

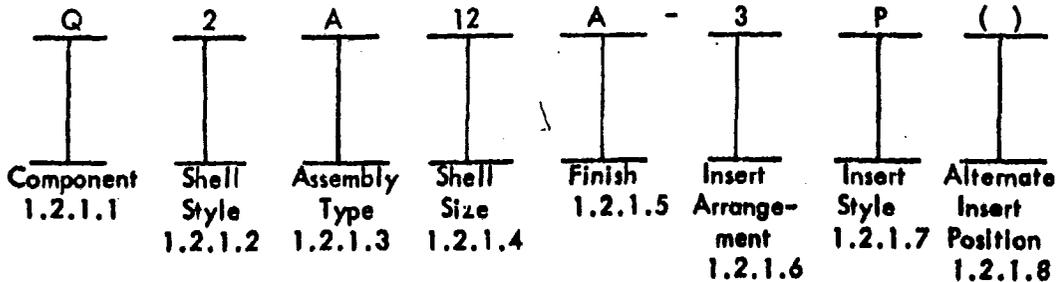
CONNECTORS, ELECTRIC, TYPE "Q," MULTI-CONTACT

1. SCOPE

1.1 Scope.- This specification covers a series of quick coupling, general purpose connectors designated type Q and described in supplement 1.

1.2 Type designations.- The type designations for the Q series of connectors and fittings are as listed in 1.2.1 and 1.2.2 respectively.

1.2.1 Connector type designation.-



1.2.1.3 Assembly type.- The assembly type shall be identified by a one letter symbol.

- A- General duty (pressurized)
- B- Sealed
- C- High temperature
- E- Environment Resistant

1.2.1.4 Shell size.- The shell size is identified by two digits. These digits indicate the major diameter of the mating thread size on the receptacle measured in one-sixteenth (1/16) inch increments. This dimension shall be used as a reference size of the mating plug shell and all fittings.

1.2.1.5 Finish.- The type of finish shall be identified by a one letter symbol.

- A- Cadmium plate, O. D. Iridite
- B- Martin Hard Coat or Alumilite
- C- Black anodize

1.2.1.6 Insert arrangement.- A one or two digit number shall be used to identify the insert arrangement. (See 6.1.2)

1.2.1.7 Insert style.- The insert style is indicated by the letter symbol "P" for male contacts or "S" for female contacts.

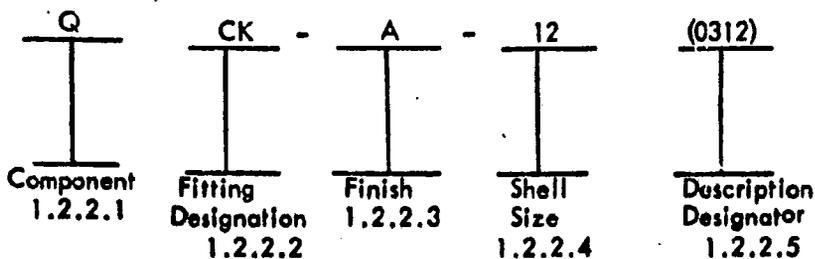
1.2.1.8 Alternate insert position.- W, X, Y, Z or 5 shall be used, as applicable, when other than a normal insert position is required. Table I indicates the alternate insert positions. To indicate alternate insert positioning add applicable letter:
Example: Q2A12A-3PX.

Table 1 - Alternate Insert Position

Insert Size	Insert Arrangement Suffix Number	DEGREES ROTATION SUFFIX LETTER DESIGNATION				
		W	X	Y	Z	5
12	3	-	150	210	-	-
14	7	90	-	270	-	-
16	10	-	180	260	-	100
16	53	70	150	270	-	-
18	1	90	180	225	-	135
18	4	35	110	250	-	-
18	11	-	150	-	275	-
20	14	60	180	240	300	120
20	72	40	110	250	320	-
20	73	80	110	250	280	-
20	78	80	110	250	280	-
24	7	80	110	250	280	-
24	22	80	150	210	280	-
24	69	80	115	245	280	-
24	70	80	150	210	280	-
24	77	80	150	210	280	-
24	99	60	180	240	300	120
28	12	60	180	240	300	120
28	65	80	110	250	280	-
36	52	80	125	235	280	-
36	66	60	110	250	300	-
40	65	70	135	225	290	-
40	83	80	110	250	280	-

NOTE: The table indicates, in degrees, the available alternate insert positions from the normal position when looking at front face of insert. Socket contact inserts are given in a clockwise rotation from normal position. Pin contact inserts are given in a counterclockwise rotation from normal position.

1.2.2 Fitting type designation.



1.2.2.1 Component.- Same as 1.2.1.1.

1.2.2.2 Fitting designator.- A one or two letter symbol shall indicate the type of fitting.

CK- Clamp kits
PC- Plug caps
RC- Receptacle caps
G- Cable grips

1.2.2.3 Finish.- Same as 1.2.1.5.

NOTE: Fitting symbol "G" uses no finish letter: Example QG-12(0312).

1.2.2.4 Shell size.- Same as 1.2.1.4.

1.2.2.5 Description designator.- Four digits, applicable only to clamp kits and cable grips are to be used to indicate in thousandths of an inch the maximum size cable that can be used. A letter symbol, applicable to protection caps, is to be used to indicate the following type terminations.

E- Wire rope furnished with eyelet
R- Wire rope furnished with ring

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on date of invitation for bids, form a part of this specification to the extent specified herein.

