

MIL-C-24217A(SH)
5 September 1984
SUPERSEDING
MIL-C-24217(SHIPS)
12 May 1966
(See 6.9)

MILITARY SPECIFICATION

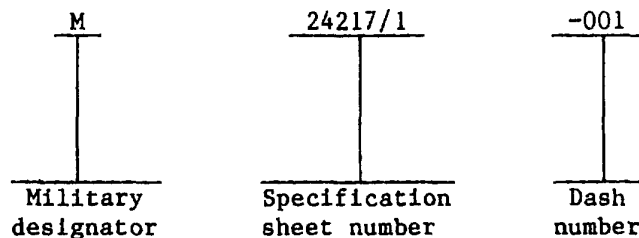
CONNECTORS, ELECTRICAL, DEEP SUBMERGENCE, SUBMARINE

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 deep submergence electrical connectors for submarine applications. These connectors shall be capable of withstanding the hydrostatic pressure range from zero pounds per square inch (lb/in^2) to $10,000 \text{ lb/in}^2$, with a maximum recommended operating pressure of $6,500 \text{ lb/in}^2$. This specification also covers accessories for these connectors, such as protective caps and pressure-proof caps. Harness assemblies and complete electrical hull penetrators are not covered by this specification (see 6.6).

1.2 Military part number. The military part number shall consist of the letter "M", the basic number of the specification sheet, and an assigned dash number (see 3.1) as shown in the following example:



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 55Z3, Department of the Navy, Washington, DC 20362 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. Unless otherwise specified, the following specifications and standards, of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation form a part of this specification to the extent specified herein.

SPECIFICATIONS

FEDERAL

- L-P-410 - Plastic, Polyamide (Nylon), Rigid: Rods, Tubes, Flats, Molded and Cast Parts.
- QQ-C-465 - Copper-Aluminum Alloys (Aluminum Bronze) (Copper Alloy Numbers 606, 614, 630, 632M, and 642); Rod, Flat Products with Finished Edges (Flat Wire, Strip, and Bar), Shapes, and Forgings.
- QQ-N-290 - Nickel Plating (Electrodeposited).
- QQ-P-35 - Passivation Treatments for Corrosion-Resisting Steel.
- QQ-S-763 - Steel Bars, Wire, Shapes, and Forgings, Corrosion-Resisting.
- ZZ-R-765 - Rubber, Silicone.

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- MIL-M-14 - Molding Plastics and Molded Plastic Parts, Thermosetting.
- MIL-P-79 - Plastic Rods and Tubes, Thermosetting, Laminated.
- MIL-P-116 - Preservation, Methods of.
- MIL-S-8660 - Silicone Compound, NATO Code Number S-736.
- MIL-W-16878 - Wire, Electrical, Insulated, General Specification for.
- MIL-W-16878/4 - Wire, Electrical, Polytetrafluoroethylene (PTFE) Insulated, 200°C, 600 Volts, Extruded Insulation.
- MIL-I-17214 - Indicator, Permeability; Low Mu (GO-NO GO).
- MIL-E-17555 - Electronic and Electrical Equipment, Accessories, and Repair Parts: Packaging and Packing of.
- MIL-C-22520 - Crimping Tools, Terminal Hand or Power Actuated, Wire Termination, and Tool Kits, General Specification for.
- MIL-P-25732 - Packing, Preformed, Petroleum Hydraulic Fluid Resistant, Limited Service at 275°F (135°C).
- MIL-C-39029 - Contacts, Electrical Connector, General Specification for.
- MIL-C-39029/35 - Contacts, Electrical Connector, Socket, Crimp Removable, (for MIL-C-28748/4 and MIL-C-28748/14 Connectors).
- MIL-C-39029/37 - Contacts, Electrical Connector, Socket, Crimp Removable, (for MIL-C-28748/10 Connectors).

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STANDARDS

FEDERAL

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

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MIL-STD-202 - Test Methods for Electronic and Electrical
Component Parts.

MIL-STD-454 - Standard General Requirements for Electronic
Equipment.

MS20995 - Wire, Safety or Lock.

MS28775 - Packing, Preformed, Hydraulic, +275°F ("O" Ring).

(See supplement 1 for applicable specification sheets.)

(Copies of specifications and standards required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. The issues of the documents which are indicated as DoD adopted shall be the issue listed in the current DoDISS and the supplement thereto, if applicable.

