

INCH- POUND

MIL-C-22249B(SH)

29 September 1989

SUPERSEDING

MIL-C-22249A(SHIPS)

19 April 1968

(See 6.8)

MILITARY SPECIFICATION

CONNECTOR SETS, ELECTRICAL, HERMETICALLY SEALED, SUBMARINE GENERAL SPECIFICATION FOR

This specification is approved for use by the Naval Sea Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

1 SCOPE

1.1 Scope. This specification covers requirements for electrical connector sets for fleet ballistic missile submarine applications. This specification also covers accessories for the connectors.

2. APPLICABLE DOCUMENTS

2.1 Government documents

2.1.1 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

FEDERAL

L-P-390 - Plastic, Molding and Extrusion Material, Polyethylene and Copolymers (Low, Medium, and High Density).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Sea Systems Command, SEA 5523, Department of the Navy, Washington, DC 20362-5101 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter

AMSC N/A

FSC 5935

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MILITARY

- MIL-P-116 - Preservation, Methods of
- MIL-S-901 - Shock Tests, HI (High-Impact); Shipboard Machinery, Equipment and Systems, Requirements for.
- MS3190 - Contact Wire Barrel, Crimp Type.
- MIL-S-8660 - Silicone Compound, NATO Code Number S-736
- MIL-E-17555 - Electronic and Electrical Equipment, Accessories, and Provisioned Items (Repair Parts): Packaging of.
- MIL-M-24041 - Molding and Potting Compound, Chemically Cured, Polyurethane.
- MIL-P-25732 - Packing, Preformed, Petroleum Hydraulic Fluid Resistant Limited Service at 275°F (135°C)
- MS28775 - Packing Preformed, Hydraulic, +275°F (O-ring).
- MIL-C-39029 - Contacts, Electrical Connector, General Specification for
- MIL-C-39029/56 - Contacts, Electrical Connector, Socket, Crimp Removable, (for MIL-C-38999 Series I, III, and IV Connectors).
- MIL-G-45204 - Gold Plating, Electrodeposited.

(See Supplement 1 for list of applicable specification sheets)

STANDARDS

FEDERAL

- FED-STD-H28 - Screw-Thread Standards for Federal Services
- FED-STD-H28/2 - Screw-Thread Standards for Federal Services Section 2 Unified Inch Screw Threads - UN and UNR Thread Forms.

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- MIL-STD-129 - Marking for Shipment and Storage.
- MIL-STD-167-1 - Mechanical Vibrations of Shipboard Equipment (Type I - Environmental and Type II - Internally Excited)
- MIL-STD-454 - Standard General Requirements for Electronic Equipment.
- MIL-STD-1344 - Test Methods for Electrical Connectors

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Naval Publications and Forms Center, (ATTN NPODS), 5801 Tabor Avenue, Philadelphia, PA 19120-5099)

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2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the 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, INC. (ANSI)
ANSI B 46.1 - Surface Texture (Surface Roughness,
Waviness, and Lay). (DoD adopted)

(Application for copies should be addressed to the American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018.)

UNIFORM CLASSIFICATION COMMITTEE AGENT
Uniform Freight Classification Ratings, Rules, and
Regulations.

(Application for copies should be addressed to the Uniform Classification Committee Agent, Tariff Publication Officer, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.)

(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 3 Order of precedence In the event of a conflict between the text of this document and the references cited herein (except for specification sheets), 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.

3.2 First article. When specified (see 6.2), a sample shall be subjected to first article inspection (see 6.4) in accordance with 4.3

3 3 Materials Materials shall be as specified (see 3.1). When not specified, the contractor may select any material that will perform the intended function in the equipment and will otherwise comply with the requirements of this specification. Sufficient material identifications and controls shall be exercised by the manufacturer to assure that the final product conforms to this specification.

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3 3.1 Pin and socket contacts Pin contacts shall be fabricated from molybdenum or nickel clad molybdenum. Socket contacts shall be fabricated from a material which shall pass the electrical and physical tests specified herein. Contact surfaces shall be smooth, and shall be plated with a minimum 0.0002-inch thick hard gold finish over a minimum 0.00005 inch of copper in accordance with MIL-G-45204. Hard gold shall be considered gold alloy, 23 karat or greater, having a minimum Knoop hardness of 110. The molybdenum pins shall have a nickel underplate.

3 3.2 Pin contact insulation. Pin contact insulation shall be fabricated from a compression glass-seal material which shall pass the electrical tests specified in 4.7.1 and 4.7.2. This material shall provide a watertight seal which shall pass the physical tests specified herein.