SPECIFICATIONS

FEDERAL

PPP-B-585	Boxes, Wood, Wirebound
PPP-B-591	Boxes, Fiberboard, Wood-Cleated

SPECIFICATIONS (Continued)

FEDERAL

PPP-B-601	Boxes, Wood, Cleated-Plywood
PPP-B-621	Boxes, Wood, Nailed and Lock-Corner
PPP-B-636	Box, Fiberboard
PPP-T-97	Tape, Pressure-Sensitive Adhesive, Waterproof-for Packaging and Sealing

MILITARY

JAN-S-44	Shock-Testing-Mechanism for Electrical Indicating Instruments
MIL-P-116	Preservation, Methods of
MIL-B-10377	Box, Wood, Cleated, Veneer, Paper-Overlaid
MIL-M-13231	Marking of Electronic Items
MIL-F-14072	Finishes for Ground Signal Equipment

STANDARDS

MILITARY

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-202	Test Methods for Electronic Component Parts
MIL-STD-252	Wired Equipment, Classification of Visual and Mechanical Defects

DRAWINGS

SIGNAL CORPS

For applicable Signal Corps drawings of connectors covered by this specification, see Supplement 1.

SC-A-362100	Requirements for Preparation of Packaging and Packing Illustrations and Bills of Material.
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(Copies of specifications, standards, drawings, and publications required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer. Both the title and number or symbol should be stipulated when requesting copies.)

2.2 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 shall apply.

CONSOLIDATED CLASSIFICATION COMMITTEE

Uniform Freight Classification

(Application for copies should be addressed to the Consolidated Classification Committee, 202 Union Station, Chicago 6, Ill.)

3. Requirements.

3.1 Description.- Type Q designates a series of quick coupling, general purpose, waterproof (mated and unmated positions), pressurized, polarized, multi-contact connectors for interconnection of power and control circuits on electronic equipment. The connectors are sealed and intended to operate over a temperature range of -67° F to $+185^{\circ}$ F (except the high temperature insulation which shall operate up to $+392^{\circ}$ F) and shall be capable of 10,000 hours continuous operation and 500 mating cycles without failure.

3.2 Preproduction Samples.- The contractor shall furnish for each type of connector on order, six (6) assembled, one (1) unassembled, and six (6) applicable mating connectors, as preproduction samples for approval, provided the invitation for bids and the contract requires samples.

3.3 Construction.- Each "Q" connector shall be constructed in accordance with the requirements of this specification with supplement 1.

3.3.1 Individual connectors.- Individual connectors covered by this specification are listed in supplement 1. Detailed physical requirements for the individual connectors are specified on the Signal Corps drawings listed in the supplement.

3.4 Assembly.- The inserts, contacts and applicable shell, shall be permanently bonded together as an integral unit.

3.5 Contact spacing. Contacts shall be arranged as specified on the drawings. Unless otherwise specified on the drawings, mechanical spacing and creepage distances shall be not less than specified in Table II.

Table II.- Contact Spacing

Service Rating	Limit Operating Voltages At Sea Level		Effective Creepage Distance (nominal)	Mechanical Spacing (nominal)
	<u>DC</u>	<u>AC(rms)</u>		
Inst	250	200	1/16	----
A	700	500	1/8	1/16
D	1250	900	3/16	1/8
E	1750	1250	1/4	3/16
B	2450	1750	5/16	1/4
C	4200	3000	1	5/16

3.6 Cleaning.-

3.6.1 Parts.- After fabrication, parts shall be cleaned in accordance with good commercial practice, or as specified in an applicable document. Cleaning processes shall have no deleterious effect. Corrosive material shall be removed completely before the parts are assembled.

3.6.2 Units.- After assembly, units shall be cleaned thoroughly and shall be free from foreign material. In addition, when necessary, such cleaning shall also be performed before final assembly.

3.7 Finish.- The equipment shall be finished in accordance with Specification MIL-F-14072 and the equipment drawings. (See 4.4.)

3.8 Marking.-

3.8.1 General.- Marking shall conform to Specification MIL-M-13231. Except as specified in paragraph 3.8.2. (See 4.4)

3.8.2 Identification of product.- Each connector shall be clearly and permanently marked on the shell or coupling ring with the manufacturer's name or trademark and with the appropriate type designation in accordance with 1.2. All connectors having a type B finish shall be marked in a manner which will not damage the finish. If ink stamping is used, it shall be covered by a smooth clear protective coating or film.

3.9 Air pressure.- Connectors shall be tested as specified in 4.7.

3.9.1 Plugs.- Cable mounted plugs shall not leak more than one (1) cubic inch of air per hour when subjected to a pressure differential of 30 psi applied to either face of the insert.

3.9.2 Receptacles.- Neither the receptacles nor the O-ring seal shall leak more than one (1) cubic inch of air per hour when subjected to a pressure differential of 30 psi applied to either side of receptacle at a stabilized temperature of -55°C (+0, -3) $^{\circ}\text{C}$.

3.10 Cable retention.- Washer and gland assembly (type CK fitting) shall not permit the cable to slip more than 1/16 inch when loaded for one hour as specified in 4.8 with the applicable force listed in Table III.

Table III.- Cable Pullout Force

Connector Size	Pullout Force Pounds, Min
12	40
14	50
16	65
18	80
20	95
24	110
28 and larger	120

3.11 Contact engaging and separating forces. The average force required to either engage or separate random picked pins and sockets shall not exceed the average value indicated in Table IV. Ninety-six percent of all values obtained shall not exceed the maximum force and none of the values shall be less than the minimum force indicated. Gradual increasing loads shall be applied until the pin contact properly engages with, or separate from, the socket. Depth of engagement shall conform to that encountered in service. (See 4.9)

Table IV.- Contact Engaging and Separating Forces (Pounds)

Contact Size	Average Force	Maximum Force	Minimum Force
16	1/2	1-1/2	1/8
12	1-1/2	2-1/2	1/4
8	2-1/2	6	3/8
4	5	9	1/2

3.12 Contact resistance. - When tested in accordance with 4.10 the potential drop between contacts of mated connectors shall not be greater than indicated in Table V.

