Series "G" Connectors

1. SCOPE

This specification establishes the physical and performance requirements for the modular Series "G" Connectors. It also describes the testing and quality assurance provisions applicable to product manufactured to this specification.

1.1. Product Configuration

This specification covers multiple position module housings (diallyl phthalate or phenolic) installed in various shells which will accommodate from one to three modules. All modules have the same facial envelope dimensions and vary only in the type and number of contacts each will accommodate.

No. of Contacts	Module Will Accommodate These Variations of Contacts
4	Type XII
4	Miniature COAXICON Contacts or Type I, Size 12
8	Miniature COAXICON Contacts or 4 - Miniature COAXICON and 4 - Type I Size 12 Contacts
11	6 - Miniature COAXICON or Type I, Size 12 and 5 - Type II, Size 16 (Long), Type III (+) Size 16 or Subminiature COAXICON (Long Pin) Contacts
14	2 - Type XII and 12 - Type II, Size 16 (Long), Type III (+) Size 16 or Subminiature COAXICON (Long Pin) Contacts
23	Type II, Size 16 (Long), Type III (+) Size 16 or Subminiature COAXICON (Long Pin) Contacts

FIG. 1

Modules

2. REFERENCE DOCUMENTS

The following documents form a part of this specification to the extent referenced herein

2.1. Military and Federal Specifications

MIL-M-14	Molding Plastic and Molded Plastic Parts; Thermosetting
MIL-S-7947	Steel (#1095)
MIL-W-16878	Wire, Electrical Insulated, Copper
MIL-I-45208	Inspection System Requirements
QQ-A-591	Aluminum Alloy Die Castings
QQ-P-416	Cadmium Plating (Electrodeposited)
QQ-N-290	Nickel Plating (Electrodeposited)
QQ-S-640	Steel, Carbon
QQ-S-763	Steel, Corrosion Resistant

2.2. AMP Specifications

109-1	Definitions of Terms and Methods used in AMP Test Specifications
108-10101	Product Specification for Type II and Type III+ Contacts
108-10102	Type XII Contacts
108-10108	Type I Contacts
GPS-501-1	Miniature Coaxicon Contacts
GPS-501-6	Sub-Miniature Coaxicon Contacts
112-230	Passivation of Stainless Steel

2.3. Military Standards

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-202	Test Methods for Electronic and Electrical Components Parts

2.4. Other Documents

Powder Metallurgy Parts Manufacturers Association - BZN-1818-U
Nickel Silver Powered Metal

3. DESIGN REQUIREMENTS

3.1. Intended Use

The Series "G" Connector has been designed to provide a multiple position connector which combines signal, power, and coaxial circuits in one basic connector style. The connector provides easy assembly and maintenance, ready circuit identification, ease of circuit change, and repeated connect-disconnect capabilities.

3.2. Physical Characteristics

The dimensions of all components and assemblies which constituted the Series "G" connector system shall meet the requirements contained on applicable drawings. The materials and finishes used shall be as specified in the following paragraphs. Substitute materials and finishes may be authorized only after the performance and life equivalency of the substitute has been demonstrated.

A. Connector Assembly

A connector assembly consists of a mated plug assembly and receptacle assembly wired with a full complement of contacts which have been crimped to wire. The assembly also includes accessory hardware.

B. Plug Assembly

A plug assembly consists of a shell sub-assembly which will accommodate from one to three pin or socket modules.

C. Receptacle Assembly

A receptacle assembly consists of a shell sub-assembly which will accommodate from one to three pin or socket modules.

D. Shell Sub-Assembly

The shell sub-assembly consists of a die cast shell and retainer conforming to QQ-A-591 and cadmium plated per QQ-P-416.

E. Pin and Socket Module

The modules are molded plastic blocks categorized by the number of contacts, the type of contacts, and the type of plastic material. The plastic molding material shall conform to MIL-M-14, Type SDG-F (Diallyl Phthalate) or Type CFG (Phenolic).

F. Shields and Cable Clamps

The shields and cable clamps shall be die cast from material conforming to QQ-A-591 and cadmium plated per QQ-P-416.

G. Locking Latch Assembly

The assembly consists of a spring catch made from nickel silver powdered metal conforming to PMPMA-BZN-1818-U and a spring catch plate conforming to QQ-S-640. The spring catch plate shall be nickel plated per QQ-N-290.

H. Locking Spring and Locking Spring Catch

Both the locking spring and the locking spring catch shall be fabricated from steel conforming to MIL-S-7947 and nickel plated per QQ-N-290.