3.3.3 O-rings. O-rings shall be in accordance with MIL-P-25732. Sizes shall be in accordance with MS28775 and shall be as specified in the applicable specification sheet. O-rings shall be lubricated with a light film of silicone compound in accordance with MIL-S-8660 at the time of assembly.

3 3 4 Covers (caps). Watertight and protective covers shall be of the material specified (see 3.1). Where covers are not specified, red plastic end caps in accordance with type I of L-P-390 shall be installed to prevent damage to threads or entrance of water or dust.

3.3 5 Prohibited materials. Asbestos, cadmium and mercury (see 3.3.5.1) shall not be used in construction of pressure proof fittings covered by this specification.

3 3 5 1 Mercury. Mercury in any form shall not be used in manufacturing and test processes (including test equipment such as mercury thermometers) applying to the basic pressure proof fitting, but may be used in manufacturing and test processes for materials and parts, provided it is used in such a way that contamination of the materials and parts themselves cannot result.

3 3 6 Recovered materials Unless otherwise specified herein, all equipment, material and articles incorporated in the products covered by this specification shall be new and may be fabricated using materials produced from recovered materials to the maximum extent practicable without jeopardizing the intended use. The term "recovered materials" means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials. None of the above shall be interpreted to mean that the use of used or rebuilt products is allowed under this specification unless otherwise specifically specified.

3 4 Construction The construction and physical dimensions shall be as specified herein and on the applicable specification sheet.

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3 4 1 Contacts Contacts shall be such that neither the pins nor the sockets will be damaged during mating of counterpart plugs and headers. Contact arrangements and spacing shall be as specified (see 3.1).

3.4.1.1 Pin engaging end. The entering end of the pins shall be machined with tapers and radii as detailed in the applicable specification sheet.

3.4.1.2 Socket engaging end. The entering end of the socket contact shall be rounded or chamfered to allow for directing and centering of the entering pin. The socket contact shall provide the spring action for maintaining the contacting pressure between the pin and the socket.

3.4.1.3 Crimp type socket contacts. The barrels of the crimp type socket contacts shall be in accordance with type C of MS3190, or MIL-C-39029/56.

3.4.1.4 Solder type socket contacts Solder type contact dimensions shall be as shown on figure 1 and the applicable specification sheets. Solder caps shall be aligned to facilitate soldering. Soldering shall be in accordance with requirement 5 of MIL-STD-454

3.4.1.5 Conductor-contact seals. Conductors or contacts shall be provided with a gasket to allow proper sealing of the contacts or conductors to the plug insert (see 3 1)

3 4 1 6 Taper pin type socket contacts. Taper pin type socket contact terminations shall be as shown on figure 2 and the applicable specification sheet.

3 4 2 Plug assembly. A plug assembly shall consist of a plug body, cover plate, coupling nut, insert assembly, protective covers, insert retaining, coupling nut retaining ring, thrust washer, O-ring and required screws and nuts to fasten component parts Plugs with molded boot cable seals shall have a plug sleeve and a sleeve retainer clip, or a cable grip and conductor clamp as specified on the applicable specification sheet Plugs with cable grommets shall have a stuffing tube, grommet, ferrule, end bell, and cable clamps

3 4.2.1 Plug-header polarization. Polarization of the plug with its header assembly shall be accomplished by the use of two integral keys and two keyways (see 3.1).

3.4.2 2 Plug inserts Plug inserts shall have the proper sections and radii as specified in the applicable specification sheets. Front and rear plug inserts shall have fastening devices installed to allow insertion of the completely assembled and wired insert assembly into the plug body Contacts shall be properly identified on both sides of the insert assembly as specified (see 3.1)

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3.4.3 Header assembly. A header assembly shall consist of a header body, header insert, jam nut, polarizing bushing, O-rings, backup rings, and protective covers (see 3.1).

3.4.3.1 Pin contact insulation and seal. The surface of the glass insulation for the pin contacts shall be recessed not more than 0.070 inch below the missile face of the insert, and 0.090 inch below the compartment face of the insert, at any point, and it shall be raised not more than 0.016 inch above the face of the insert at any point. Those header assemblies not having removable inserts shall comply with these requirements on the missile face only. The pin contact insulation surface shall be smooth, have a glazed surface finish and a uniform surface free from porosity. There shall be no cracks, pits, voids, or inclusion of foreign material (as viewed with 10X magnification and an adequate light source). For the purpose of this requirement, the word "crack" shall be understood to mean an open fault line in the surface of the glass exhibiting depth as opposed to a crazed condition limited to the surface and exhibiting no depth, or a completely sealed condition.

3.4.3.2 Pin contact identification. A sufficient number of pin contacts shall be identified on both sides of the header insert to assure that every pin contact will be properly identified

3.4.3.3 Header protective and watertight caps. The header protective and watertight cap assemblies shall be as specified on the applicable specification sheet.