Table V- Potential Drop

Contact Size	Test Current Amps	Potential Drop Initial(mv)	Potential Drop, mv(max) After Corrosion and Moisture Resistance
16	20	25	35
*16L	20	35	45
12	35	24	30
*12L	35	34	40
8	60	19	25
*8L	60	20	26
4	110	17	25
*4L	110	17	25

*Long version of contact, used in shell sizes 36 and 40.

3.13 Contact retention.- Individual contacts shall withstand axial loads in both directions as shown in Table VI. There shall be no axial movement greater than 1/32 inch in respect to insert. (See 4.11)

Table VI.- Contact Retention

Contact Size	Axial Load Pounds, min
16	10
12	15
8	20
4	20

3.14 Corrosion resistance.- Unmated plugs and receptacles shall be tested as specified in 4.12. At the conclusion of the test, the connector shall:

- a. show no evidence of base metal corrosion,
- b. be capable of normal mating and unmating,
- c. comply with the requirements of 3.12.

3.15 Dielectric withstanding voltage.- Connector shall show no evidence of breakdown or flashover when tested in accordance with 4.13 with the applicable test voltage listed in Table VII. The harmonic content of the ac voltage shall not exceed 1/2 percent of the fundamental wave form.

Table VII.- Test Voltages

Service Ratings	Voltage (rms) 60 cps
Inst	1000
A	2000
D	2800
E	3500
B	4500
C	7000

3.16 Durability.- When tested as specified in 4.14, base metal shall not be visible on more than 10 percent of the contacts after 100 cycles of insertion and withdrawal. After 500 cycles, there shall be no electrical and mechanical defects and the connector shall comply with 3.12 and 3.9.

3.17 Elevation.- Connector shall show no evidence of breakdown when tested in accordance with 4.15 with the applicable test voltage listed in Table VIII at a barometric pressure of 3.4 inches of mercury.

Table VIII.- Test Voltage

(Barometric Pressure 3.4 inches Mercury)

Service Rating	Test Voltages rms, 60 cps
Inst	400
A	600
D	675
E	750
B	825
C	975

3.18 Insert retention.- Inserts of the plugs and receptacles (unmated) shall withstand an axial load in either direction as specified in Table IX without being dislocated from their normal position in the connector shell. (See 4.16.)

Table IX.- Insert Retention Test Pressure

Connector Size	Gage Pressure psi
8 thru 12	45
14 thru 18	60
20 thru 22	75
24 thru 28	100
32 thru 40	150

3.19 Insulation resistance.- When tested as specified in 4.17 connectors shall have an insulation resistance of not less than 5000 megohms.

3.20 Interchangeability.- Like units, assemblies, subassemblies, and replaceable parts shall be physically and functionally interchangeable, without modification of such items or of the equipment. (See 4.18.) Individual items shall not be hand-picked for fit or performance; however, matched pairs or sets, when permitted, may be interchangeable as such. Reliance shall not be placed on any unspecified dimension, rating, characteristic, etc.

3.21 Moisture resistance.- After the tenth cycle of the test specified in 4.19 the insulation resistance shall be a minimum of 1 megohm. After the 24 hour drying period the insulation resistance shall be a minimum of 1000 megohms and the connector shall comply with 3.15 and 3.9.

3.22 Shock.- Connectors shall withstand the test specified in 4.20 without damage to the parts of the connector assembly. The contacts shall then satisfy the requirements of 3.12 and 3.9.

3.23 Temperature cycling.- Connectors shall be capable of being mated, maintaining electrical continuity, and being unmated at all of the temperatures prescribed in Table X. The inserts shall not crack and after the test specified in 4.21 the connectors shall comply with 3.9.

Table X.- Temperature Cycling

Sequence	Assembly types A, B and E		Assembly Type C	
	°C	°F	°C	°F
Start (high)	+85(+3, -0)	+185(+5.4, -0)	+200(+16, -0)	+392(+20, -0)
Return to	+25(±5)	+77(±9)	+25(±5)	+77(±9)
Reduce (low)	-55(+0, -3)	-67(+0, -5.4)	-55(+0, -3)	-67(+0, -5.4)
Return to	+25(±5)	+77(±9)	+25(±5)	+77(±9)

3.24 Vibration.- Plugs and receptacles shall be mated with the applicable coupling torque listed in Table XI and shall be subjected to the vibration test specified in 4.22. Mated connectors shall comply with the following:

- a. Plug and receptacle shall not become disengaged.
- b. There shall be no cracking, breaking or loosening of parts.
- c. There shall be no interruption of electrical continuity between mated contacts.

After the test, plugs and receptacles shall be unmated with a torque greater than that listed in Table XI.

Table XI.- Coupling and Uncoupling

Connector Size	Coupling Torque Pound-Inches	Uncoupling Torque (Minimum) Pound-Inches
12	20	2
14	20	2
16	20	2
18	25	3
20	25	6
24	30	9
28	50	15
36 and larger	60	18

3.25 Water immersion.- After immersion for 48 hours as specified in 4.24, mated and unmated connectors shall show no evidence of water leakage into the connector bodies, and shall comply with 3.19 except that insulation resistance shall not be less than 100 megohms.

3.26 Workmanship.- The equipment shall be manufactured and assembled in accordance with the requirements of this specification and the applicable portions of the paragraph listed below. There shall be no evidence of loose parts, poor molding or fabrication, damaged or improperly assembled contacts, or nicks and burrs on metal parts.

3.6 Cleaning

4. QUALITY ASSURANCE PROVISIONS

4.1 Contractor's responsibility. - The supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own or any other inspection facilities and services acceptable to the Government. Inspection records of the examination and tests shall be kept complete and available to the Government as specified in the contract. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure that supplies and services conform to prescribed requirements.