ASTM

D 1141 - Substitute Ocean Water. (DoD adopted)

(Application for copies should be addressed to ASTM, 1916 Race Street, Philadelphia, PA 19103.)

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

AS 568 - Aerospace Size Standard for O-Rings.

(Application for copies should be addressed to the Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096.)

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.)

(Industry association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

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3. REQUIREMENTS

3.1 Specification sheets. The individual item requirements shall be as specified herein and in accordance with the applicable specification sheets. In the event of any conflict between the requirements of this specification and the specification sheets, the latter shall govern.

3.2 First article. When specified (see 6.2.1), a sample shall be subjected to first article inspection (see 4.4, 4.7.5.1 and 6.4).

3.3 Materials. Plugs (see 6.3.3), receptacles (see 6.3.2) and parts shall be made of materials specified on the applicable specification sheets and as specified herein.

3.3.1 Non-magnetic materials. Unless otherwise specified herein, all parts shall be of a non-ferrous material or a material generally considered to be non-magnetic; permeability shall be less than 2.0 nanometer (nm) (see 4.7.13).

3.3.2 Receptacle bodies. Receptacle bodies shall be of corrosion-resistant steel in accordance with class 316L of QQ-S-763, and shall be passivated in accordance with QQ-P-35.

3.3.2.1 Material certification. When specified (see 6.2.1), each receptacle shall be accompanied by documentary evidence in accordance with the data ordering document (see 4.6.1 and 6.2.2) that chemical and mechanical properties of the body material are in accordance with QQ-S-763, as verified by laboratory analysis.

3.3.3 Plug shells. Plug shells (see 6.3.4) shall be fabricated from corrosion-resistant steel in accordance with class 316 of QQ-S-763, and shall be passivated in accordance with QQ-P-35.

3.3.4 Coupling rings. Coupling rings (see 6.3.8) shall be fabricated from nickel aluminum bronze or copper aluminum alloy number 630 in accordance with QQ-C-465.

3.3.5 Socket contacts. Socket contact (see 6.3.7) material shall be in accordance with MIL-C-39029.

3.3.6 Pin contacts. Pin contacts (see 6.3.6) shall be made of a conductive material passing the electrical test specified herein. Contact surfaces shall be smooth, and shall be plated with a minimum 0.0002 inch thick hard gold finish over a minimum of 0.00005 inch of copper. Hard gold shall be considered gold alloy, 23 karat or greater, having a minimum knoop hardness of 110. An intermediate plating layer of nickel, in accordance with QQ-N-290, is acceptable.

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3.3.7 Thrust washers. Coupling ring (see 6.3.8) thrust washers shall be made from polyamide, in accordance with L-P-410.

3.3.8 Insulator retaining rings. Insulator retaining rings shall be made of class 302 corrosion-resistant steel in accordance with QQ-S-763.

3.3.9 Plug insulators. Plug insulators (see 6.3.5) shall be a molded glass filled diallyl phthalate material in accordance with type GDI-30F of MIL-M-14.

3.3.10 Pin contact insulation. Receptacle pin contact insulation shall be fabricated from insulation material passing the electrical tests specified herein. This material shall also provide a watertight seal passing the physical tests specified herein.

3.3.11 Protective caps. Protective caps shall be molded or machined from acrylo butadiene styrene, or alternate plastic or non-ferrous material. Marking of protective caps is not required. These caps are intended to maintain cleanliness and provide physical protection during handling and shipping and are not intended for pressure test applications.

3.3.12 Seal, plug to receptacle. Automatic squeeze type gaskets, such as O-rings, shall be molded of material in accordance with MIL-P-25732.

3.3.13 Contact gasket. Contact gasket seal material shall be molded from silicone in accordance with class 2b of ZZ-R-765 or poured in place using a clean room temperature vulcanizing (RTV) silicone.

3.3.14 Pressure proof receptacle caps. Pressure proof caps for receptacles shall be fabricated from corrosion-resistant steel in accordance with class 316 of QQ-S-763, and shall be passivated in accordance with QQ-P-35.

3.3.15 Pressure proof plug caps. Pressure proof caps for plugs shall be fabricated from corrosion-resisting steel in accordance with class 316 of QQ-S-763.

3.3.16 Recovered materials. Unless otherwise specified herein, all equipment, material, and articles incorporated in the products covered by this specification shall be new and shall 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 apposed 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 Design and construction. The design and construction of electrical connectors shall conform to the applicable specification sheet and the requirements specified herein.