3.4.4 Stress relieving. Metals used in fabrication and assembly shall be treated or heat-treated to prevent deterioration or failure due to stresses or other conditions resulting from working, forming, welding, brazing, and so forth during the fabrication process

3.4.5 Threads. Unless otherwise specified in the specification sheet, threads shall be right-hand, class 2, in accordance with Unified National screw threads as specified in FED-STD-H28 and FED-STD-H28/2. The first and last partial thread of both internal and external threads shall have the initial portions removed for an extent of 110 to 120 degrees.

3.4.6 Machined surfaces. Unless otherwise specified (see 6.2), machined surfaces shall be 63 root mean square (rms) maximum. Any machining of metal parts shall be accomplished before plating or other finish is applied.

3.4.7 Cast and molded parts. Every cast or molded part shall be free from cold shuts, blow holes, fins, flashing, or burrs. Non-machined surfaces shall have a 250 rms maximum finish.

3.4.8 Sharp edges. Sharp edges shall be slightly rounded (0.003 to 0.010 inch maximum). Drilled and tapped holes shall have all burrs removed

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3.4.9 Finish. Surface finishes shall be in accordance with ANSI B46.1, except that O-ring sealing surfaces shall have a 32 rms maximum finish and shall be free from tool marks, scratches, voids, blow holes, dents, and flaws. Exposed corrosion-resistant steel parts of the plug and header assemblies shall have a passivated finish.

3.4.10 Loose parts. Loose parts required for installation or operation shall be enclosed in a cloth or plastic bag and packaged with the assembly (see 5.1).

3.5 Interchangeability. In no case shall parts be physically interchangeable or reversible unless such parts are also interchangeable or reversible with regard to function, performance, and strength.

3.6 Performance.

3.6.1 Insulation resistance. The insulation resistance shall be 500 megohms or greater (see 4.7.1).

3.6.2 Dielectric withstanding voltage. There shall be no evidence of flashover, disruptive discharge, arcing, corona, or breakdown when the contacts are subjected to the test as specified in 4.7.2.

3.6.3 Contact resistance. The potential drop of the two mated socket contacts and the header pin contact (when assembled as if in service) shall be not greater at the specified current than that shown in table I (see 4.7.3).

TABLE I Contact potential drop

Contact size	Test current (amperes)	Potential drop (millivolts, maximum)
20	5	40
16	20	60
10	44	60
4	110	40

3.6.4 Hydrostatic pressure. When completely wired and sealed plug assemblies are mated to header assemblies, or when header insert assemblies are tested as specified in 4.7.4, there shall be no evidence of mechanical damage, water leakage, or impaired electrical characteristics.

3.6.5 Vibration. Mated connectors shall not be damaged and there shall be no loosening of parts when tested as specified in 4.7.5. Counterpart connectors shall be retained in full engagement, and there shall be no interruptions of electrical continuity longer than 10 milliseconds (ms).

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3.6.6 Physical shock Headers and mated connectors shall not be damaged when subjected to the physical shock test as specified in 4.7.6.

3.6.7 Probe damage (contacts). Each socket contact of size AWG 16 or smaller shall not be damaged when tested in accordance with 4.7.7.

3.7 Marking Marking shall be that of the prime manufacturer responsible for the final acceptance of equipment.

3.7.1 Identification of product The manufacturer's name or trademark, and military part number shall appear on the rear face of the plug body adjacent to the cover plate. The header body and the header insert shall be marked with the manufacturer's name or trademark and military part number on the compartment side of the header. The markings shall be depressed in the metal to provide permanent identification. Markings shall not be placed on sealing surfaces. The compartment side plug assemblies shall be identified by placing "compartment side" designation on the face of the front insert and on the rear face of the plug body adjacent to the cover plates. The missile side plug shall be identified in the same manner, except the plug shall have the "missile side" designation. The manufacturer's name or trademark and military part number shall appear on the outside face of the protective and watertight caps.

3.7.2 Header insert serial number. Each header insert assembly shall be serialized by the manufacturer. This serial number shall be the method of identifying the test report document submitted with each header assembly (see 4.4.1).

3.8 Workmanship. Connectors and accessories shall conform to the dimensions and interchangeability requirements of this specification. Loose contacts, poor molding fabrication, loose materials, defective bonding, damaged or improperly assembled contacts, physical and electrical defects in the hermetic seals, peeling or chipping of plating or finish, galling of parts in mating, nicks or burrs on metal parts, and post molding warpage shall be considered adequate basis for rejection of items as being of a quality inferior for the purpose intended.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examination and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

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4.1.1 Responsibility for compliance All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program (see 6.3). 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.