4.2 Classification of inspection. - Inspection shall be classified as follows:

(a) Preproduction inspection (does not include preparation for delivery).
(See 4.3.)

(b) Acceptance inspection.

(1) Acceptance inspection of equipment before preparation for delivery.
(See 4.4 and 4.5.)

(2) Acceptance inspection of preparation for delivery. (See 4.25)

4.3 Preproduction inspection. - This inspection will be performed by the Government unless otherwise specified in the contract. It shall consist of the preproduction inspection specified in table XII, the inspection specified in the subsidiary documents covering the items listed in 4.4, and the inspection specified for group A, group B, and group C (see tables XIII, XIV, and XV, respectively). The preproduction inspection will normally be performed in this order: (1) vibration, (2) shock, and (3) immersion; other preproduction inspection may precede, follow, or be interspersed between the foregoing.

Table XII. - Preproduction inspection

Inspection (For additional preproduction inspection see 4.3)	Req. Par.	Insp Par.
Cable Retention	3.10	4.8
Moisture resistance	3.21	4.19
Shock	3.22	4.20
Temperature cycling	3.23	4.21
Vibration	3.24	4.22

4.4 Acceptance inspection covered by subsidiary documents. - The following shall be inspected under the applicable subsidiary documents as part of the acceptance inspection before preparation for delivery:

<u>Item</u>	<u>Where required</u>
Finish	3.7
Marking	3.8

4.5 Acceptance inspection of equipment before preparation for delivery. -

The contractor, to demonstrate compliance with specified requirements, shall perform the inspection specified in 4.4 and 4.5.1 through 4.5.4. This does not relieve the contractor of his responsibility for performing any additional inspection which is necessary to control the quality of the product and to assure compliance with all specification requirements. The Government will review and evaluate the contractor's inspection procedures and examine the contractor's inspection records. In addition the Government--at its discretion--may perform all or any part of the specified inspection, to verify the contractor's compliance with specified requirements. (See 6.5) Test equipment for Government verification inspection shall be made available by the contractor .

4.5.1 Group A Inspection. - This inspection, including sampling, shall conform to table XIII and the ordinary inspection procedures of Standard MIL-STD-105. Group A inspection shall be performed in any order which is satisfactory to the Government.

Table XIII - Group A Inspection

<u>Inspection</u>	<u>Req. Para</u>	<u>Insp Para</u>	<u>AQL Major</u>	<u>AQL Minor</u>
Dielectric withstanding voltage	3.15	4.13	1.0% for group	*
Insulation resistance	3.19	4.17		*
Visual and mechanical	3.26	4.23	1.0%	4.0%

*All electrical defects are considered major.

4.5.2 Group B inspection.- This inspection, including sampling, shall conform to table XIV and to the special procedures for small-sample inspection of Standard MIL-STD-105. The AQL shall be 4.0 percent defective and the inspection level shall be L-8 for normal and tightened inspection and L-6 for reduced inspection. The reduced inspection procedure shall be R-1. Group B inspection shall normally be performed on inspection lots that have passed group A inspection and on samples selected from units that have been subjected to and met the group A inspection.

Table XIV - Group B Inspection

Inspection	Req. Para	Insp. Para.	AQL Percent
Air pressure	3.9	4.7	4.0
Contact engaging and separating force	3.11	4.9	4.0
Contact Resistance	3.12	4.10	4.0
Contact Retention	3.13	4.11	4.0
Insert retention	3.18	4.16	4.0
Interchangeability	3.20	4.18	4.0

4.5.3 Group C inspection.- This inspection shall be as listed in table XV, and shall normally be performed on sample units that have been subjected to and met group A and group B inspection.

Table XV - Group C inspection

Inspection	Req. Par.	Insp Par.
Corrosion resistance	3.12	4.10
Durability	3.16	4.14
Elevation	3.17	4.15
Water Immersion	3.25	4.24

4.5.3.1 Sampling for inspection of equipment.- For each group C inspection, two connectors for each type produced shall be selected from each month's production. Selection shall be made without regard to the connector quality. Units inspected at the start of the contract shall be selected from the first units produced.

4.5.3.2 Noncompliance.- If a sample unit fails group C inspection, the contractor shall immediately investigate the cause of failure and shall report to the Government inspector the results thereof and details of the corrective action taken on the process and all units of product which were manufactured with the same conditions, materials, processes, etc. If the Government inspector does not consider that the corrective action will enable the product to meet specified requirements, or if the contractor cannot determine the cause of failure, the matter shall be referred to the contracting officer. (See 6.4)

4.5.4 Reinspection of conforming group B and group C sample units.- Unless otherwise specified, sample units which have been subjected to and passed group B or group C inspection, or both, may be accepted on contract, provided that they are resubjected to and pass group A inspection after repair of all visible damage.

4.6 Test conditions.- Unless otherwise specified, all measurements and tests shall be made at $77^{\circ} \pm 9^{\circ}\text{F}$ ($25^{\circ} \pm 5^{\circ}\text{C}$) and prevailing humidity except that the insulation resistance and dielectric withstanding voltage tests shall be conducted at relative humidities not exceeding 80 percent.

4.7 Air pressure.- Connectors shall be tested as follows:

4.7.1 Plugs.- Cable mounted plugs shall be tested to determine compliance with 3.9.1.

4.7.2 Receptacles.- Jam nut receptacles, with O-ring in place, shall be securely mounted to a suitable fixture by means of the hexagon nut supplied as part of the assembly and shall comply with 3.9.2.

4.8 Cable retention.- In order to determine compliance with 3.10, cable mounted connectors using the applicable washer and gland assembly (type CK) and cable listed in table XVI shall be axially loaded with the specified load in order to simulate a cable pullout force. The load shall be applied uniformly at a rate of approximately 5 pounds per second until specified load is reached and shall be maintained for 1 hour. Conductors shall not be assembled to terminals.

