7.4, there shall be no evidence of physical damage. Following temperature cycling, the dielectric withstanding voltage shall meet the requirements of 3.6.16.1.

3.6.4 Mating and unmating forces. When tested as specified in 4.7.5, the axial force required to fully mate or separate the plug and receptacle shall not exceed the applicable value listed in table II.

TABLE II. Mating force.

Shell size	Maximum force pounds (N)	
	Without mounting accessories	Spring mounting 1/
A	70 (311.4)	176 (783)
B	95 (422.5)	176 (783)

1/ For connectors using spring mounting, the mating force becomes a function of the spring loading. Values listed apply to connectors mounted as shown on figure 4 at minimum panel spacing.

3.6.5 Altitude immersion. When tested as specified in 4.7.6, the insulation resistance shall be not less than 1,000 megohms, and a dielectric withstanding voltage shall not be less than 1,000 volts rms at sea level for service rating M, and 1,500 volts rms at sea level for service rating I.

3.6.6 Insert retention. When tested as specified in 4.7.7, completely assembled and unmated connectors shall withstand an axial load of 45 pounds (200 N) applied to the mating face for a period of at least 5 seconds without being dislocated from their normal position in the shell, cracking, or breaking.

3.6.7 Salt spray (corrosion). When tested as specified in 4.7.8, connectors and contacts shall show no exposure of basic metal due to corrosion, which will adversely affect performance.

3.6.8 Contact resistance. When tested as specified in 4.7.9, the contact resistance (millivolt drop) for class R connectors shall not exceed the values listed in table III.

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TABLE III. Contact resistance (millivolt drop).

Contact size	Wire size	Maximum voltage drop (millivolt)				Test current (amperes)
		Silver plated wire		Nickel plated wire		
		25° +3° -0° C	200° +3° -0° C	25° +3° -0° C	200° +3° -0° C	
22D	28	54	92	81	138	1.0
22D	26	52	89	80	137	2.0
22D	24	45	77	68	116	3.0
22D	22	73	125	110	188	5.0
20	24	45	77	68	116	3.0
20	22	73	125	110	188	5.0
20	20	55	94	83	141	7.5
16	20	46	79	69	119	7.5
16	18	46	79	69	119	7.5
16	16	49	84	74	126	13.0
12	14	40	68	60	102	17.0
12	12	42	71	63	107	23.0

3.9 Gauge location. When tested as specified in 4.7.10, the axial location of contacts shall be measured using test gauges conforming to figure 5 or 6, or MS3461, as applicable. Gauge location measurements shall fall within the range specified on figure 1 or 2, as applicable.

3.6.10 Pin contact stability. When tested as specified in 4.7.11, the total displacement of the contact tip end shall not exceed the applicable limit specified in table IV.

TABLE IV. Pin contact stability.

Pin size	Total Displacement (mm)
22D	.030 (0.76)
20	.026 (0.66)
16	.028 (0.71)
12	.030 (0.76)

3.6.11 Gauge retention. When tested as specified in 4.7.12, test gauges conforming to figure 5, 6, or MS3461, as applicable, shall be retained in the contact cavities of crimp contact connectors. The axial displacement of the test gauge while under load shall not exceed .012 inch (0.30 mm).

3.6.12 Magnetic permeability. The relative permeability of the connector assembly, when tested as specified in 4.7.13 shall be 2.0μ or less.

3.6.13 Contact retention. When tested as specified in 4.7.14, the individual contact-locking mechanism of unmated connectors shall withstand, in both directions, the axial load specified in table V. During the axial displacement of the contact shall not exceed .012 inch (0.030 mm) when pressures are applied from the face side.

TABLE V. Axial load.

Contact size	Axial load pounds (N)
22D	10 ±1 (44.5 ±0.4.4)
20	20 +3/-0(88.9 +13.3/-0)
16	25 +3/-0 (111.2 +13.3/-0)
12	30 +3/-0 (133.4 +13.3/-0)

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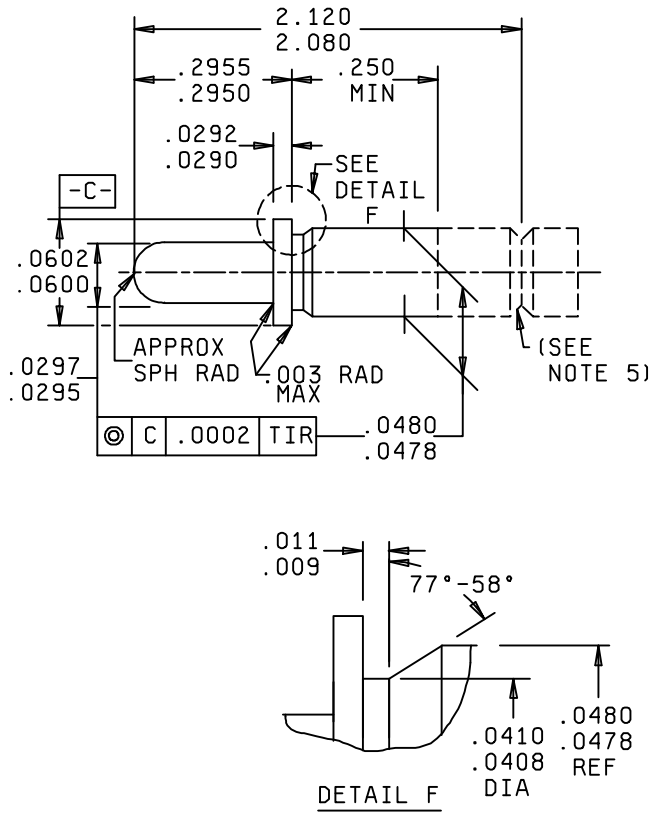

CONTACT SIZE 22D.

Inches	mm	Inches	mm
.003	0.08	.0478	1.214
.009	0.23	.0480	1.219
.011	0.28	.0600	1.524
.0290	0.737	.0602	1.529
.0292	0.742	.250	6.35
.0295	0.749	.2950	7.493
.0297	0.754	.2955	7.506
.0408	1.036	2.080	52.83
.0410	1.041	2.120	53.85

FIGURE 5. Test gauge, pin, gauge location and retention.

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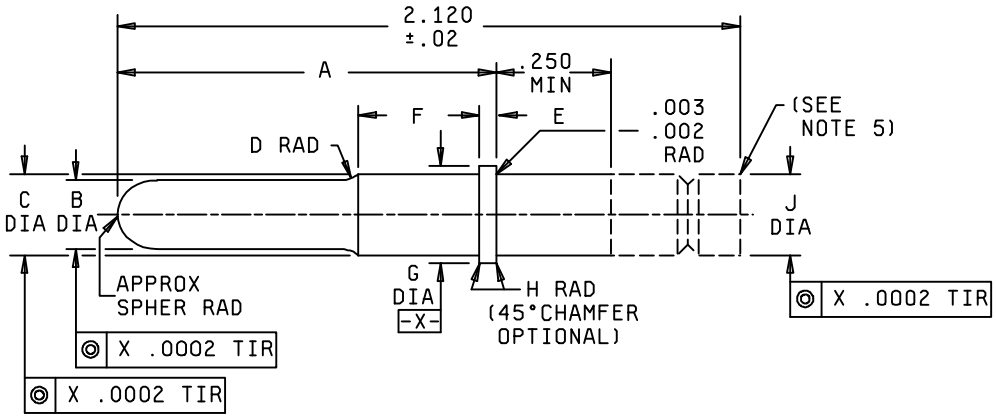

CONTACT SIZES 12, 16, and 20.