4.2 Classification of inspections The inspection requirements specified herein are classified as follows:

- (a) First article inspection (see 4.3)
- (b) Quality conformance inspection (see 4.4).

4.3 First article inspection First article inspection shall be performed on sample units which have been produced with equipment and procedures normally used in production (see 6.3).

4.3.1 Sample size One complete connector assembly or accessory of each military part number shall be subjected to first article inspection. There shall also be provided 100 percent excess socket contacts for wired tests.

4.3.2 Inspection routine Samples shall be subjected to the first article inspections specified in table II, in the order shown

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TABLE II First article inspection.

Step No.	Inspection	Requirement paragraph	Test method paragraph	Control test step No.	Header assembly	Connector assembly	Accessory or piece part
1	Examination of product	3 1, 3.3, 3.4, 3.5, 3 7, 3.8	4 6.1	-	X	X	X
2	Probe damage (contacts)	3 6.7	4.7.7			X	
3	Insulation resistance	3.6.1	4.7.1.1, 4 7.1.2	- -	X	X	
4	Dielectric with-standing voltage	3 6 2	4 7.2	-	X	X	
5	Contact resistance	3 6.3	4.7.3	-	X		
6	Hydrostatic pressure	3.6 4	4 7.4 1	3	X		
7	Vibration	3.6 5	4.7.5	3		X	
8	Physical shock	3 6 6	4 7.6	3	X	X	
9	Hydrostatic pressure	3 6 4	4 7.4 1, 4 7 4 1 1	3 3	X	X	

4.4 Quality conformance inspection.

4 4 1 Inspection of product for delivery. Inspection of product for delivery shall consist of groups A and B quality conformance inspections specified in table III (see 6 3)

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TABLE III. Quality conformance inspection.

Step No	Inspection	Requirement paragraph	Test method paragraph	Control test step No.	Header assembly	Connector assembly	Accessory or piece part
1	<u>Group A</u> Examination of product	3 1, 3.3, 3.4, 3.5, 3.7, 3.8	4 6.1	-	X	X	X
2	<u>Group B</u> Insulation resistance	3.6 1	4 7.1.1, 4.7.1.2	-	X	X	
3	Dielectric with-standing voltage	3.6.2	4.7 2	-	X	X	
4	Hydrostatic pressure	3.6 4	4 7 4.2	2	X	X	

4 4 1 1 Inspection lot An inspection lot shall consist of complete connector assembly, accessory, or part of the same military part number, produced under essentially the same conditions, and offered for inspection at one time

4 4 1 2 Sampling plan. Quality conformance inspection shall be made on 100 percent of the product supplied under this specification.

4 5 Test conditions Unless otherwise specified (see 6.2), examinations and tests required by this specification shall be conducted under any combination of conditions within the ranges in accordance with MIL-STD-1344.

4 5 1 Wire-to-contact assembly Where wired contacts are required, the union shall be formed as specified in 4 5.1 1, 4 5 1 2, and 4 5 1 3

4 5.1 1 Solder contacts. Soldering shall be in accordance with 3.4 1 4.

4 5.1.2 Taper pin contacts Standard crimping and taper pin insertion and removal tools, as recommended by the contractor supplying the taper pin contacts, shall be used

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4 5.1 3 Crimp contacts Standard crimping and insertion and removal tools, as recommended by the contractor supplying the contacts, shall be used

4.6 Examinations.

4.6.1 Visual and mechanical examination. Connector sets, accessories and piece parts shall be examined to verify that materials, design, Construction, physical dimensions, marking and workmanship are in accordance with the requirements specified herein and in the specification sheets (see 3 1, 3 3, 3.4, 3.5, 3.7, and 3.8).

4.7 Tests.

4 7 1 Insulation resistance.

4.7.1.1 Connectors. Connectors shall be tested in accordance with method 3003.1 of MIL-STD-1344 to determine conformance to 3.6.1. The resistance shall be measured between adjacent pairs of contacts and between each contact and the metal housing.

4 7 1.2 Unmated header assembly. Unmated header assemblies shall be tested as specified in 4 7 1 1, with resistance measurement between adjacent contacts deleted.