Table XVI - Test Cables

Clamp Size	Designation (See 6.1.4)
QCK-()-12 (0219)	WT-15/U-0.21" Dia.
QCK-()-14 (0250)	COS-2(2:1)-0.235" Dia.
QCK-()-16 (0344)	WS-4-0.330" Dia.
QCK-()-18 (0406)	WS-5-0.390" Dia.
QCK-()-20 (0531)	CO-04HGF(2/10-2/14)-

4.8 (cont.)

Table XVI - Test Cables (cont.)

Clamp Size	Designation
QCK-()-24(0625)	CO-04HGF(4/14)-0.605
QCK-()-28(0828)	WM-65/U-.800" Dia.
QCK-()-36(1312)	CO-02HGF(2/2)-1.300" Dia.
QCK-()-40(1656)	041635

4.9 Contact engaging and separating forces.- Individual pin and socket contacts shall be engaged at a rate not more than 2 inches per minute to a depth encountered in service and then separated. The maximum forces to engage and separate shall be recorded in order to determine compliance with 3.11.

4.10 Contact resistance.- The electrical resistance of each pair of mated pin and socket contacts in the sample connector assembly shall be determined by measuring potential drop across the assembled contacts when carrying the specified test current. In making this test, the potential drop shall be measured at the extreme terminal ends of the contacts, and shall comply with 3.12.

4.11 Contact retention.- Individual contacts shall withstand axial loads in both direction as specified in 3.13. Measurements shall be made with all other contacts in place and the insert in the shell. The load shall be applied uniformly at a rate of 1 pound per second.

4.12 Corrosion resistance.- In order to determine compliance with 3.14, unmated plugs and receptacles shall be tested in accordance with Standard MIL-STD-202, Method 101, Test Condition B.

4.13 Dielectric withstanding voltage.- To determine compliance with 3.15, the test voltage shall be applied between each contact and the remaining contacts and the shell connected in series. Both mated and unmated connectors shall be tested. The voltage shall be increased gradually at the rate of approximately 500 volts each second until specified voltage is reached and shall be maintained for 1 minute \pm 5 seconds.

4.14 Durability.- The complete connector assembly less coupling nut of the male connectors, shall be subjected to 500 cycles of insertions and withdrawals, at a rate not exceeding 10 cycles per minute. The insertions and withdrawals shall be accomplished by application of gradually increasing forces sufficient to accomplish full mating or unmating without impact. Connectors shall comply with 3.16.

4.15 Elevation.- To determine compliance with 3.17, mated connectors shall have the test voltage applied between each contact and the remaining contacts and the shell connected in series at a barometer pressure of 3.4 inches of mercury. The voltage shall be increased gradually at the rate of approximately 500 volts each second until specified voltage is reached and shall be maintained for 1 minute \pm 5 seconds.

4.16 Insert retention.- Loading shall be accomplished by applying air pressure to either face of the insert. The pressure shall be increased gradually at a rate of approximately 10 pounds per second, until the specified pressure is reached. The insert assembly shall retain its normal location in the connector shell after 5 seconds at the specified pressure (see 3.18).

4.17 Insulation resistance.- In accordance with Standard MIL-STD-202, method 302, a direct current potential of 500 volts \pm 10 percent shall be applied between each contact of the connector and the remaining contacts and the shell connected in series. Insulation resistance shall comply with 3.19.

4.18 Inspection for interchangeability.- The dimensions listed below shall be measured to determine conformance to the physical interchangeability requirement of 3.20. When a listed dimension is not within specified or design limits, it shall be considered a major defect.

(a) External and internal dimensions of mating parts.

(b) Size and form of threads.

4.19 Moisture resistance.- Two mated pairs of connectors and the remaining unmated plugs and receptacles, with cable housings removed shall be subjected to 10 cycles of exposure specified in MIL-STD-202, Method 106 with the exception of steps 7a and 7b. The connectors shall be mounted with their major axis in a horizontal plane and suitable means provided to prevent water running down the leads into the contact area.

4.19.1 Initial measurements.- Initial measurements of insulation resistance shall be made as specified in MIL-STD-202 and shall be no less than 5000 megohms.

4.19.2 Polarizing potential.- During the steps 1 to 6, inclusive, a polarizing potential of 100 volts direct-current shall be applied to half of the mated pairs and half of the unmated connectors. The potential shall be applied between alternate contacts connected in series and the remaining contacts and the metal shell connected in series. The polarity of the voltage applied to the shell shall be negative.

4.19.3 Intermediate measurements.- After a minimum of 3 hours of step 7 of the tenth cycle, the insulation resistance shall be measured for compliance with 3.21.

4.19.4 Final measurements.- Following the measurements in 4.19.3, the samples shall be maintained at a temperature of $25^{\circ} \pm 2^{\circ}\text{C}$ and $50 \pm 5\%$ relative humidity for 24 hours. At the conclusion of this drying period, samples shall comply with 3.21.

4.20 Shock.- A mated plug and receptacle shall be subjected to a transient decelerating force produced by securing them to sufficient mass, and dropping the assembly through such a height that, when decelerated by resilient impact, a deceleration of 100 gravity units shall be obtained. The shock test shall be performed in each of the 90-degree axis positions. A shock testing device in accordance with specification JAN-S-44, revised for connector mounting is a satisfactory device for this test. Samples shall comply with 3.22.

4.21 Temperature cycling.- Plugs and receptacles unmated shall be exposed to 5 cycles of applicable temperature changes as indicated in Table X. They shall be held at the specified maximum and minimum temperatures for not less than 30 minutes. At the end of each step of the fifth cycle, and while at the specified temperature, the connectors shall be mated and unmated. With the connectors in a mated position the contacts shall be checked for continuity.