Contact size	A +.0005 (0.013) -.0000 (mm)	B +.0002 (0.005) -.0000 (mm)	C +.0002 (0.005) -.0000 (mm)	D (RAD) ±005 (0.13) (mm)	E +.0000 -.0002 (0.005) (mm)	F +.0000 -.0005 (mm)	G +.0002 (0.005) -.0000 (mm)	H (RAD) +.0000 -.0005 (0.013) (mm)	J +.0000 -.0002 (0.005) (mm)
20	.5430 (13.792)	.0390 (0.991)	.0760 (1.930)	.050 (1.27)	.0330 (0.838)	.1250 (3.175)	.1000 (2.540)	.0050 (0.127)	.0780 (1.981)
16	.5580 (14.173)	.0615 (1.562)	.1010 (2.565)	.050 (1.27)	.0480 (1.219)	.1250 (3.175)	.1300 (3.302)	.0050 (0.127)	.1030 (2.616)
12	.5580 (14.173)	.0930 (2.362)	.1480 (3.759)	.050 (1.27)	.0480 (1.219)	.1115 (2.832)	.1870 (4.750)	.0050 (0.127)	.1580 (4.013)

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for information only.
3. Material: Hardened tool steel.
4. Finish: 32 - microinch polished.
5. Design of rear extension is optional, but must have a groove provided as indicated.

FIGURE 5. Test gauge, pin, gauge location and retention - Continued.

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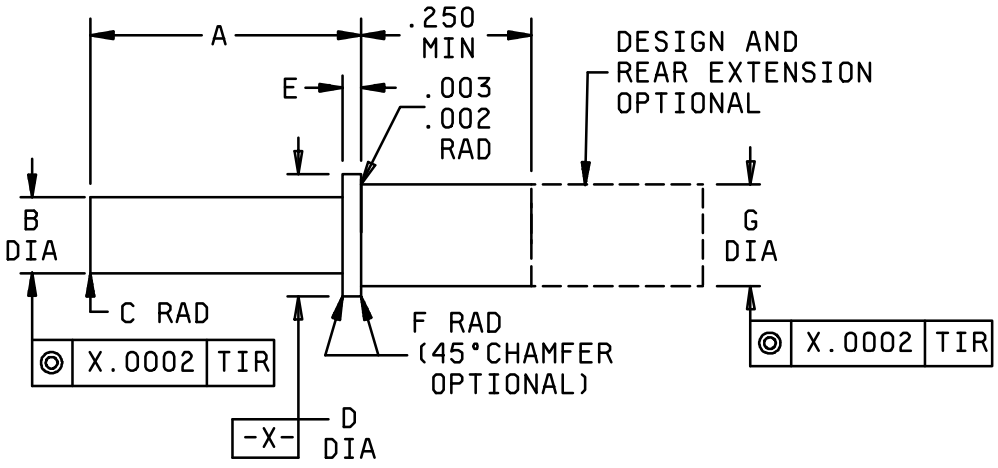

Contact Size	A +.0005 (0.013) -.0000 (mm)	B +.0002 (0.005) -.0000 (mm)	C (RAD)	D +.0002 (0.005) -.0000 (mm)	E +.0000 -.0002 (0.005) (mm)	F (RAD) +.0000 -.0005 (0.013) (mm)	G +.0002 (0.005) -.0000 (mm)
22D	.2885 (7.328)	.0600 (1.524)	.004 (0.10) .002 (0.05)	.0610 (1.549)	.0292 (0.742)	.0030 (0.076)	.0478 (1.214)
20	.4790 (12.167)	.0760 (1.930)	.010 (0.25) .005 (0.12)	.1000 (2.540)	.0330 (0.838)	.0050 (0.127)	.0780 (1.981)
16	.4940 (12.548)	.1100 (2.794)	.010 (0.25) .005 (0.12)	.1300 (3.302)	.0480 (1.219)	.0050 (0.127)	.1030 (2.616)
12	.4940 (12.548)	.1580 (4.013)	.010 (0.25) .005 (0.12)	.1870 (4.750)	.0480 (1.219)	.0050 (0.127)	.1580 (4.013)

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for information only.
3. Material: Hardened tool steel.
4. Finish: 32 - microinch polished.

FIGURE 6. Test gauge, socket, gauge location and retention.

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3.6.14 Altitude - low temperature. When tested as specified in 4.7.15, connectors shall withstand a dielectric withstanding voltage of 625 volts rms after stabilizing at an atmospheric pressure equivalent to an altitude of 80,000 feet (24.38 km) and a temperature of -54°C +4°C, -0°C.

3.6.15 Insulation resistance.

3.6.15.1 At ambient temperature. When tested as specified in 4.7.16.1, the insulation resistance of connectors shall be greater than 5,000 megohms when measured separately between pairs of contacts and between the shell and any contact.

3.6.15.2 At elevated temperature. When tested as specified in 4.6.16.2, the insulation resistance of connectors shall be greater than 200 megohms when measured separately between any two contacts and between the shell and any contact.

3.6.16 Dielectric withstanding voltage.

3.6.16.1 Dielectric withstanding voltage. When tested as specified in 4.7.17.1, connectors shall show no evidence of breakdown or flashover.

3.6.16.2 Dielectric withstanding voltage, altitude. When tested as specified in 4.7.17.2, completely wired and assembled shall show no evidence of breakdown or flashover.

3.6.17 Durability. When tested as specified in 4.7.18, mated pairs of fully assembled connectors shall meet the subsequent test requirements listed in table VII.

3.6.18 Random vibration. When tested as specified in 4.7.19, connectors shall not crack or break and there shall be no loosening of parts. Connectors shall be in full engagement during vibration. Interruption of electrical continuity shall not be longer than 1.0 microsecond.

3.6.19 Shock (specified pulse). During and after the test specified in 4.7.20, connectors shall show no sign of damage.

3.6.20 Humidity. During and after the test specified in 4.7.21, the insulation resistance shall be not less than 100 megohms.

3.6.21 Ozone exposure. When tested as specified in 4.7.22, connectors shall meet the subsequent test requirements listed in table VII.

3.6.22 Fluid immersion. When tested as specified in 4.7.23, connectors shall meet the subsequent test requirements listed in table VII.

3.6.22.1 Retention system fluid exposure. When tested as specified in 4.7.23.1, connectors shall meet the requirements of 3.6.10. Effects of fluids on resilient sealing members shall not be a consideration of this test.

3.6.23 Contact insertion and removal forces. When tested as specified in 4.7.24, the individual contact insertion force shall not exceed 15 pounds (66.7 N) and the removal force shall not exceed 10 pounds (44.5 N). Contacts shall be wired using wire specified in table VI. The applicable tool specified in 3.5.1.1 shall be used for this test.

3.6.24 Thermal vacuum out-gassing (class S). The entire connector assembly, when tested in accordance with 4.7.28, shall not have a total mass loss (TML) of 1.0 percent of the original specimen mass and shall have a maximum volatile condensable material (VCM) content of 0.1 percent of the original specimen mass. When successfully tested as specified in 4.7.30, the connectors shall meet the subsequent tests listed in table VII.

3.6.25 Flammability, odor, and toxicity (class S). Fully mated connectors shall be tested as specified in 4.7.29 and shall meet subsequent tests listed in table VII.