4 7.2 Dielectric withstanding voltage Mated and unmated connectors shall be tested in accordance with method 3001.1 of MIL-STD-1344 The applicable test voltage (600 volts rms) shall be applied between every contact and metal housing

4.7.3 Contact resistance. The contact resistance shall be measured in accordance with the contact resistance test of MIL-C-39029, and in accordance with the test points as shown on figure 3

4.7.4 Hydrostatic pressure.

4 7 4 1 First article testing Unmated header assemblies and mated plug and header assemblies shall be subjected to a hydrostatic pressure test as follows. The test header assembly shall be mounted to the pressure vessel cover flange using the O-ring and fastening methods as specified in the applicable specification sheet For the unmated header test, the missile side face of the header shall be exposed to the pressure and be completely filled with fresh water The assembly shall then be tested as shown in table IV. For the mated plug-header test, the missile side plug shall be mated to the header with the tools specified herein and held with the normal locking devices. Twenty-five percent of the contacts shall be wired in series. The cable shall be end sealed at the plug as shown on the applicable specification sheets The cable shall be sealed at the open end with an elastomeric compound in accordance with MIL-M-24041 The missile side of the connector assembly shall then be exposed to hydrostatic pressure as shown in table IV

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For the unmated header test, insulation resistance measurements shall be taken prior to and following the pressure tests. Prior to taking the insulation resistance readings, the unmated header shall be cleaned in accordance with 4.8.

TABLE IV Hydrostatic pressure test schedule.

Step No.	Pressure (pounds force per square inch)		Hold time (minutes)
	Low	High	
1	0	20	5
2	0	20	5
3	0	20	5
4	0	250	5 (mated test 24 hours)
5	0	500	5
6	0	1000	5
7	0	2000	5
8-17	0	2000	1
18	0	2000	1 hour (initial test No. 6, 168 hours, final test No 9, see table II)

4 7.4 1.1 Mated connector test. Insulation resistance readings shall be taken prior to and following the hydrostatic pressure tests. For the mated connector test, steps 1 through 4 as shown in table IV shall be used. Maximum pressure shall be 250 pounds force per square inch. Following the pressure tests, the parts shall be inspected for leakage and mechanical damage.

4 7 4.2 Quality conformance testing. The missile side of the header assembly shall be exposed to the hydrostatic pressure as specified in 4 7.4 1 at the pressure range specified in step 7 of table IV, with a 30-minute hold time.

4.7.5 Vibration. The vibration test shall be conducted as specified for type I of MIL-STD-167-1. Contacts shall be wired in series and instrumented to indicate any discontinuity in the circuit exceeding 10 ms.

4.7 6 Physical shock Mated connectors and unmated headers shall be tested in accordance with the type A, grade A, class I test for lightweight equipment in accordance with MIL-S-901. Three blows shall be applied in each direction of the three major axes of the connectors or headers. Headers shall be mounted on the shock device or carriage. For the mated connector test, plugs shall be engaged to the header and held only by normal locking means. Every contact shall be wired in series and the wire bands or cables shall be clamped to structures that move with the connectors. A minimum of 8 inches of cable shall be unsupported behind the rear of each connector set. An

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instrument shall be employed which shall indicate any discontinuity in the circuit exceeding 10 ms

4.7.7 Probe damage (contacts). Contacts shall be tested in accordance with method 2006.1 of MIL-STD-1344.

4.8 Cleaning samples.

4.8.1 Normal cleaning. Where referred to, normal cleaning shall consist of removing contaminants with warm distilled water. Excess water shall be blown dry with clean dry air for a period of time not to exceed 10 minutes. The air may be warmed to 125°F. If necessary, the component may be washed with clean acetone and parts scrubbed with a small soft bristle brush. Excess acetone may be blown dry with clean dry air as specified herein. Normal cleaning may be used prior to control tests.

4.8.2 Forced cleaning. Air drying at temperatures elevated above 125°F, or requiring more than three of the cycles specified in 4.8.1, are considered forced, and shall not be permitted.

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

5. PACKAGING

(The packaging requirements specified herein apply only for direct Government acquisition. For the extent of applicability of the packaging requirements of referenced documents listed in section 2, see 6.6.)

5.1 Domestic shipment and early equipment installation.

5.1.1 Connector assemblies.

5.1.1.1 Packaging. Unless otherwise specified (see 6.2), for particular connector assembly parts, packaging, which may be in accordance with the contractor's commercial practice, shall be sufficient to afford adequate protection against corrosion, deterioration, and physical damage during shipment from the supply source to the using activity and until early installation. Where plug to header seals are also used as protective cover seals, one additional seal shall be provided and separately packaged for use as a plug to header seal.

5.1.1.1.1 Header assemblies. Each header assembly shall be provided with metal or plastic (as specified on the applicable specification sheet) protective caps to protect the pin contacts and gaskets and seal surfaces. The caps shall be securely screwed to the header threads. The plug to header O-ring seal gaskets shall be separately packaged in accordance with method

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IA-8 of MIL-P-116. Where plug to header O-ring seals also serve as a protective cover seal, one additional O-ring shall be separately packaged for use as a plug to header seal.