After completion of the last cycle, connectors shall comply with 3.23.

4.22 Vibration.- The contacts of the mated connector shall be connected in series and shall carry a current of at least 100 milliamperes throughout the test. An interruption of current flow for longer than 10 microseconds shall be considered a failure. Mated connectors shall be vibrated in each of two mutually perpendicular directions, one of which shall be along the longitudinal axis, in accordance with Standard MIL-STD-202, method 201, length of test 5 hours. (See 3.24)

4.22.1 Mounting.- The receptacle or cable mounted female plug shall be securely mounted to a plate attached to the vibration table in such a manner that the mating plug is not supported by any means other than the coupling device.

4.23 Visual and mechanical inspection.- Equipment shall be examined for defects listed in MIL-STD-252 and Table XVII.

Table XVII.- Classification of Visual and Mechanical Defects

<u>Classification</u>	<u>Defect</u>
Major	Parts missing Misalignment or distortion of parts Broken or cracked inserts No finish Broken contact Crack or hole in housing
Minor	Poor finish Small cracks or burrs No marking

4.24 Water immersion. - Cable mounted connectors using applicable washer and gland assembly (type CK) and cable listed in table XVI shall be immersed in tap water to a depth of 6 feet or equivalent pressure for a period of 48 hours in accordance with 4.24.1 and 4.24.2. The free ends of the cable shall be sealed to prevent seepage of water through the cables. Receptacles shall be mounted using the normal mounting method so that only the front face is exposed to water. Conductors shall not be assembled to terminals.

4.24.1 Mated connectors. - Fifty percent of the test connectors shall be mated and shall comply with 3.25.

4.24.2 Unmated connectors. - The remaining fifty percent of test connectors shall remain unmated. Upon completion of the test all excess moisture shall be removed and the connector dried with compressed air at room temperature for a period of five minutes. Connectors shall be examined for leakage and shall comply with 3.25.

4.25 Acceptance inspection of preparation for delivery. - Preparation for delivery shall be inspected in accordance with Specification MIL-P-116 to determine conformance to the requirements of section 5.

5. PREPARATION FOR DELIVERY.

5.1 Packaging. -

5.1.1 Level A. - Type Q Multi-Contact Connector shall be preserved, packaged and tested in accordance with the applicable provisions of Specification MIL-P-116 and in a manner that will afford adequate protection against corrosion deterioration and damage during world wide shipment, handling and open storage.

5.1.2 Level C. - Type Q Multi-Contact Connector shall be afforded preservation and packaging in accordance with the suppliers' normal commercial practice.

5.2 Packing. - Type Q Multi-Contact Connector, packaged as specified, shall be packed in shipping containers conforming to the requirements of the specifications referenced below for the designated level. The gross weight shall not exceed the weight shown unless an individually packed item exceeds that amount. Closure and strapping shall be as prescribed in the applicable box specification or appendix thereto, except that the bands of reinforced, pressure-sensitive adhesive tape, 1/2 inch wide and conforming to Specification PPP-T-97 for Grade IV, shall be used for fiberboard boxes in lieu of metal strapping.

5.2.1 Level A. -

<u>BOX SPECIFICATION</u>		<u>MAX. GROSS WT.</u>
Fiberboard (Type 1, Class 2)	PPP-B-636	Table VI
Nailed Wood (Style 4, Class 2)	PPP-B-621	200 lbs.
Wirebound (Style 2 or 3, Class 2)	PPP-B-585	200 lbs.
Wood Cleated Fiberboard (Overseas)	PPP-B-591	200 lbs.
Wood Cleated Plywood (Overseas)	PPP-B-601	200 lbs.
Wood Cleated Veneer, Paper Overlaid (Overseas)	MIL-B-10377	200 lbs.

5.2.2 Level B.

<u>BOX SPECIFICATION</u>		<u>MAX. GROSS WT.</u>
Fiberboard (Type 1, Class 1)	PPP-B-636	Table 1
Nailed Wood (Style 4, Class 1)	PPP-B-621	200 lbs.
Wirebound (Style 3, Class 1)	PPP-B-585	200 lbs.
Wood Cleated Fiberboard (Domestic)	PPP-B-591	200 lbs.
Wood Cleated Plywood (Domestic)	PPP-B-601	200 lbs.
Wood Cleated Veneer, Paper Overlaid (Overseas)	MIL-B-10377	200 lbs.

5.2.3 Level C. - Type Q Multi-Contact Connector shall be packed in containers of the type, size and kind commonly used for the purpose, in a manner that will insure acceptance by common carrier and safe delivery at destination at lowest rate. Shipping containers shall comply with the Uniform Freight Classification Rules or Regulations of other carriers as applicable to the mode of transportation.

5.2.4 Pilot Pack. - When Level "A" packaging and packing is specified above, one acceptable model of Type Q Multi-Contact Connector will be pilot packed in a manner that will pass the preproduction test prescribed in Specification MIL-P-116. Illustrations of the packaging and packing procedure, together with Bills of material, will be prepared and furnished in accordance with the provisions of the Signal Corps Drawing No. SC-A-362100.

5.3 Marking. - In addition to any special marking required by the contract or order, interior packages and exterior shipping containers shall be marked in accordance with the applicable provisions of Standard MIL-STD-129.

6. NOTES

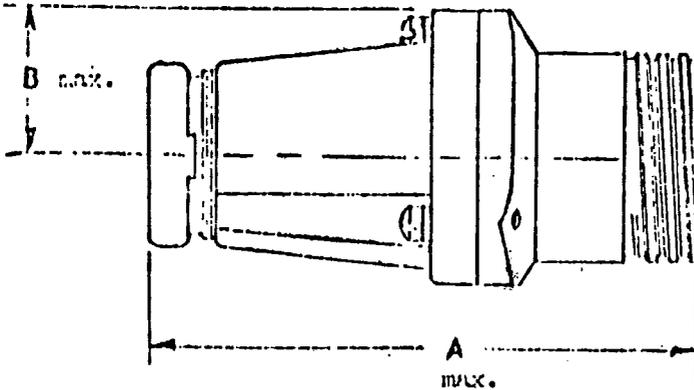
6.1 Intended use. - The connectors covered by this specification are intended for use on newly developed equipment in multi-contact power and control circuits. The outline dimensions listed on figure 1 and 2 are for reference information of the intended user.