3.6.26 Contact walkout. When tested as specified in 4.7.25, contacts shall not become dislodged from their normal position.

3.6.27 Insertion removal tool abuse. When tested as specified in 4.7.26, there shall be no damage to the contacts, the connector insert, or the contact retainer mechanism. The connectors shall meet the requirements of subsequent testing.

3.6.28 Temperature life with contact loading. When tested as specified in 4.7.27, contacts shall maintain their specified locations as shown on figure 1 or 2, as applicable and there shall be no electrical discontinuity in excess of 1.0 microsecond.

3.7 Interchangeability. All complete connectors, including their complement of contacts, having the same PIN shall be completely interchangeable with each other with respect to installation (physical) and performance (function) as specified herein.

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3.8 Marking. Connectors and shields are to be marked in accordance with method I of MIL-STD-1285, and are to include the PIN (see 3.1), the manufacturer's name or code symbol, and date code. For shipments of connectors with crimp removable contacts, shipped separately, to the original equipment manufacturer (OEM) or other contractors, the complete military PIN of the connector with contacts to be loaded, shall be marked on the connector (see 3.5.1 and 6.2). For shipments of connectors without contacts to the OEM's or other contractors, the connector shall be marked with the complete PIN of the connector "without contacts" (1L designation). For field replacement purposes, the contact types used shall be specified in the OEM's technical data.

3.9 Workmanship. Connectors, contacts, shields, jackscrews, and guide pins shall be processed in such a manner as to be uniform in quality and shall be free from defects that will affect life, serviceability or appearance. There shall be no evidence of poor molding, fabricating, cracking of insulator after molding or improperly assembled contacts, peeling or chipping of the plating or finish, nicks and burrs of metal parts surfaces, and no post molding warpage of connectors. The contacts shall be free from such burrs or sharp cutting edges (except wire wrapposts) that would damage the plating of mating connectors.

4. VERIFICATION

4.1 Classification of inspection. The inspection requirements specified herein are classified as follows:

a. Qualification inspection (see 4.4).

b. Verification of qualification (see 4.4.1).

c. Conformance inspection (see 4.6).

4.2 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with the test conditions specified in the “General Requirements” of MIL-STD-1344 and MIL-STD-202.

4.2.1 Verification testing. The following identified tests and test methods assure connector integrity within typical operating conditions and applications. Alternate commercial industry standard test methods are allowed, however when an alternate method is used, the alternate method must be coordinated with the qualifying activity prior to performance of the test. The test methods described herein are proven methods and shall be the referee method in cases of dispute.

4.2.1.1 Reliability assurance program. A reliability assurance program shall be established and maintained in accordance with MIL-STD-790. Evidence of such compliance shall be verified by the qualifying activity of this specification as a prerequisite for qualification.

4.2.1.2 Test equipment and inspection facilities. Test and measuring equipment and inspection facilities of sufficient accuracy, qualify and quality to permit performance of the required inspection shall be established and maintained by the contractor. The establishment and maintenance of a calibration system to control the accuracy of the measuring and test equipment (i.e., NCSL-Z540-1994, ISO 10012-1 part 1, or comparable standards) shall be required.

4.2.1.3 Responsibility for compliance. All items shall meet all requirements of sections 3 and 4. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.3 Materials inspection. Materials inspection shall consist of certification supported by verifying data that the materials as specified herein and on the applicable military specification sheets (see 3.1), used in fabricating the connectors, are in accordance with the applicable referenced specifications or performance requirements prior to such fabrication (see 3.5, 4.7.2, and 6.2).

4.4 Qualification inspection. Qualification inspection shall be performed at a laboratory acceptable to the Government (see 6.3) on sample units produced with equipment and procedures normally used in production. Use of alternate materials, plating, and processes (see 3.3.1) shall be identified for inclusion in the product test documentation.

4.4.1 Verification of qualification. To retain qualification, the contractor shall verify in coordination with the qualifying activity the capability of manufacturing products which meet the performance requirements of this specification. Refer to the qualifying activity any time that the inspection data indicates failure of the qualified product to meet the performance requirements of this specification.

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4.5 Sample size and inspection routine. The number of connectors and the inspection to which they shall be subjected shall be as follows:

a. A minimum of two complete pairs of connectors of each shell size, with insert arrangements containing power contacts of all sizes for which qualification is desired, shall be wired with minimum diameter wire of table VI and mounted in accordance with figure 4. Mating connector samples shall be divided into two similar groups. One group shall be subjected to the tests of group 1, table VII, in the sequence indicated. The other group shall be subjected to the tests of group 2, table VII, in the sequence indicated.

b. A minimum of two complete mating pairs of connectors of each shell size, with insert arrangements containing power contacts of all sizes for which qualification is desired, shall be wired with the maximum wire of table VI and mounted in accordance with figure 4. Mating connector samples shall be divided into two similar groups. One group shall be subjected to the tests of group 1, table VII, in the sequence indicated. The other group shall be subjected to the tests of group 2, table VII, in the sequence indicated.

c. Twelve mated pairs of connectors representing both shell sizes in any insert arrangement providing a minimum of 21 contact cavities of each appropriate contact size shall be terminated with nominal gauge wire and mounted in accordance with figure 4. The connectors shall be subjected to the tests of group 4, table VII, in the sequence indicated.

d. Twelve mated pairs of connectors, representing both shell sizes in any insert arrangements, shall be terminated with nominal gauge wire and mounted in accordance with figure 4. The connectors shall be subjected to the tests of group 3, table VII, in the sequence indicated.

TABLE VI. Test wire sizes.

Contact size	Maximum wire dia (mm)	Minimum wire dia (mm)
22D	.049 ±.002 (1.24 ±0.05)	.031 - .034 (0.79 - 0.86)
20	.068 ±.002. (1.73 ±0.05)	.040 - .045 (1.02 - 1.14)
16	.085 ±.002 (2.16 ±0.05)	.068 - .074 (1.73 - 1.88)
12	.120 ±.004 (3.05 ±0.10)	.097 - .107 (2.46 - 2.72)
12 Shielded	M17/094-RG179	- - -

4.5.1 Preparation of samples. Preparation of samples shall be in accordance with 4.5. Mated connectors shall be as shown on figure 4.

4.5.2 Retention of qualification. Every 12 months, the manufacturer shall verify in coordination with the qualifying activity the capability of manufacturing products, which meet the performance requirements of this specification. Refer to the qualifying activity the capability of manufacturing products that meet the performance requirements of this specification. Refer to the qualifying activity any time the inspection data indicates failure of the qualified product to meet the performance requirements of this specification.

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

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TABLE VII. Qualification inspection.