3.4.1 General construction requirements. Unless otherwise specified on the applicable specification sheet, the general construction requirements shall be as follows:

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- (a) Tolerances:
- (1) Fractional dimension plus or minus 0.010 inch
 - (2) Decimal dimensions plus or minus 0.005 inch
 - (3) Angles plus or minus 1/2 degree
 - (4) Chamfer angles plus or minus 1 degree
- (b) Sharp corners and edges shall be rounded 0.005 to 0.010 inch.
- (c) Drilled and tapped holes shall have all burrs removed.
- (d) Unless otherwise specified on applicable specification sheets, machined surfaces shall have a roughness average (Ra) of 63 microinches maximum.
- (e) Machining of metal parts shall be accomplished before plating or other finish is applied.
- (f) Unless otherwise specified on the applicable specification sheet, threads shall be in accordance with FED-STD-H28. Threads shall be checked by means of ring and plug gages only in accordance with FED-STD-H28.
- (g) Surfaces in contact with automatic squeeze type gaskets (see 3.4.3.8) (such as O-ring) shall have a Ra of 32 microinches, maximum, finish. These surfaces shall be free of total marks, nicks and scratches.
- (h) Prior to welding or brazing, all parts shall be jugged or clamped to ensure proper alinement.
- (i) Cast or molded parts shall be free from cold shuts, blow holes or other imperfections. Surfaces shall have fins, flashing and burrs removed.

3.4.2 Contact design. Contacts shall be so designated that neither the pins nor the sockets will be damaged during mating of counterpart plugs and receptacles.

3.4.2.1 Solder type pin contacts. Pin contact solder cups shall be dimensioned as shown on figure 1.

3.4.2.2 Crimp type socket contacts. The socket contact crimp barrels shall be in accordance with MIL-C-39029, and MIL-C-39029/35 or MIL-C-39029/37.

3.4.3 Plug assembly. A plug assembly shall consist of plug shell, front insulator, rear insulator, retaining ring, socket contacts, coupling ring, thrust washer, O-ring gasket and plug protective cap.

3.4.3.1 Plug shell. The plug shell shall conform to design and dimensions specified on the applicable specification sheet.

3.4.3.2 Plug-receptacle polarization. Polarization of the plug with its receptacle shall be with the use of two integral keys in the receptacle and two keyways in the plug shell. Polarization shall conform to the applicable specification sheet.

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3.4.3.3 Front, middle and rear insulators. The insulators shall be constructed with proper sections and radii as specified on the applicable specification sheet, in order that insulators will not chip, crack or break at assembly or in service.

3.4.3.3.1 Front insulator. The front insulator shall be polarized to the plug shell by means of a shell key and a keyway in the insulator as specified on the applicable specification sheet.

3.4.3.4 Retaining ring. The insulators shall be held in position inside the plug shell by means of a retaining ring designed to fulfill its function.

3.4.3.5 Plug coupling ring. The plug coupling ring shall be designed as shown on the applicable specification sheet.

3.4.3.6 Plug protective and pressure proof caps. The plug protective and pressure proof caps shall be as specified on the applicable specification sheet.

3.4.3.7 Thrust washer. A thrust washer shall be provided as shown on the applicable specification sheet.

3.4.3.8 O-ring seals. Automatic squeeze type gaskets shall be provided and shall conform dimensionally as specified in SAE AS 568 or MS28775.

3.4.4 Receptacle. The receptacle design and dimensions shall be as shown on the applicable specification sheet. A receptacle assembly shall consist of a receptacle body, two polarizing keys, pin contacts, pin contact insulation, O-ring gasket, face seal and a protective cap.

3.4.4.1 Polarizing keys. Each receptacle shall be provided with two polarizing keys as shown on the applicable specification sheet or figure 2. The method of affixing and locating these keys shall in no way involve, at any stage of manufacture, a through drilling of the receptacle body.

3.4.4.2 Pin contact insulation. The pin contact insulation surface shall be smooth and have a glazed surface finish. It shall have a uniform surface free from porosity or blow holes. There shall be no cracks, pits or inclusions of voids or foreign material which would be detrimental to the electrical or watertight performance of the connector (as viewed with a 10-power microscope). The surface of the pin insulation shall not be recessed more than 1/32 inch below the web at any point, and shall be not more than 1/64 inch above the web at any point.