I. Screws

All screws which are component parts of the various assemblies shall be stainless steel conforming to QQ-S-763 and passivated per AMP Specification 112-230.

3.3. Performance and Environmental Requirements

The Series "G" Connector has been designed to equal or exceed the following rating for principal characteristics.

A. Temperature Rating

The upper temperature limit includes current heating effects associated with various contact current loads.

Dielectric Material	Operating Temperature
Type CFG (Phenolic)	-55°C to +125°C
Type SDG-F (DiallyI)	-65°C to +150°C

The temperature range of a particular connector assembly may be further reduced by including one or more of the following components;

Miniature or Sub-Miniature Coaxicon Contact (-55°C to +85°C)
Type XII Contacts (-55°C to +105°C)
Cable Bushing (-55°C to +145°C)

B. Insulation Resistance - See Figure 2

C. Dielectric Strength - See Figure 3

D. Vibration - 10G @ 10 to 500 hertz

E. Mechanical Shock - 50G

F. Durability - 500 cycles

G. Contact Retention

Type II & III+: 10 pounds
Type I: 15 pounds
Type XII: 25 pounds

4. TEST REQUIREMENTS AND TEST METHODS

4.1. Test Environments and Conditions

Unless specifically stated, tests and examinations required by this specification shall be conducted under any combination of conditions within the following ranges.

Temperature:	20° to 30°C
Relative Humidity:	30 to 80 percent
Barometric Pressures:	24 to 31 inches of mercury

4.2. Test Measurements

Whenever possible, all testing shall be conducted in a manner which yields variables data. Unless otherwise specified, a minimum of 15 random measurements shall be recorded.

4.3. Examination of Product

Before, during, and after testing the test operator shall visually examine all hardware, to note and record original and changed characteristics with respect to; surface finish, texture, color, cracks, etc. Changes in physical characteristics beyond drawing and/or specification allowances shall be considered a test failure.

4.4. Insulation Resistance

A. Requirements

When tested in accordance with Para. 4.4.B., the insulation resistance shall not be less than the values specified in Figure 2.

Type	Material	Insulation Resistance, Megohms	
		Initial	Final
CFG	Phenolic	5,000	100
SDG-F	Diallyl	50,000	5,000

FIG. 2

B. Test Method

The insulation resistance of unmated connector assemblies shall be tested in accordance with MIL-STD-202, Method 302, Test Condition B. The following details shall apply:

(1) Duration of application of test voltage - 1 minute.
(2) Points of application of test voltage - between contacts alternately connected and between contacts and shell (See Figure 6).

4.5. Dielectric Strength

A. Requirement

When tested in accordance with Para. 4.5.B., the connectors shall show no evidence of flashover or corona when the voltages specified in Figure 3 are applied.

Altitude	Dielectric Strength, Modules With Mixed Contacts	Voltage AC RMS Modules With Only Type XII Contacts
Sea Level	900	1,500
25,000 Feet	600	1,000
50,000 Feet	300	750

FIG. 3

B. Test Method

The unmated connector assemblies shall be tested in accordance with MIL-STD-202, Method 301 at the voltages and simulated altitudes specified in Figure 3. The modules shall be wired as shown in Figure 6 and the voltage applied between all adjacent contacts and between the shell and closest contacts. The test voltage shall be applied at a rate not exceeding 500 volts per second until the applicable voltage of Figure 3 is reached. The specified voltage shall be maintained for one minute.

4.6. Durability

A. Requirement

When tested in accordance with Para. 4.6.B., the connector assemblies shall show no evidence of mechanical damage.

B. Test Method

The connector assemblies shall be subjected to 500 cycles of mating and unmating. The cycling shall be conducted in a manner which simulates service at a rate not exceeding 500 cycles per hour.

4.7. Vibration

A. Requirement

When tested in accordance with Para. 4.7.B., the connector assemblies shall show no evidence of cracking, breaking, loosening of parts, nor loss of continuity of any contact circuit greater than one microsecond.

B. Test Method

The mated connector assemblies shall be vibrated in accordance with MIL-STD-202, Method 204, Condition A. The connector assemblies shall be rigidly attached to the vibration fixture. The wires shall be secured to a stable support external to the vibrating table at a distance of 8 inches. The wires between the assemblies and support shall approximate the neutral condition of neither slack nor tension. All contacts shall be series wired and connected to a suitable testing circuit with 0.1 ampere flowing through the contacts.

4.8. Physical Shock

A. Requirement

When tested in accordance with Para. 4.8.B., the connector assemblies shall show no evidence of cracking, breaking, loosening of parts, nor loss of continuity of any contact circuit greater than one microsecond.