Inspection	Requirement paragraph	Test paragraph
Group 1		
Examination of product	3.1, 3.3, 3.4, 3.7, 3.8, and 3.9	4.7.2
Maintenance aging	3.6.2	4.7.3
Temperature cycling	3.6.3	4.7.4
Mating and unmating forces	3.6.4	4.7.5
Altitude immersion 1/	3.6.5	4.7.6
Insert retention	3.6.6	4.7.7
Salt spray (corrosion)	3.6.7	4.7.8
Mating and unmating forces	3.6.4	4.7.5
Contact resistance	3.6.8	4.7.9
Post test inspection	- - -	4.7.30
Group 2		
Examination of product	3.1, 3.3, 3.4, 3.7, 3.8, and 3.9	4.7.2
Gauge location	3.6.9	4.7.10
Gauge retention	3.6.11	4.7.12
Maintenance aging	3.6.2	4.7.3
Magnetic permeability	3.6.12	4.7.13
Contact retention 2/	3.6.13	4.7.14
Altitude - low temperature	3.6.14	4.7.15
Insulation resistance at ambient temperature	3.6.15.1	4.7.16.1
Temperature cycling	3.6.3	4.7.4
Dielectric withstanding voltage	3.6.16.1	4.7.17.1
Dielectric withstanding voltage, altitude 1/	3.6.16.2	4.7.17.2
Mating and unmating forces	3.6.4	4.7.5
Insulation resistance at elevated temperature	3.6.15.2	4.7.16.2
Durability	3.6.17	4.7.18
Random vibration 1/	3.6.18	4.7.19
Shock (specified pulse)	3.6.19	4.7.20
Humidity	3.6.20	4.7.21
Contact resistance 3/	3.6.8	4.7.9
Post test inspection	- - -	4.7.30
Group 3		
Examination of product	3.1, 3.3, 3.4, 3.7, 3.8, and 3.9	4.7.2
Ozone exposure	3.6.21	4.7.22
Insulation resistance at ambient temperature	3.6.15.1	4.7.16.1
Dielectric withstanding voltage	3.6.16.1	4.7.17.1
Fluid immersion (one mated pair per fluid)	3.6.22	4.7.23
Mating and unmating forces	3.6.4	4.7.5
Thermal vacuum out-gassing (class S)	3.6.24	4.7.28
Flammability, odor, and toxicity (class S)	3.6.25	4.7.29
Post test inspection	- - -	4.7.30
Group 4		
Examination of product	3.1, 3.3, 3.4, 3.7, 3.8, and 3.9	4.7.2
Contact walkout	3.6.26	4.7.25
Insertion removal tool abuse 1/	3.6.27	4.7.26
Pin contact stability	3.6.10	4.7.11
Retention system fluid exposure (one mated pair per fluid)	3.6.22.1	4.7.23.1
Temperature life with contact loading 1/	3.6.28	4.7.27
Gauge retention	3.6.11	4.7.12
Contact insertion and removal forces	3.6.23	4.7.24
Insert retention	3.6.6	4.7.7
Post test inspection	- - -	4.7.30

1/ Original qualification only.
2/ Load from front only.
3/ Load from both directions.

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4.6 Conformance inspection.

4.6.1 Inspection of product for delivery. Inspection of product for delivery shall consist of group A inspection.

4.6.1.1 Inspection lot. An inspection lot shall consist of all the connectors of the same PIN, produced under essentially the same conditions, and offered for inspection at one time.

4.6.1.2 Group A inspection. Group A inspection shall consist of the tests specified in table VIII and the dielectric withstanding voltage test specified in 4.7.17.1.

TABLE VIII. Group A inspection.

Inspection	Requirement paragraph	Test paragraph
Examination of product	3.1, 3.3, 3.4, 3.7, 3.8, and 3.9	4.7.2
Dielectric withstanding voltage	3.6.16.1	4.7.17.1

4.6.1.2.1 Sampling plan. Statistical sampling and inspection for the samples submitted for group A inspection shall be on a lot by lot basis with sample sizes as listed in table IX. Any occurrence of a failure shall be considered as failure of the lot.

TABLE IX. Lot and sample size.

Lot size	Sample size
1 to 5	All
6 to 50	5
51 to 90	7
91 to 150	11
151 to 280	13
281 to 500	16
501 to 1200	19
1201 to 3200	23
3201 to 10000	29
10001 to	35

4.6.1.2.2 Rejected lots. If an inspection lot is rejected, the manufacturer may rework it to correct the defects, or screen out the defective units, and resubmit for reinspection. Resubmitted lots shall be inspected using the sample size of the next higher lot size specified in table XI and shall not thereafter be tendered for acceptance unless the former rejection or requirement of correction is disclosed. Such lots shall be clearly identified as reinspected lots.

4.6.1.2.3 Group B inspection (periodic). Periodic inspection shall consist of a 12 month inspection and an 36 month requalification.

4.6.1.2.4 Group B inspection. Group B inspection shall consist of the examinations and tests specified in table X, in the order shown, and the sample shall be selected from inspection lots that have passed group A inspection. Connectors shall be selected at random during each 36-month integrated production period as follows:

a. One mated pair of connectors containing a high density insert arrangement (-131 or -185) shall be terminated and mounted in accordance with 4.5.a. The connectors shall be subjected to the tests of sample 1, table X.

b. One mated pair of connectors containing a high density insert arrangement (-131 or -185) shall be terminated and mounted in accordance with 4.5.b. These connectors shall be subjected to tests of sample 2, table X.

c. A minimum of one mated pair of connectors containing a typical insert arrangement representing two or more contact sizes shall be terminated and mounted in accordance with 4.5.c. The connectors shall be subjected to the tests of sample 3, table X.

d. Two mated pairs of connectors containing any representative insert arrangement shall be terminated and mounted in accordance with 4.5.d. One mated pair shall be subjected to the tests of sample 4, table X. The other mated pair shall be subjected to the tests of sample 5, table X.

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TABLE X. Group B inspection.

Inspection	Requirement paragraph	Method paragraph	Group				
			1	2	3	4	5
Examination of product	3.3, 3.8	4.7.2	X	X	X	X	X
Insulation resistance at ambient temperature	3.6.15.1	4.7.16.1	X	X	X	X	X
Dielectric withstanding voltage	3.6.16.1	4.7.17.1	X	X	X	X	X
Humidity	3.6.20	4.7.21	X	X			
Temperature life with contact loading (250 hours)	3.6.28	4.7.27			X		
Insert retention	3.6.6	4.7.7			X		
Fluid immersion (MIL-PRF-87257)	3.6.22	4.7.23				X	
Fluid Immersion (MIL-DTL-5624, JP-5)	3.6.22	4.7.23					X
Mating and unmating forces	3.6.4	4.7.5				X	X
Post test inspection	- - -	4.7.30	X	X	X	X	X

4.6.1.2.5 Failures. If one or more sample units fail to pass group B inspection, the sample shall be considered to have failed.

4.6.1.2.6 Rejected lots. If an inspection lot is rejected, the contractor may rework it to correct the defects, or screen out the defective units, and submited for reinspection. Such lots shall be separate from new lots, and shall be clearly identified as reinspected lots. If an inspection lot fails fluid immersion the entire lot is considered to have failed, and shall not be reinspected.

4.6.1.2.7 Disposition of sample units. Sample units which have passed group B inspection shall not be delivered on a contract or purchase order.

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

4.7 Methods of inspection.

4.7.1 Test methods. The following identified tests and test method assure connector integrity within typical operating conditions and applications. Alternate commercial industry standard methods are allowed, however when and alternate method is used, the qualifying activity must be notified prior to performance of the test. The test methods described herein are proven methods and shall be the referee method in cases of dispute.

4.7.2 Visual and mechanical examination. Connectors and associated fittings shall be examined to verify that the design, construction, physical dimensions, marking and workmanship are in accordance with the applicable requirements (see 3.1, 3.3, 3.4, 3.7, 3.8, and 3.9).

4.7.3 Maintenance aging (3.6.2). Each contact shall be inserted, removed, and reinserted using applicable insertion and removal tools. The connector shall be mated and unmated 10 times and at least 10 of the contacts in both plugs an receptacles shall be inserted and removed 9 times, using applicable insertion and removal tools. The contact insertion and removal forces required by 4.6.24 shall be made on the third insertion of 5 contacts of each of the connectors.