5.1.1.1.2 Plug assemblies. Each plug shall have a plastic cap fitted over the cable end of the plug, and a plug protective cap securely screwed into the plug coupling ring (as specified on the applicable specification sheet) to protect the socket contacts insert assembly, and the gaskets and seal surfaces. The plug-to-header O-ring seal gaskets shall be separately packaged in accordance with method IA-8 of MIL-P-116.

5.1.1.1.2.1 Removable crimp type socket contacts. Removable crimp type socket contacts shall not be packaged with the contacts installed in the insulator. Contacts shall be packaged in accordance with method IA-8 of MIL-P-116. The packaging shall protect the contacts against damage during shipment and storage. Contacts may be individually protected or packaged in bulk in a rigid container having filler material.

5.1.1.2 Packing. Packing shall be accomplished in a manner which will ensure acceptance by common carrier at the lowest rate and will afford protection against physical or mechanical damage during direct shipment from the supply source to the using activity for early installation. The shipping containers or methods of packing shall conform to the Uniform Freight Classification Rules or other carrier regulations as applicable to the mode of transportation, and may conform to the contractor's commercial practice

5.1.1.3 Marking. Shipment marking information shall be provided on interior packages and exterior shipping containers in accordance with the contractor's commercial practice. The information shall include: nomenclature, National stock number or manufacturer's part number, contract or order number, quantity, contractor's name, federal code numbers, year and quarter of manufacture, and destination.

5.2 Domestic shipment and storage or overseas shipment.

5.2.1 Packaging, packing, and marking. Connector sets, accessories and piece parts shall be packaged level A or C, packed level A, B, or C, as specified (see 6.2), and marked in accordance with MIL-E-17555, except that descriptive details and plans and testing of a first article pack is not required

5.2.2 Cushioning, dunnage, and wrapping materials. The use of cushioning, dunnage, and wrapping materials shall be as follows:

- (a) Level A packaging, level A and B packing Use of all types of loose-fill materials for applications such as cushioning, filler, stuffing and dunnage for material destined for shipboard use is prohibited.

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- (b) Level C packaging and packing Unless otherwise specified (see 6.2), use of all types of loose-fill materials for applications such as cushioning, filler, stuffing, and dunnage for material destined for shipboard use is prohibited. When loose-fill material is permitted for use unit packages and containers (interior and exterior) shall be marked or labeled as follows

"CAUTION

Contents cushioned etc. with loose-fill material
Not to be taken aboard ship. Remove and discard
loose-fill material before shipboard storage. If
required, recushion with cellulosic material bound
fiber, fiberboard, or transparent flexible cellular
material."

5.3 Marking In addition to any special marking required (see 6.2), unit, intermediate, and exterior shipping containers shall be marked for shipment in accordance with MIL-STD-129.

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 connector sets are used primarily on fleet ballistic submarines and are mounted to the watertight missile tubes.

6 2 Acquisition requirements. Acquisition documents must specify the following:

- (a) Title, number, and date of this specification
- (b) Title, number, and date of the applicable specification sheet and the complete military part number.
- (c) Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).
- (d) Requirements for machined surfaces, if other than specified (see 3 4.6)
- (e) Test conditions, if other than specified (see 4 5)
- (f) Packaging requirements for particular connector assembly parts, if other than specified (see 5.1.1.1).
- (g) Level of packaging and packing required (see 5.2.1)
- (h) When loose-fill materials are permitted for use for level C packaging and packing (see 5.2.2(b)).
- (i) Special marking required (see 5.3).
- (j) Requirement for wire rope assemblies on protective and water tight covers, if applicable.

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6.3 Consideration of data requirements. The following data requirements should be considered when this specification is applied on a contract. The applicable Data Item Descriptions (DID's) should be reviewed in conjunction with the specific acquisition to ensure that only essential data are requested /provided and that the DID's are tailored to reflect the requirements of the specific acquisition. To ensure correct contractual application of the data requirements, a Contract Data Requirements List (DD Form 1423) must be prepared to obtain the data, except where DOD FAR Supplement 27.475-1 exempts the requirement for a DD Form 1423.

<u>Reference Paragraph</u>	<u>DID Number</u>	<u>DID Title</u>	<u>Suggested Tailoring</u>
4.1.1.	DI-R-4803	Inspection system program plan	---
4 3	DI-T-4902	First article inspection report	---
4.4.1	DI-T-5329	Inspection and test reports	---

The above DID's were those cleared as of the date of this specification. The current issue of DOD 5010.12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL), must be researched to ensure that only current, cleared DID's are cited on the DD Form 1423.