B. Test Method

The mated connector assemblies shall be subjected to a shock test in accordance with MIL-STD-202, Method 205, Condition C. All contacts shall be series wired and connected to a suitable testing circuit with 0.1 ampere flowing through the contacts. The shock test shall be repeated 3 times in both directions of the referenced 90° axis planes (a total of 18 drops).

4.9. Thermal Shock

A. Requirement

When tested in accordance with Para. 4.9.B., the connector assemblies shall show no evidence of mechanical damage.

B. Test Method

The mated assemblies shall be subjected to temperature cycling in accordance with MIL-STD-202, Method 107. The minimum and maximum temperature shall be as specified in Para. 3.3.A.

4.10. Moisture Resistance

A. Requirement

When tested in accordance with Para. 4.10.B., the assemblies shall show no evidence of corrosion.

B. Test Method

The unmated connector assemblies shall be tested in accordance with MIL-STD-202, Method 106, except that Step 7B is not required.

4.11. Contact Retention

A. Requirement

When tested in accordance with Para. 4.11.B., the contact retention shall not be less than the applicable values specified below.

Type II, & III+: 10 pounds
Type I: 15 pounds
Type XII: 25 pounds

B. Test Method

The contacts shall be extracted and inserted 10 times using the applicable extraction tool. After the eleventh insertion, the connector shall be mounted to an appropriate fixture and the force to dislodge the contact from the cavity measured and recorded. The load shall be applied uniformly to the contacts from the mating face at approximately 5 pounds per second.

5. QUALITY ASSURANCE PROVISIONS

5.1. General Requirements

Connector assemblies furnished under this specification shall be a product which has been tested and has passed the test sequence specified in Figure 5. Qualification testing shall demonstrate the effectiveness of the manufacturing processes and the quality processes on a product which has previously demonstrated its ability to meet the product design requirements of Para. 3. Qualification testing shall be conducted on a product which represents established materials, processes, and production tooling. Re-qualification testing shall occur at 18 month intervals or subsequent to any material, process, or tooling change that can effect the product performance.

5.2. Lot Acceptance Inspection

Piece parts, sub-assemblies, and finished assemblies shall be subjected to inspection and tests to assure product conformance to Para. 3 of this specification. Dimensional and visual inspections shall be performed using both sampling and 100% inspection methods. The inspection system shall meet the requirements of MIL-STD-105 and MIL-I-45208. AMP as the responsible authority shall select the sampling plan, the plan level, and the acceptance quality level in order to assure the quality of the finished assemblies. A 1.0% AQL is used for major defects and 4.0% is used for minor defects. A major defect is defined as one which can degrade the performance or reliability of the product to the point where it will not meet the requirements of Para. 3. A minor defect is defined as one which will not significantly degrade the performance or reliability of the product to the point where it will not meet the requirements of Para. 3.

5.3. Qualification Test Samples

The connector assemblies for test shall be wired with a full complement of contacts which have been crimped to wire. The wire used with Type I, II, and III+ contacts shall meet the requirements of MIL-W-16878, Type E. The wire used with Type XII contacts shall meet the requirements of MIL-W-16878, Type D. Each connector assembly shall utilize one of the available plug to receptacle fastening methods. All connector hardware shall be represented in the test package.

A. Individual Module Qualification

If an individual pair of module part numbers are to be qualified, 6 module pairs shall be installed in a "G" 1, "G" 2, and "G" 3 shell sub-assemblies. The connector assemblies shall be subjected to the test sequence of Figure 5.

B. Connector Family Qualification

If the family of Series "G" connectors is to be qualified, a total of 12 connector assemblies shall be subjected to the test sequence of Figure 5. The 12 connector assemblies, as shown in Figure 4, shall include 3 modules of each part number.

Connector Family		Plug With Pin Modules		Plug With Socket Modules	
		Diallyl	Phenolic	Diallyl	Phenolic
Shell Sub-Assembly	"G" 1	1 Assy	1 Assy	1 Assy	1 Assy
	"G" 2	1 Assy	1 Assy	1 Assy	1 Assy
	"G" 3	1 Assy	1 Assy	1 Assy	1 Assy

FIG. 4

5.4. Test Documentation and Failures

A formal report containing test data, analysis summaries, and product evaluation shall be issued at the completion of each qualification test program. Unless otherwise specified, all performance characteristics shall fall within established limits 99% of the time at a confidence level of 95%. Failures attributed to causes such as test set-up, equipment, or operator deficiencies will not disqualify the product; however, that portion of the test shall be re-run after correction of the cause.