4.7.4 Temperature cycling (see 3.6.3). Wired and mated connectors shall be subjected to temperature cycling in accordance with method 1003 of MIL-STD-1344, test condition A, except the minimum temperature shall be -65° +0°, -3°C and the maximum temperature shall be 200° +3°, -0°C. Upon completion of the last cycle, the connectors shall be returned to room temperature for inspection and additional tests specified in table VII.

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4.7.5 Mating and unmating forces (see 3.6.4). Mating and unmating forces shall be measured in accordance with method 2013, of MIL-STD-1344. The following details shall apply:

a. Special mounting means - See MIL-STD-1344.

b. Force or torque requirements - See table II.

c. Lubrication - None.

d. Wire type, gauge, and length - See table VI and 4.5.1: length optional.

e. Rate of mating and unmating - Maximum of 10 seconds for each operation.

f. Definition of mating parameter - Mating dimensions are as shown on figure 4.

g. Applicable hardware - All hardware furnished with connector.

h. Test conditions - Standard ambient.

4.7.6 Altitude immersion (see 3.6.5). Mated connectors shall be tested in accordance with method 1004, of MIL-STD-1344. The following details shall apply.

a. All wire ends shall be located within the chamber and exposed to the chamber atmosphere, but not submerged or sealed.

b. At the end of the third cycle while connectors are still submerged in the solution, the insulation resistance shall be measured as specified in 4.7.16.1 and the dielectric withstanding voltage test shall be performed as specified in 4.7.17.1.

4.7.7 Insert retention (see 3.6.6). Insert faces of unmated connectors shall be tested in accordance with method 2010, of MIL-STD-1344 to a pressure of 45 psig (310 kPa).

4.7.8 Salt spray (corrosion) (see 3.6.7). Unmated connectors shall be tested in accordance with method 1001, of MIL-STD-1344. The following detail and exceptions shall apply:

a. Test condition letter - B.

b. The samples shall not be mounted, but shall be suspended using waxed twine (or string), glass rods, or glass cord.

4.7.9 Contact resistance (see 3.6.8). Contact resistance shall be measured in accordance with method 3004, of MIL-STD-1344. Twenty percent, but not less than three contacts of the mated connectors, shall be tested. The following details and exceptions shall apply:

a. Test sample preparation shall be in accordance with MIL-STD-1344.

b. Wire size and type - See table VI and 4.5.1.

c. Test current shall be as specified herein.

d. Millivolt drop - See table III.

e. Preconditioning and special environment - Samples shall be tested a +25°C and +200°C.

4.7.10 Gauge location (see 3.6.9). Applicable test gauges shall be installed in three randomly selected cavities of each contact size in each connector. With the gauges fully seated against the contact retention device, the axial location of the front of the gauges shall be measured relative to the reference plane indicated on front of the gauges shall be measured relative to the reference plane indicated on figure 1 or 2, as applicable.

4.7.11 Pin contact stability (see 3.6.10). Ten percent of the pin contact cavities of each size in each unmated connector shall be subjected to this test. Test gauges conforming to figure 5 shall be installed in the connector and the connector held rigidly in a suitable fixture. A moment shall be applied to the exposed rod as shown on figure 7. The rate of moment application shall not exceed 1 pound inch (4.45 Nm) per minute. The total pin tip displacement shall be measured as shown on figure 7.

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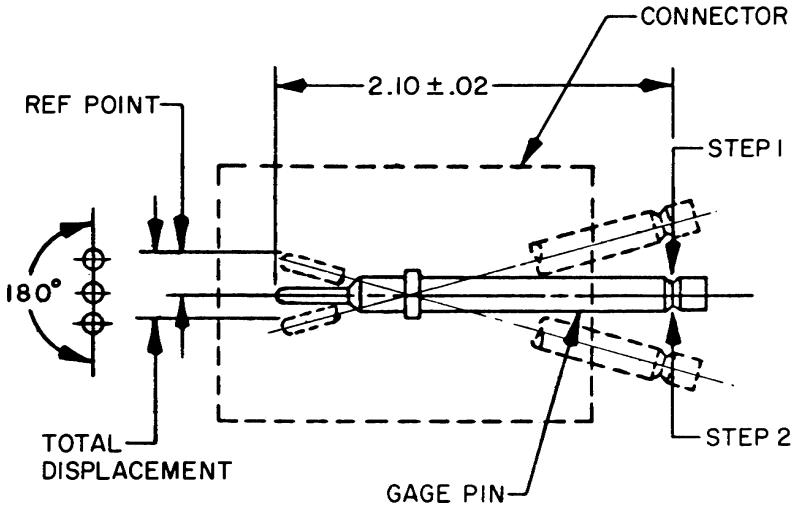
4.7.12 Gauge retention (see 3.6.11). Applicable test gauges conforming to figure 5 or 6, shall be installed in three randomly selected cavities in each connector, with the accessory rear hardware removed. The axial load specified in table V shall be applied at a rate of 1 pound (0.45 kg) per second until the specified load has been reached. Gauge displacement shall be measured with respect to the connector shell after an initial load of 2 pounds (0.91 kg) has been applied to assure that all slack has been taken up.

4.7.13 Magnetic permeability (see 3.6.12). The wired, assembled, and fully mated connectors shall be checked for relative permeability with an indicator conforming to ASTM A342.

4.7.14 Contact retention (see 3.6.13). The contact retention shall be tested as specified in method 2007 of MIL-STD-1344. An axial load, as shown in table V, shall be applied to 20 percent of the contacts in unmated connectors as specified in paragraph 4.5.b. A preload of 3 pounds (1.36 kg) maximum shall be initially applied to fully seat the contacts. Connectors shall have all contacts in place during the test.



Step 1 - Apply moment to determine reference point.
Step 2 - Apply moment in opposite direction (180°) and measure total displacement.

Contact Size	Moment pound inch (Nm)
22D	1 (0.113)
10	1.5 (0.169)
16	2 (0.226)
12	2 (0.226)

FIGURE 7. Pin contact stability test.

4.7.15 Altitude - low temperature (see 3.6.14). Connectors shall be conditioned in a dry oven at a temperature of 50°C ±5°C for at least 8 hours. Wired, mated assembled connectors in a continuous loop circuit shall be placed in a chamber that will simulate actual service usage. A suitable method must be made to energize the connector between shell and contacts.

a. Reduce the chamber internal temperature to -54°C +4°C, -0°C and maintained until the specimen stabilizes.

b. Reduce the chamber internal pressure to simulate an altitude of 80,000 feet (24.4 km).

c. Maintain the above temperature and pressure for 1 hour minimum.

d. Energize the connector between the connector shell and all contacts using 625 volts rms, 60 Hz for 1 minute minimum. There shall be no dielectric breakdown.

e. With the test voltage removed, increase the chamber internal pressure and temperature to standard ambient conditions and allow the specimen to stabilize.

f. Perform dielectric withstanding voltage and insulation resistance tests of 4.7.17.1 and 4.7.16.1 respectively. (The continuous loop circuit may be opened for these tests.) The connectors shall remain mated during the test.

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4.7.16 Insulation resistance.