3.4.4.3 Face seal. The face seal shall be made as specified on the applicable specification sheet and shall be adhered to the web of the receptacle to accomplish its intended purpose.

3.4.4.4 Receptacle protective and pressure proof caps. The receptacle protective and pressure proof cap assemblies shall be as specified on the applicable specification sheet.

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3.4.5 Contact identification. The contact identification shall correspond to design and dimensions shown on the applicable specification sheet.

3.4.5.1 Pin contact identification. Pin contacts shall be identified on both sides of the web as specified on the applicable specification sheet. The markings shall be depressed or raised characters 0.050- to 0.070-inch high and not less than 0.003-inch deep.

3.4.5.2 Face seal identification. The contact identification on premolded face seals shall be on the top side and shall be raised or depressed markings which are 0.050- to 0.070-inch size and not less than 0.010-inch high. Markings shall not be required if clear poured gaskets are used.

3.4.5.3 Socket contact identification. The front insulator shall be marked on the front and back faces with 0.010- to 0.020-inch deep raised or depressed characters and 0.050- to 0.070-inch high. Depressed characters shall be filled with white paint.

3.4.5.4 Identification of product. The manufacturer's name or trademark, military part number and serial number shall appear on the outside diameter (o.d.) of the coupling ring and the receptacle. Markings shall be 0.050- to 0.130-inch high characters not less than 0.003-inch deep.

3.4.5.5 Identification of pressure proof caps. The pressure proof caps shall be identified and marked with the military part number, for example M24217/10-001, and the manufacturer's name or trademark.

3.4.6 Contact arrangement and spacing. Contact arrangement and spacing shall be as shown on the applicable specification sheet. Solder cups on the pin contacts shall be oriented to face in the direction parallel to the receptacle radial axis through the 0-degree receptacle polarizing key.

3.4.7 Lubrication of O-rings. O-rings shall be lubricated with a light film of silicone base lubricant in accordance with MIL-S-8660.

3.4.8 Interchangeability. Connectors and accessories having the same part number shall be completely interchangeable with each other with respect to installation (physical) and performance (function) as specified herein.

3.5 Performance.

3.5.1 Insulation resistance. When tested in accordance with 4.7.1, the insulation resistance shall be 5000 megohms or greater.

3.5.2 Contact resistance. When tested in accordance with 4.7.2, the potential drop between pin and socket contacts when assembled as in service shall be not greater at the applicable test current than that specified in table I.

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TABLE I. Contact potential drop.

Contact size	Test current (amperes)	Potential drop (millivolts, maximum)
16	13	55
12	23	55
8	46	30
4	80	18
0	150	15

3.5.3 Dielectric withstanding voltages. There shall be no evidence of breakdown or flashover when the pin contacts are subjected to a test voltage of 1880 volts alternating current (V.a.c.) root mean square (rms).

3.5.4 Durability. The connectors shall withstand the durability test as specified in 4.7.4. Counterpart connectors shall show no mechanical or electrical defects detrimental to the operation of the connector after 100 cycles of coupling and uncoupling.

3.5.5 Hydrostatic pressure-static. Connectors shall operate within a hydrostatic gage pressure range of zero to 10,000 lb/in². When tested as specified in 4.7.5, there shall be no evidence of mechanical damage, water leakage or impaired electrical characteristics.

3.5.6 Thermal shock. No damage detrimental to the operation of the connector shall be evident when the connector is subjected to the extremes of temperature specified in table II in accordance with 4.7.6.

TABLE II. Temperature extremes.

Extreme	Degrees Celsius (°C)
Low	+0
	-54 -5
High	+5
	+74 -0

3.5.7 Vibration. When tested in accordance with 4.7.7, mated connectors shall not be damaged and there shall be no loosening of parts. Counterpart connectors shall be retained in full engagement and there shall be no interruption of electrical continuity longer than 10 milliseconds (ms).

3.5.8 High impact shock. When tested in accordance with 4.7.8, unmated receptacles and mated connectors shall not be damaged.

3.5.9 Hydraulic shock. The hydraulic shock requirements for unmated receptacles and mated connectors (see 6.3.1) shall be as specified (see 6.2.1).

3.5.10 Hydrostatic gage pressure-cycling. When tested in accordance with 4.7.10, unmated receptacles and mated connector assemblies shall show no evidence of mechanical damage, water leakage or impaired electrical characteristics.

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3.5.11 Humidity. When tested in accordance with 4.7.11, unwired plug assemblies and unwired receptacles shall meet the requirements for insulation resistance as specified in 3.5.1.