6.1.1 Features. - Type "Q" connectors have the following features:

1. Quick disconnect
2. Rugged construction for high shock and vibration resistance
3. Field reparability
4. Low insertion and withdrawal forces
5. Watertight construction over temperature range -67° to $+185^{\circ}$ F
6. Non-fouling knife contacts with low contact resistance
7. Positive five key and keyway polarization

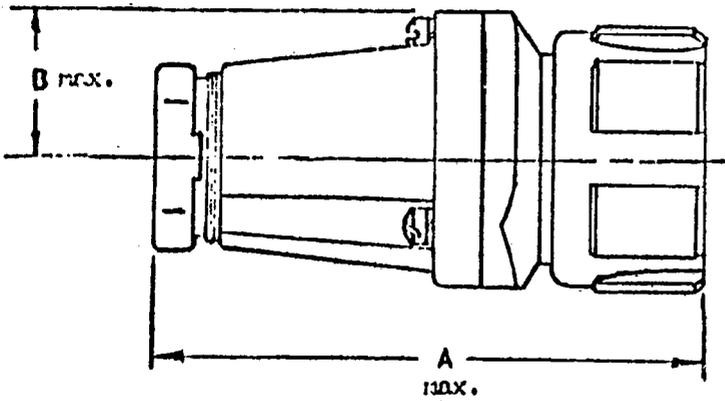
6.1.2 Ratings. - The following ratings are for sea level:

Voltage rating	Inst	200 v (rms)
	A	500 V (rms)
	B	1750v (rms)
	D	900 v (rms)
Current rating	#16	22 amps
	#12	41 amps
	# 8	73 amps



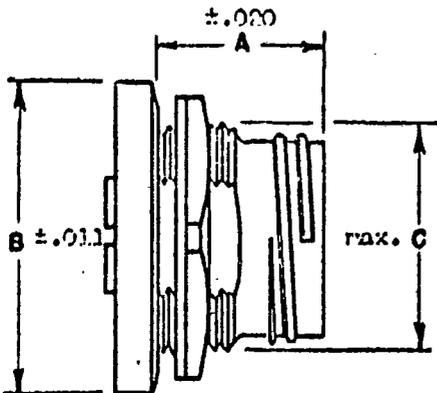
Size	A	B
12	3.214	.649
14	3.262	.711
16	3.309	.789
18	3.668	.805
20	3.978	.899
24	4.339	1.016
28	4.761	1.142
36	6.144	1.485
40	6.727	1.610

Straight, Female



Size	A	B
12	3.224	.649
14	3.272	.711
16	3.319	.789
18	3.681	.805
20	3.994	.899
24	4.353	1.016
28	4.775	1.142
36	6.166	1.485
40	6.963	1.610

Straight, Male

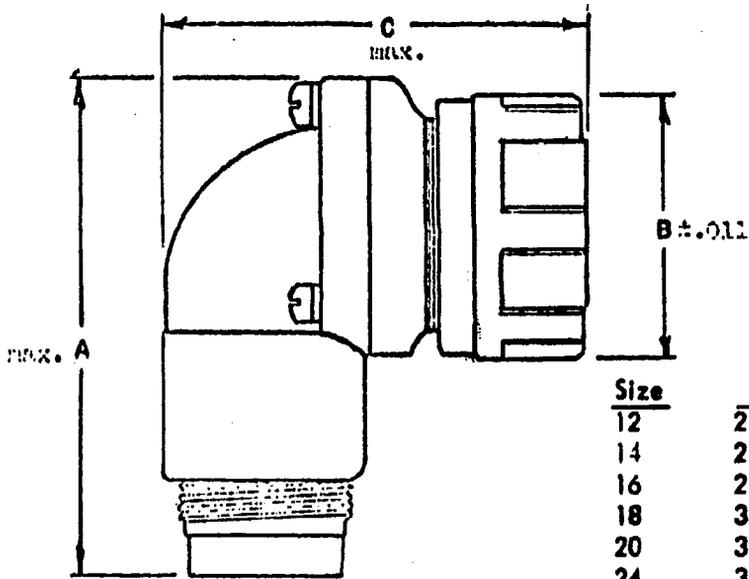


Size	A	B	C
12	1.032	1.281	.875
14	1.032	1.406	1.000
16	1.032	1.531	1.125
18	1.000	1.750	1.250
20	1.000	1.875	1.375
24	1.000	2.125	1.625
28	1.000	2.375	1.875
36	1.375	2.875	2.375
40	1.375	3.125	2.625