6 4 First article. When first article inspection is required, the contracting officer should provide specific guidance to offerors whether the item should be preproduction sample, a first article sample, a first production item, a sample selected from the first production items, a standard production item from the contractor's current inventory (see 3.2), and the number of items to be tested as specified in 4 3. The contracting officer should also include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results, and disposition of first articles. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract. Bidders should not submit alternate bids unless specifically requested to do so in the solicitation.

6 5 Definitions

6 5.1 Compartment side. The compartment side is that side of the connector set exposed to lower pressure (normally dry)

6 5 2 Connector set A connector set is an assembly consisting of a missile side plug, compartment side plug, and a header assembly

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6.5.3 Header assembly. A header assembly is that portion of the connector that is fixed (or rigidly attached) to a supporting surface. The header assembly is provided with pin contacts. The header assembly serves as a safety water barrier

6.5.4 Header insert. The header insert is that removable portion of some header assemblies that contains the double-ended pin contacts which are glass-sealed and insulated to the header body inserts.

6 5.5 Missile side The missile side is that side of the connector set exposed to higher pressure (may be hydrostatic pressure).

6 5.6 Plug assembly. A plug assembly is that portion of the connector set that is removable after disengagement from the mating header, and is not attached to the panel of another supporting surface. The plug is provided with socket contacts.

6 5 7 Plug inserts The plug inserts are those portions of the plug assembly that contain the socket contacts and insulates them from the plug body.

6.6 Sub-contracted material and parts. The packaging requirements of referenced documents listed in section 2 do not apply when material and parts are acquired by the contractor for incorporation into the equipment and lose their separate identity when the equipment is shipped

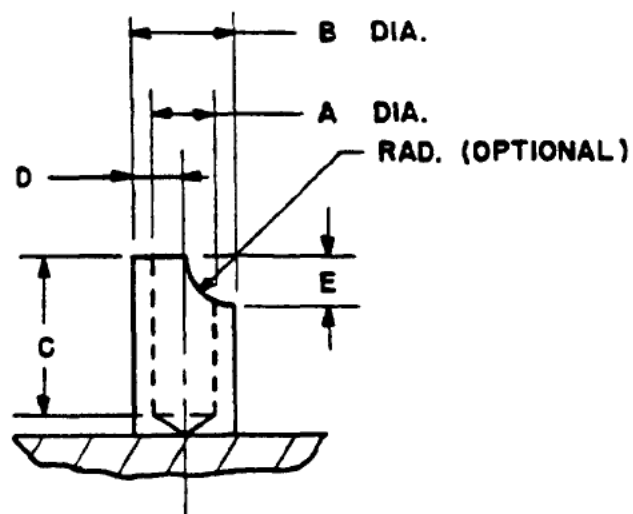
6 7 Subject term (key word) listing

Compartment side
Header assembly
Missile side
Plug-header polarization

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

Preparing activity:
Navy - SH
(Project 5935-N278-01)