3.5.12 Life. Wired connectors shall withstand the life test specified in 4.7.12.

3.6 Finish. Corrosion-resisting steel parts of the plug and receptacle assemblies shall have a passivated finish.

3.7 Workmanship. Connectors and accessories shall meet all design dimensions and intermateability 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 mated parts, nicks or burrs of metal parts and post molding warpage shall be the basis for rejection of items of 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 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 assure supplies and services conform to prescribed requirements.

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

- (a) First article inspection (see 4.4).
- (b) Quality conformance inspection (see 4.5).

4.3 Inspection conditions. Unless otherwise specified (see 6.2.1), examinations and tests required by this specification shall be conducted under any combinations of conditions within the ranges specified hereinafter.

Temperature	-	25 ± 5 degrees Celsius (°C)
Relative humidity	-	30 to 60 percent
Barometric pressure	-	27 to 31 inches of mercury

4.4 First article inspection. First article inspection shall consist of the examinations and tests performed in the sequence specified in table III. Control tests are invoked to detect failures that occur during the basic test. Unless a different sequence is specified in 4.7, the control tests shall be performed after the completion of each basic test as specified in table III.

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TABLE III. First article inspection.

Title	Requirement	Test	Control test	Receptacle	Wired and sealed bulkhead connector	Wired and sealed in-line or union connector
Examination of product	3.1, 3.3, 3.4, 3.6, 3.7	4.6	----	X	X	X
Insulation resistance	3.5.1	4.7.1	----	X	X	X
Contact resistance	3.5.2	4.7.2	----	X		
Dielectric withstanding voltage	3.5.3	4.7.3	----	X	X	X
Durability	3.5.4	4.7.4	4.7.1		X	X
Permeability	3.3.1	4.7.13	----	X	X	X
Hydrostatic pressure-static	3.5.5	4.7.5	4.7.1	X	X	X
Thermal shock	3.5.6	4.7.6	4.7.1	X	X	X
Vibration	3.5.7	4.7.7	4.7.1		X	X
High impact shock	3.5.8	4.7.8	4.7.1			
Hydraulic shock	3.5.9	4.7.9	4.7.1			
Hydrostatic gage pressure-cycling	3.5.10	4.7.10	4.7.1	X	X	X
Dielectric withstanding voltage	3.5.3	4.7.3	----	X	X	X
Humidity	3.5.11	4.7.11	4.7.1	X		
Contact resistance	3.5.2	4.7.2	----	X		
Life	3.5.12	4.7.12	4.7.1 and 4.7.5			

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4.4.1 First article samples. Six connector samples, of each size, shall be required for first article inspection, two for the unmated and four for the mated testing. One hundred percent excess socket contacts shall be required for wired tests. Samples shall have been manufactured by production tooling.

4.4.1.1 Wire-to-contact assembly. Where wired contacts are required, the union shall be formed as follows:

- (a) Solder contacts - Solder shall be in accordance with requirement 5 of MIL-STD-454.
- (b) Crimp contacts - A class 1 crimping tool in accordance with MIL-C-22520 shall be used.

4.4.1.2 Sample preparation. Six receptacle assemblies of each pin configuration shall be provided, together with counterpart plug assemblies, as follows:

- (a) Two receptacle assemblies of each size shall be wired with approximately 3 feet of wire of the nominal gage in accordance with MIL-W-16878 and MIL-W-16878/4.
- (b) One plug assembly of each size shall be wired, molded, and end-sealed using an appropriate cable (see 6.4).
- (c) The samples shall be subjected to appropriate tests in accordance with table III.

4.5 Quality conformance inspection. Quality conformance inspection shall consist of the examinations and tests in the sequence specified in table IV. Sampling shall be made on 100 percent of production parts.

TABLE IV. Quality conformance inspection.

No.	Title	Requirements	Test method	Unwired plug	Unwired receptacle	Control test
1.	Examination of product	3.1, 3.3, 3.4, 3.6, 3.7	4.6	X	X	----
2.	Insulation resistance	3.5.1	4.7.1		X	----
3.	Dielectric withstanding voltage	3.5.3	4.7.3		X	4.7.1
4.	Hydrostatic pressure-static	3.5.5	4.7.5.2		X	4.7.1

4.6 Examination. The connectors and accessories shall be examined to ensure conformance with this specification as follows:

- (a) Applicable specification sheet (see 3.1).
- (b) Materials (see 3.3).
- (c) Design and construction (see 3.4).
- (d) Identification of product (see 3.4.5.4).