4.7.16.1 At ambient temperature (see 3.6.15.1). Connectors shall be tested in accordance with method 3003, of MIL-STD-1344. For test purposes, the resistance shall be measured separately between the closest pairs of contacts, including those which were inserted and removed 10 times in maintenance aging, and between the shell and the contacts closest to the shell. Each connector shall have a minimum of 50 percent of the contacts subjected to this test. The tolerance of the applied voltage shall be ±10 percent. For conformance inspection, simulated contacts and special techniques may be used in performing this test.

4.7.16.2 At elevated temperature (see 3.6.15.2). The insulation resistance of mated connectors shall be measured in accordance with 4.6.16.1, except the connectors shall have been exposed to an ambient temperature of 200°C ±3°C for a period of 30 minutes. The resistance shall be measured while the connector is at the elevated temperature.

4.7.17 Dielectric withstanding voltage.

4.7.17.1 Dielectric withstanding voltage (see 3.6.16.1). Unmated connectors shall be tested in accordance with method 3001 of MIL-STD-1344. Test voltages, as shown in table XI, shall be applied between the closest pairs of contacts and also between the shell and the contacts closest to the shell. Each connector shall have a minimum of 50 percent of its contacts subjected to this test. The specified voltage shall be maintained for 2 seconds minimum. For quality conformance inspection, simulated contacts and special techniques may be used in performing this test.

TABLE XI. Test voltages (ac rms).

Altitude feet (km)	Equivalent pressure (Torr)	1/ Service rating M		Service rating I	
		Mated	Unmated	Mated	Unmated
Sea level	---	1300	1300	1800	1800
50,000 (15.24)	87.5	800	550	1000	600
70,000 (21.34)	35.5	800	350	1000	400
110,000 (33.53)	5.74	800	200	1000	200

1/ For service rating, see 3.1.

4.7.17.2 Dielectric withstanding voltage, altitude (see 3.6.16.2). The mated connectors shall be placed in a suitable chamber at room temperature and tested at the simulated altitudes of table XI starting at sea level and concluding at 110,000 feet (33.53 km). The test shall be in accordance with method 3001 of MIL-STD-1344. Test voltages, as shown in table XI, shall be applied between the closest pair of contacts as well as between the shell and the contacts closest to the shell. Each connector shall have a minimum of 50 percent of its contacts subjected to this test. The specified voltage shall be maintained for 2 seconds minimum. The leads of all test circuits shall be brought out through the walls of the chamber. There shall be no wire splices inside the chamber. The wire ends of all leads shall be unsealed.

4.7.18 Durability (see 3.6.17). Connectors shall be subjected to 500 cycles of mating and unmating at a rate not exceeding 300 cycles per hour. The mating and unmating shall be accomplished in a manner similar to subjection in service. After 500 cycles, the plug and receptacle assemblies shall pass the remaining sequence of tests.

4.7.19 Random vibration (see 3.6.18). Connectors shall be tested in accordance with method 2005 of MIL-STD-1344. All contacts shall be wired in series with at least 100 milliamperes of current allowed to flow. The following details shall apply:

a. Monitoring instrumentation - A suitable instrument shall be used to monitor the current flow and to indicate any discontinuity of contacts of interruption of current flow.

b. The number and location of test points.

c. Method of mounting - Similar to figure 8, except the plug and receptacle shall be mounted on a separate adapter plates using the connector's normal mounting provisions and suitable hardware. The adapter plate for the plug shall be attached to the mounting bracket. The adapter for the receptacle shall be subsequently attached to the plug adapter plate in a manner simulating the normal mated condition.

d. Test condition VI, letter G; time duration 8 hours per axis.

e. Measurements before, during and after test.

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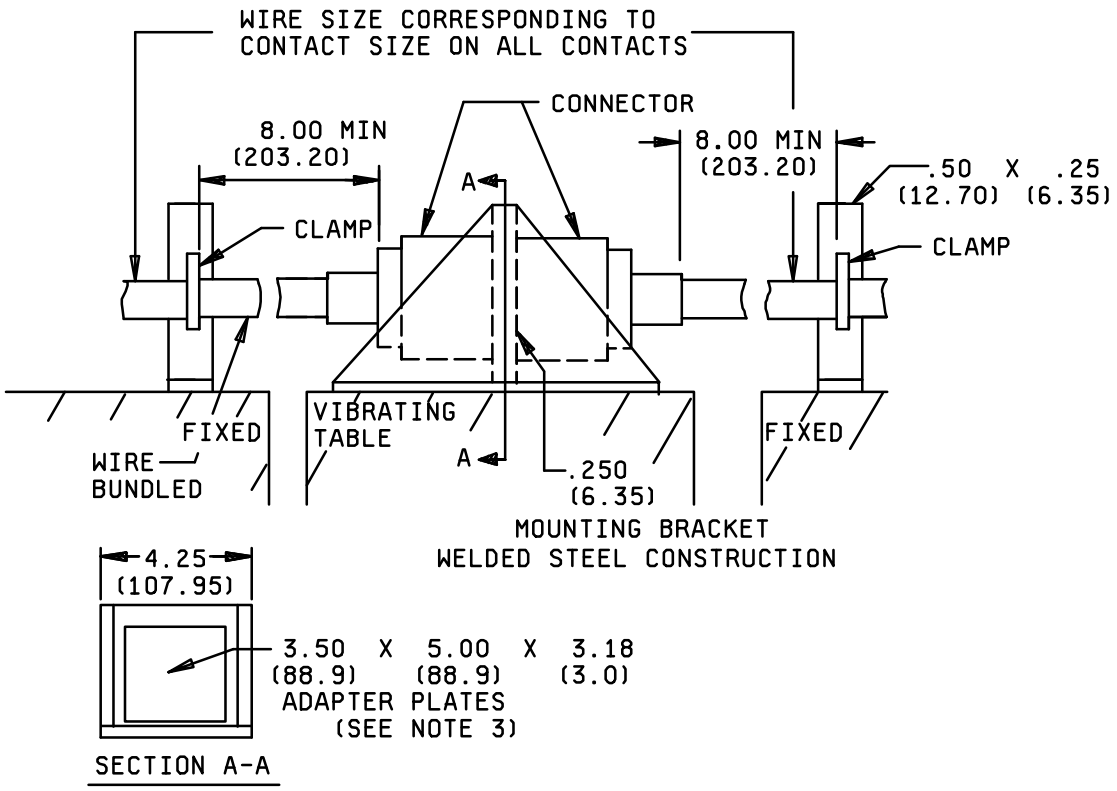

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Metric equivalents are in parenthesis.
4. Cable to panel mounting requires a single adapter plate.
5. Unless otherwise specified, dimensions are for reference.

FIGURE 8. Vibration testing equipment.

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4.7.20 Shock (specified pulse) (see 3.6.19). Wired connectors shall be tested in accordance with method 2004 of MIL-STD-1344, test condition A. Receptacles shall be mounted by a method similar to the vibration tests on the shock device or carriage. Plugs shall be engaged with the receptacles. The connectors shall be fully wired and the wired bundle or cable clamped to points that move with the connector. A minimum of 8 inches (203.2 mm) of wire or cable shall be unsupported behind the rear of each connector.

4.7.21 Humidity (see 3.6.20). Wired, mated connectors shall be tested in accordance with test type II of method 1002 of MIL-STD-1344. The following details and exceptions shall apply:

a. Polarized voltage - Not required.

b. Wired and mated connectors - As specified in 4.5.b

c. Test type - II, omitting step 7b.

d. Initial measurements - none. No dip loops in wire or wire splices in chamber. Wires shall be brought out of the chamber through vapor-tight seals.

e. Final measurements - After a minimum of 3 hours at step 7a of the final cycle and while the connectors are still subjected to high humidity, the insulation resistance shall be measured when the chamber temperature reaches 20°C ±5°C and condensation is observed on the connector.