All dimensions in inches

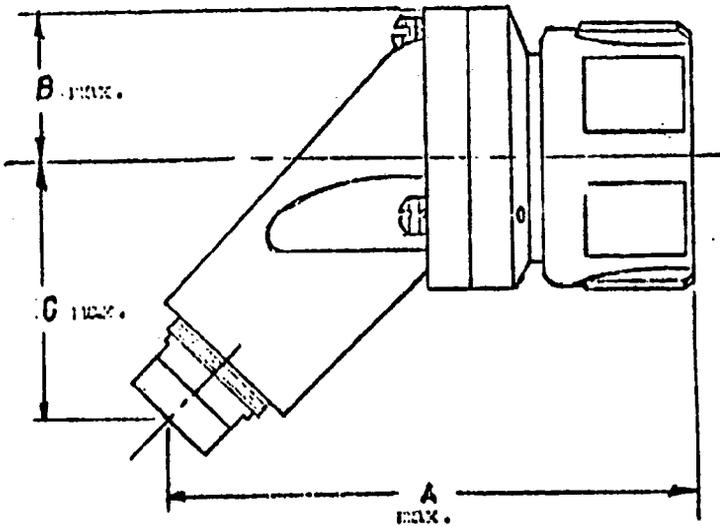
Receptacles

Figure 1



Plug, Right Angle Male

Size	A	B	C
12	2.730	1.078	2.158
14	2.851	1.203	2.299
16	2.997	1.328	2.423
18	3.091	1.453	2.471
20	3.387	1.578	2.617
24	3.708	1.828	2.830
28	3.987	2.078	3.103
36	4.896	2.625	4.197
40	5.368	3.062	5.072



45° Angle, Male

Size	A	B	C
12	3.031	.656	1.625
14	3.156	.719	1.688
16	3.297	.797	1.766
18	3.453	.813	1.859
20	3.688	.907	2.047
24	3.984	1.024	2.234
28	4.281	1.147	2.406
36	5.391	1.493	2.797
40	5.641	1.618	3.062

All dimensions in inches

Figure 2

<u>Type Designation</u> <u>Shell Size-Insert Arrg't.</u>	<u>Contact</u> <u>Number and Size</u>	<u>Voltage</u> <u>Rating</u>
12-3 (P or S)	2 No. 16	
14-7 "	3 No. 16	
16-10 "	3 No. 12	
16-53 "	6 No. 16	A
18-1 "	10 No. 16	4A-6 inst.
18-4 "	4, No. 16	D
18-11 "	5 No. 12	A
20-14 "	2 No. 8 - 3 No. 12	A
20-72 "	12 No. 16	A
20-73 "	3 No. 8 coax.	
20-78 "	3 No. 16	5000 v rms
24-7 "	14 No. 16 - 2 No. 12	A
24-69 "	21 No. 16	A
24-70 "	2 No. 8 ccax. 13 No. 16	A
24-77 "	4 No. 16	B
24-22 "	4 No. 8	D
24-99 "	5 No. 16 - 4 No. 12	18BA
28-12 "	26 No. 16	A
28-65 "	35 No. 16	A
36-52 "	52 No. 16	A
36-66 "	2 No. 4 coax, 8 No. 12, 26 No. 16	A
40-65 "	4 No. 16, 18 No. 8	A
40-83 "	83 No. 16	A

6.1.3 Accessories .- Accessories covered by this specification.

Protective Cap Assembly Type - QRC-A-() R & QRC-B-()-R
 Protective Cap Assembly Type - QRC-A-() E & QRC-B-() E
 Grip, Type QG-()
 Protective Cap Assembly Type - QPC-A-()-E & QPC-B-() E
 Gland & Washer Assembly Type - QCK-A-()
 Gland & Washer Assembly Type - QCK-B-()

6.1.4 Test cables.- Test cables used in the cable retention test (see 4.8) and water immersion test (see 4.24) shall be approximately 15 inches long and shall conform to the applicable specification as follows:

Cable WT-15/U-0.21" Dia - Specification MIL-C-10392
 Cable COS-2(23)-0.235" Dia - Specification MIL-C-3884
 Cable WS-4-0.330" Dia - Specification MIL-C-3883
 Cable WS-5-0.390" Dia - Specification MIL-C-3883
 Cable CO-04AGF(2/10-2/14) -
 SJO.516 - Specification MIL-C-3432
 Cable CO-04HGF(4/14)-0.605 - Specification MIL-C-3432
 Cable WM-65/U-.800" Dia - Specification MIL-C-10065A
 Cable CO-02HGF(2/2)-1.300" Dia - Specification MIL-C-3432
 Cable 041635 - Specification MIL-C-13777

6.2 Ordering Data.- Procurement documents should specify the following:

- (a) Title, number, and date of this specification and any amendment thereto.
- (b) Type required
- (c) Level of packaging and level of packing required for shipment. (Level A, level B, or level C.)
- (d) The specific paragraphs of section 5 which are applicable to the particular procurement.
- (e) Preproduction pack(s) as follows:
 - Makeup of pack(s).
 - Number of each kind of pack to be submitted.
 - Inspection to be performed thereon.
- (f) Marking and shipping of samples.
- (g) Place of final inspection.

6.3 Definitions.-

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

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

6.3.3 Plug.- A connector plug is that portion of the connector assembly which is normally "removable" after disengagement of the threaded coupling. The plug may be provided with either pin or socket contacts.

6.4 Group C inspection.- Approval to ship may be withheld, at the discretion of the Government, pending the decision from the contracting officer on the adequacy of corrective action. (See 4.5.3.3)

6.5 Verification inspection.- Verification by the Government will be limited to the amount deemed necessary to determine compliance with the contract and will be limited in severity to the definitive quality assurance provisions established in this specification and the contract. The amount of verification inspection by the Government will be adjusted to make maximum utilization of the contractor's quality control system and the quality history of the product, and will normally be identified by the categories listed below:

(a) Type A - The total of that inspection set forth in the Quality Assurance Provisions of this specification or the contract. Included in this category is that amount of inspection referred to as normal and tightened inspection by Military Standard 105.

(b) Type B - That inspection set forth in the Quality Assurance Provisions of this specification or the contract reduced in amount under the reduced inspection provisions of Military Standard 105.

(c) Type C - A reduced inspection procedure resulting in a material reduction in the amount of inspection set forth in the Quality Assurance Provisions of this specification. The amount of inspection is less than that provided for in type B is based upon a consistently acceptable product resulting from a planned quality control system voluntarily employed by the contractor in the production of the product.

NOTICE: When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.