Qualification Test	
Test Sequence	Requirement Paragraph
Examination of Products	4.3.
Insulation Resistance (Initial)	4.4.
Dielectric Strength	4.5.
Thermal Shock	4.9.
Durability	4.6.
Vibration	4.7.
Physical Shock	4.8.
Moisture Resistance	4.10.
Insulation Resistance (Final)	4.4.
Dielectric Strength	4.5.
Contact Retention	4.11.

FIG. 5

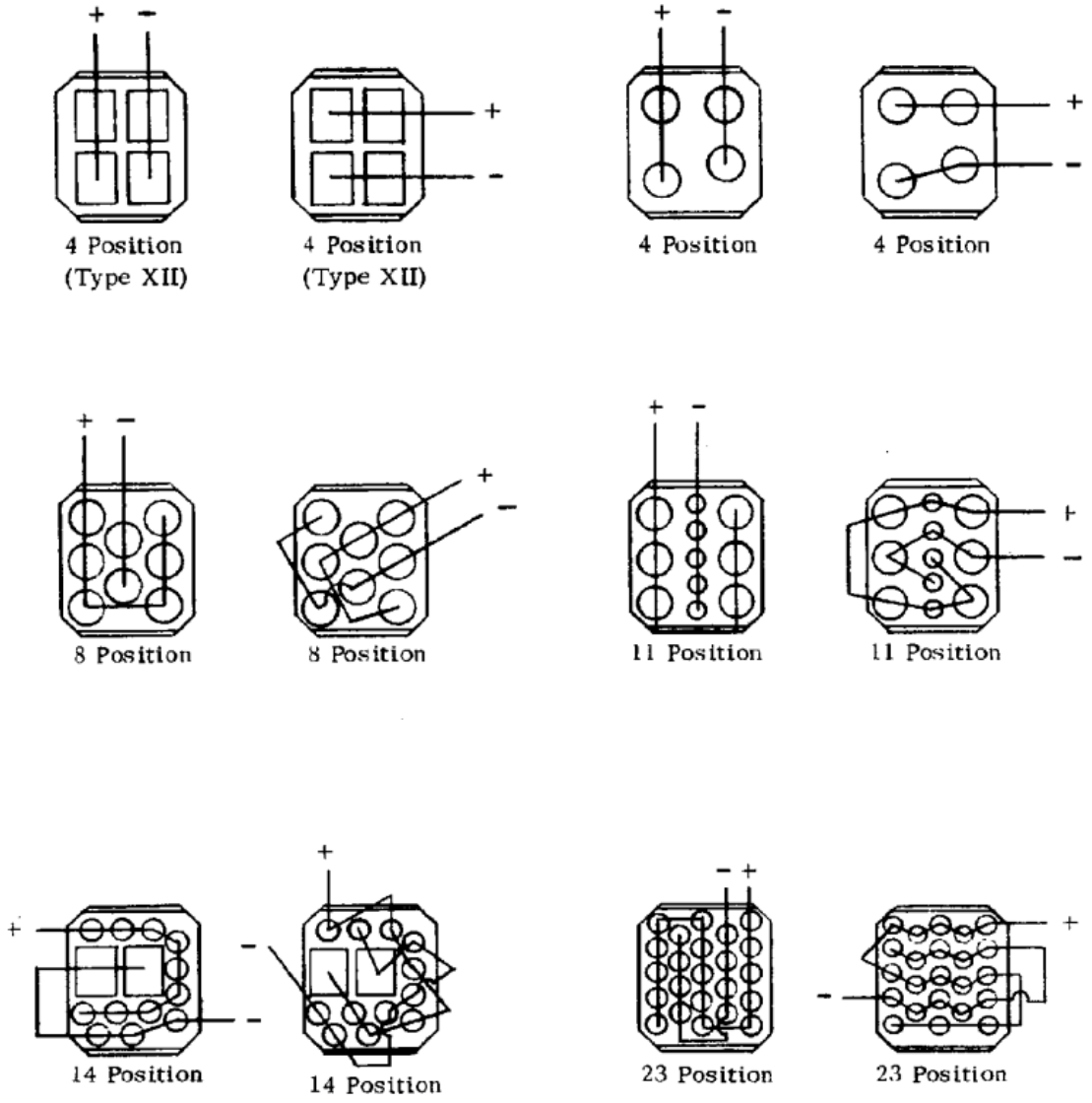

FIG. 6

Wiring Diagram, Suggested Method for Insulation Resistance and Dielectric Strength Tests