4.7.22 Ozone exposure (see 3.6.21). Ozone exposure shall be conducted in accordance with method 1007 of MIL-STD-1344. The standard details shall apply.

4.7.23 Fluid immersion (see 3.6.22). Connector samples shall be subjected to the test specified in method 1016 of MIL-STD-1344 (one sample per fluid). After testing, connectors shall be visually inspected (no magnification) for cracks and tears which may affect remaining tests in the test sequence. Connectors shall then be mated and unmated, or unmated and mated, depending on fluid immersion test conditions. Samples shall be subjected to the fluids specified in method 1016 of MIL-STD-1344, as shown in table XII herein.

TABLE XII. Fluid immersion.

Sample Number	Method 1016 MIL-STD-1344 test fluid
1	d
2	e
3	a
4	b
5	f
6	g
7	c
8	l
9	h
10	i
11	j
12	k

4.7.23.1 Retention system fluid exposure (see 3.6.22.1). Connectors shall be unmated and contacts shall be removed. Connectors shall be immersed in the test fluids of table XII (one sample per fluid) for 20 hours at room temperature. After removal, fluids shall be drained from all recesses. Connectors shall remain in free air for 4 hours minimum and the contacts shall be reinstalled.

4.7.24 Contact insertion and removal forces (see 3.6.23). Contact insertion and removal forces shall be measured in accordance with method 2012 of MIL-STD-1344, using tools specified in 3.5.1.1.

4.7.25 Contact walkout (see 3.6.26). Two contacts in each plug and receptacle shall be tested. The contacts shall be crimped to stranded steel cable of an appropriate size and installed in the connector. The unmated connector shall be mounted in a test fixture as shown on figure 9. A 3 pound (13.34 N) load shall be applied to the cable. One 360 degree rotation of the fixture shall constitute 1 cycle. The connector shall be subjected to 100 cycles at a rate of 10 to 20 cycles per minute.

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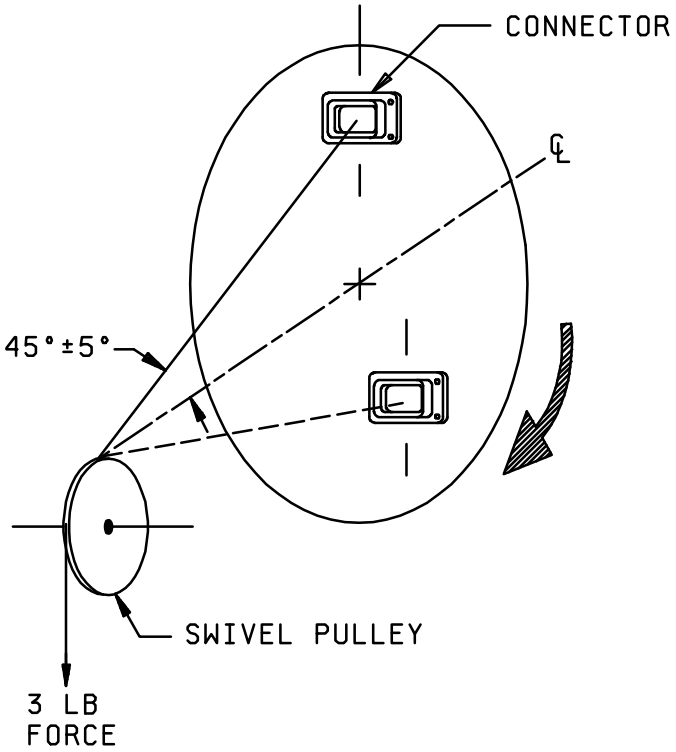

FIGURE 9. Contact walkout test setup.

4.7.26 Insertion removal tool abuse (see 3.6.27). Five contact cavities of each size in each connector shall be subjected to each of the following tests. Different contact cavities shall be used for each test. Should a tool become damaged during any of the testing, it shall be replaced. Failure of a tool shall not constitute a test failure.

a. Removal tool rotation. The applicable contact removal tool shall be inserted as if to remove a contact and an axial load of 3 pounds (13.3 N) shall be applied. With the force applied, the tool shall be rotated 180 degrees and then removed, also removing the contact. The contact shall be reinserted. These steps shall be repeated three times on each of the five contacts selected.

b. Insertion tool rotation. The contact shall first be removed. With the applicable contact insertion tool, the contact shall be reinserted and an axial load of 3 pounds (13.3 N) applied to the tool. With the force applied, the tool shall be rotated 180 degrees and then removed. These steps shall be repeated three times on each of the five contacts selected.

c. Insertion tool thrust. The contact shall first be removed. With the applicable contact insertion tool, the contact shall be reinserted and an axial load of 10 pounds (44.5 N) applied to the tool. These steps shall be performed only once on each of the five contacts selected. A new tool shall be used for each contact.

d. Removal tool thrust. The applicable contact removal tool shall be inserted as if to remove the contact and an axial load of 10 pounds (44.5 N) shall be applied to the tool. The tool shall then be removed, also removing the contact. These steps shall be performed only once on each of the five contacts selected. A new tool shall be used for each contact.

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4.7.27 Temperature life with contact loading (see 3.6.28). Temperature life shall be tested in accordance with method 1005 of MIL-STD-1344. The following details and exceptions shall apply:

a. Test condition for chamber and connector temperature and length of test - Test condition 6, letter D for qualification inspection: letter B for periodic inspection.

b. Load conditions (electrical) - 100 ±10 milliamperes at 10 volts dc maximum.

c. Special fixturing and mounting - See figure 10.

d. Observations or measurements - Discontinuities in excess of 1 microsecond during test. After return to ambient temperature, the connectors shall be unmated and the contact locations measured with approximately 2 pounds (8.9 N) axial load applied to seat the contacts against the retention device.

e. Periodic inspection - Discontinuity as in d.

f. Number of samples - One pair of contacts per sample.

g. Sample preparation - Connector samples shall have one mating pair of contacts removed and replaced with contacts crimped to stranded steel cable or steel-cored copper wire (Copper weld or equivalent) of an appropriate size. The axial location of these contacts shall be measured for conformance to figure 1 or 2, as applicable, with a load of approximately 2 pounds (0.91 kg) to seat the contacts against the retention device. A weight equal to 50 percent of the axial load specified in table V for the applicable contact size shall be suspended freely from each steel wire.