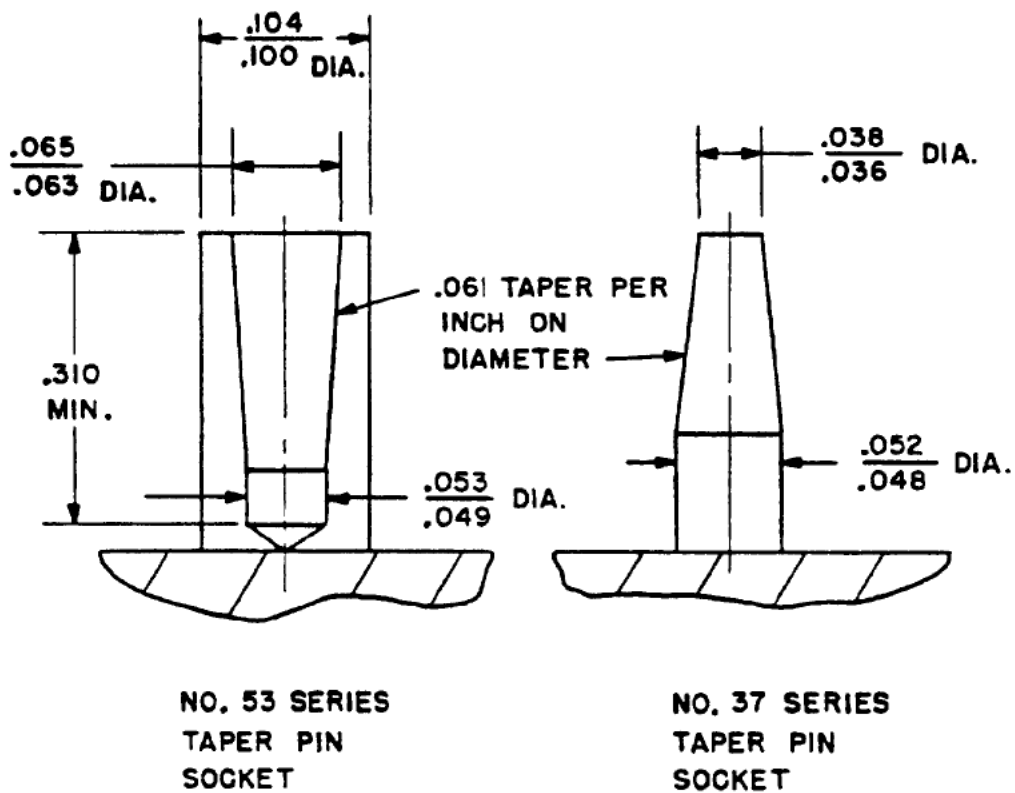
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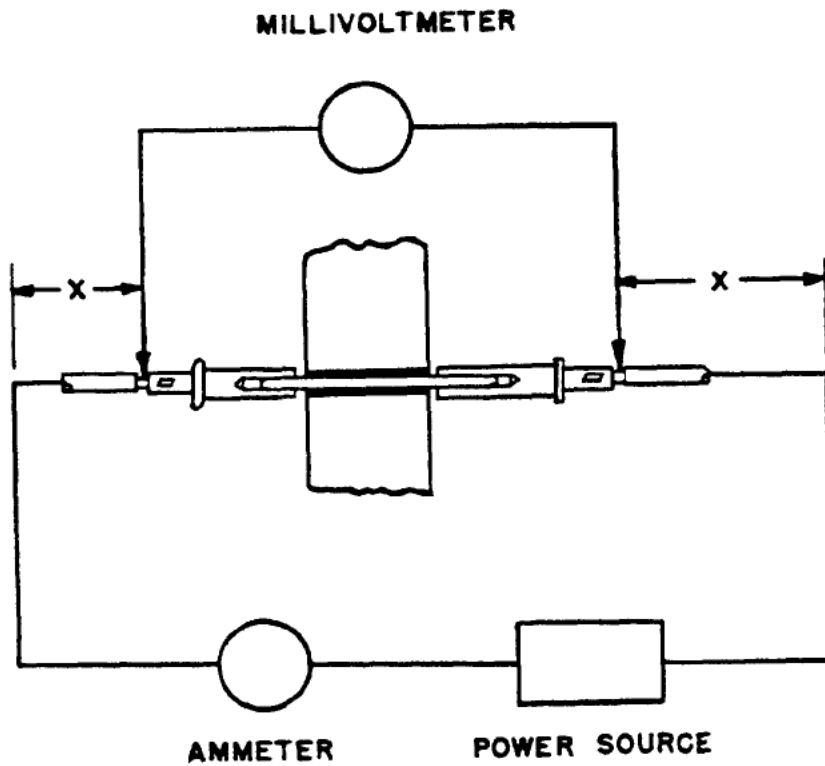
CONTACT SIZE	A $\pm .002$	B $\pm .002$	C $\pm .031$	D $\pm .020$	E $\pm .020$			REMARKS
4	.332	.371	.500	.187	.280			175 PIN ASSY
4	.402/ 410	.456	.500	.187	.280			15 PIN ASSY (FOR 3 NO. 8 WIRES)
10	.136	.164	.375	.080	.187			175 PIN ASSY

FIGURE 1. Solder cup dimensions for socket contacts.

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FIGURE 2. Taper pin dimensions for socket contacts.

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X = 3 FEET MINIMUM OF CONTINUOUS WIRE LENGTH
FOR HEAT DISSIPATION

FIGURE 3. Test setup for contact resistance.

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL*(See Instructions - Reverse Side)***1. DOCUMENT NUMBER**
MIL-C-22249B(SH)**2. DOCUMENT TITLE** Connector Sets, Electrical, Hermetically Sealed,
Submarine General Specification For.**3a. NAME OF SUBMITTING ORGANIZATION****4. TYPE OF ORGANIZATION (Mark one)**☐ **VENDOR**☐ **USER**☐ **MANUFACTURER**☐ **OTHER (Specify)** _____**b. ADDRESS (Street, City, State, ZIP Code)****5. PROBLEM AREAS****a. Paragraph Number and Wording****b. Recommended Wording****c. Reason/Rationale for Recommendation****6. REMARKS****7a. NAME OF SUBMITTER (Last, First, MI) - Optional****b. WORK TELEPHONE NUMBER (Include Area Code) - Optional****c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional****8. DATE OF SUBMISSION (YYMMDD)**

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