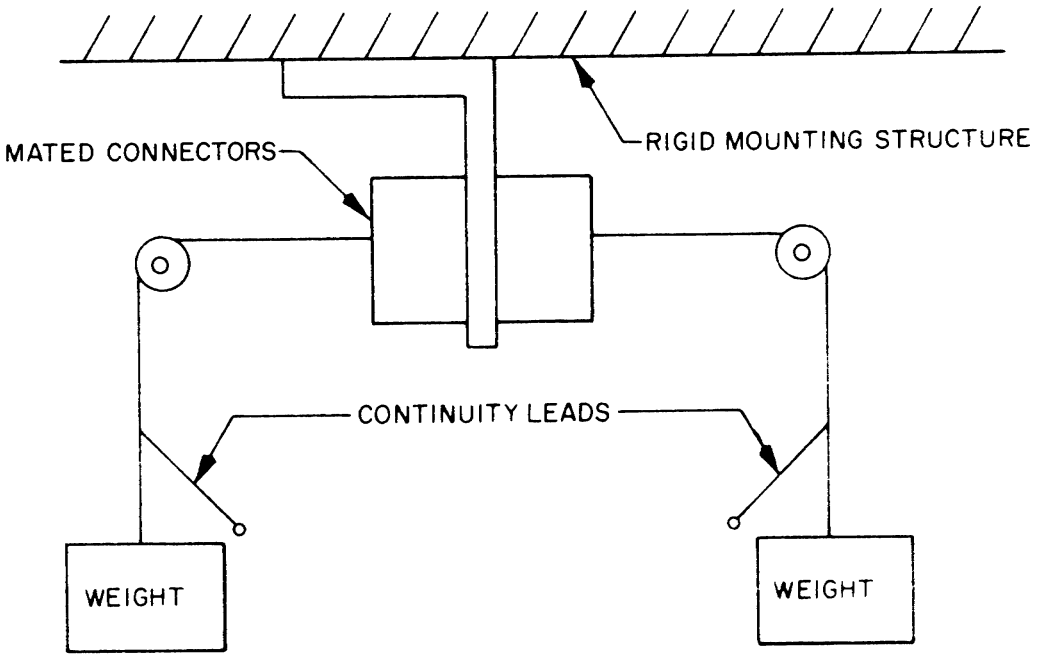

FIGURE 10. Fixturing for temperature life with contact loading.

4.7.28 Thermal vacuum out-gassing (class S) (see 3.6.24). All nonmetallic materials including lubrication used in the manufacturing of these connectors shall be tested in accordance with ASTM-E-595 to determine the maximum TML of the original specimen mass and the VCM content of the original specimen mass. For the purpose of determining TML and VCM of connectors, the original specimen mass shall be the assembled connector mass excluding metallic parts. The TML and VCM for the connectors may be determined by testing the specific materials of the connector and calculating the loss for the connector.

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4.7.29 Flammability, odor, and toxicity (class S) (see 3.6.25). Complete connector assemblies, one connector with protective cap and one fully mated connector pair shall meet the requirements of NBH 8060.1.

4.7.30 Post test inspection. The tested connectors shall be inspected to determine the effects of previous testing. Any evidence of cracking, loosening of parts, carbon tracking, excess wear, tearing of grommet seals, resilient interface material, peripheral seals, or missing parts shall be recorded.

5. PACKAGING

5.1 Packaging requirements. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of material is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military department or Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. These connectors and contacts are military unique because they are intended for use in applications wherein extremes of temperature (-60°C to +200°C), humidity (90 to 95 percent for 96 hours), and barometric pressure (110,000 feet (33.53km) are experienced. They are not intended for use at operating temperatures higher than +200°C for extended periods.

6.2 Acquisition requirements. Acquisition documents must specify the following:

a. Title, number, and date of this specification.

b. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1).

c. Packaging requirements (see 5.1).

d. Title, number, and date of the applicable specification sheet and the complete PIN (see 3.1).

e. Level of preservation, packaging, packing and marking required (see section 5).

f. Quantity of units per package, if other than one.

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contact, qualified for inclusion in the applicable Qualified Products List QPL No 83733 whether or not such products have actually been so listed by that date. The attention of the contractors is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts for the products covered by this specification. The activity responsible for the qualified products lists is the Defense Supply Center Columbus (DSCC-VQP), 3990 East Broad Street, Columbus, Ohio 43216-5000. Application for qualification tests will be made in accordance with "Provisions Governing Qualification" (see 6.3.1).

6.3.1 Provisions governing qualification. Copies of "Provisions Governing Qualification" may be obtained upon application to Standardization Document Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

6.4 Definitions. For purposes of this specification, the following definitions should apply:

6.4.1 Connector assembly. A complete connector assembly consists of a mated plug and receptacle.

6.4.2 Receptacle. A connector receptacle is that portion of the connector assembly which is normally "fixed", that is rigidly attached to a supporting surface. It will be provided with pin or socket contacts.

6.4.3 Plug. A connector plug is that portion of the connector assembly, which is normally "removable". The plug will be provided with pin or socket contacts.

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6.5 Interchangeability. All complete connectors, including their complement of pin or socket contacts, having the same PIN will be completely interchangeable with each other with respect to installation (physical) and performance (function) as specified herein. Suitable evidence, such as dimensional data, may be required by the Government in order to assure that complete connector assemblies will be interchangeable and meet the requirements of this specification.

6.5.1 Removable contacts. All pins and sockets will be capable of being assembled in the molded inserts (see 3.1) and be completely interchangeable with each other with respect to installation (physical) and performance (function) as specified herein. Tools will be capable of properly inserting and removing the pin and socket contacts from the molded inserts. Suitable evidence such as dimensional data, may be required by the Government in order to assure that pins and sockets will be interchangeable and meet the requirements of this specification.

6.5.2 Plugs and receptacles. Plugs and receptacles of a given size and design manufactured by one source to the requirements of this specification, will be capable of mating with associated plugs and receptacles manufactured to the requirements of this specification by other sources.

6.6 Environmentally preferable material. Environmentally preferable materials should be used to the maximum extent possible that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs. Table XIII lists the Environmental Protection Agency (EPA) top seventeen hazardous materials targeted for major usage reduction. If any of these hazardous materials are required, it is recommended that it be used only when other materials cannot meet performance requirements.

TABLE XIII. EPA top seventeen hazardous materials.

Benzene	Dichloromethane	Tetrachloroethylene
Cadmium and compounds	Lead and compounds	Toluene
Carbon Tetrachloride	Mercury and compounds	1,1,1 - Trichloroethane
Chloroform	Methyl Ethyl compounds	Trichloroethylene
Chromium and compounds	Methyl Isobutyl Ketone	Xylenes
Cyanide and compounds	Nickel and compounds	

6.7 Subject term (key word) listing.

Backplate
Beryllium
Contact
Copper
Gold
Insert
Magnetic permeability
Nickel
Plug
Receptacle
Sealing plug
Shell
Shielded
Silver

6.8 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

CONCLUDING MATERIAL

Custodians:
Air Force - 11
DLA - CC

Review activity:
Air Force - 99

Preparing activity:
DLA - CC

(Project 5935-F579)

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I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-DTL-83733D	2. DOCUMENT DATE *(YYYYMMDD)* 200002123

3. DOCUMENT TITLE

Connectors, Electrical Miniature, Rectangular Type, Rack to Panel, Environment Resisting, 200°C Total Continuous Operating Temperature, General Specification For

4. NATURE OF CHANGE *(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)*

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME *(Last, First, Middle Initial)*	b. ORGANIZATION	
c. ADDRESS *(Include zip code)*	d. TELEPHONE *(Include Area Code)* (1) Commercial (2) DSN *(if applicable)*	7. DATE SUBMITTED *(YYYYMMDD)*

8. PREPARING ACTIVITY

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c. ADDRESS *(Include Zip Code)* **DSCC-VAI** **P.O. Box 3990** **Columbus, Ohio 43216-5000**	**IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:** **Defense Standardization Program Office (DLSC-LM)** **8725 John J. Kingman Road,Suite 2533** **Fort Belvoir, Virginia 22060-6621** **Telephone (703) 767-6888 DSN 427-6888**