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- (e) Interchangeability (see 3.4.8).
- (f) Finish (see 3.6).
- (g) Workmanship (see 3.7).

In-process controls of parts, unrelated to lot sizes of finished connectors, may be used in lieu of examination of these parts in the finished connectors to assure conformance of these component parts. Any defect shall be cause for rejection. Defects are as follows:

- (a) Inability to mate or unmate with counterpart.
- (b) Incorrect contact construction.
- (c) Poor contact finish.
- (d) Nonconformance with specification sheets.
- (e) Improper dimensions preventing sealing.
- (f) Defective front insulator.
- (g) Defective contact hole.
- (h) Incorrect markings.
- (i) Part missing.
- (j) Incorrect material.
- (k) Burrs capable of cutting O-rings or personnel.
- (l) Defects in pin contact insulation as specified in 3.4.4.2.

- (1) Rough glazed surface.
- (2) Surface porosity or blow holes.
- (3) Cracks or pits.
- (4) Inclusions of voids or foreign material.
- (5) Insulation raised more than 1/64 inch above web.
- (6) Insulation more than 1/32 inch below web.

- (m) Poor machining on seal surface.

4.6.1 Material certification records. A minimum of one sample from each heat of bar stock shall be analyzed. A serial number (see 3.4.5.4) assigned to each receptacle shall provide traceability to individual bar material. Material certification records (see 3.3.2.1) shall be in duplicate with one copy packed with each shipment (see 6.2.1), and the other retained on file by the contractor. Failure of the contractors to provide acceptable material certification (see 6.2.2) shall be cause for rejection of any items lacking such record.

4.7 Tests.

4.7.1 Insulation resistance. Connectors shall be tested in accordance with method 302, test condition B of MIL-STD-202 to determine conformance with 3.5.1. The resistance shall be measured between all adjacent pairs of contacts and between the metal housing and each contact.

4.7.2 Contact resistance. The contact resistance shall be measured as specified in MIL-C-39029.

4.7.3 Dielectric withstanding voltage. Mated and unmated connectors shall be tested in accordance with method 301 of MIL-STD-202. The applicable test voltage as specified in 3.5.3 shall be applied between all adjacent contacts and between all contacts and the metal housing.

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4.7.4 Durability. Counterpart connectors shall be mated and unmated 100 times at a rate of 50 ± 25 cycles per hour with the coupling rings operated in a manner to simulate actual service, without power applied.

4.7.5 Hydrostatic gage pressure test. The unmated receptacle and mated plug and receptacle assemblies shall be subjected to a hydrostatic pressure test as specified in 4.7.5.1 through 4.7.5.2.

4.7.5.1 Hydrostatic gage pressure test (first article inspection). The test receptacle assembly shall be mounted to a pressure vessel cover flange using the mounting methods shown on the applicable specification sheet. For the unmated receptacle test, the face of the receptacle web section shall be exposed to the pressure and completely filled with fresh water. The assembly shall then be tested in accordance with table V.

TABLE V. Hydrostatic gage pressure schedule.

Step	Gage pressure (lb/in ²)		Hold time (minutes)
	Low	High	
1	0	20	5
2	0	20	5
3	0	20	5
4	0	500	5
5	0	1000	5
6	0	2000	5
7	2000	3000	5
8	3000	4000	5
9	4000	5000	5
10	5000	6000	5
11	6000	7000	5
12	7000	8000	5
13	8000	9000	5
14	9000	10000	5

4.7.5.1.1 For the mated connector test, the plug shall be mated to the receptacle with the tools specified in this specification. The connector shall be wired as shown on figure 3. The cable shall be end-sealed at the open ends with an elastomeric compound such as neoprene or polyurethane. The connector assembly shall then be tested in accordance with table V.

4.7.5.1.2 Insulation resistance measurements shall be taken prior to and following the hydrostatic pressure tests of the unmated receptacle assembly. The receptacle shall be cleaned in the normal manner (see 6.7.1) following this test. For the mated connector test, insulation resistance readings shall be taken prior to, following step number 10 as specified in table V, and following the hydrostatic pressure test.

4.7.5.1.3 Following the pressure tests, the parts shall be examined (see 3.5.5) for leakage and mechanical damage.

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4.7.5.2 Hydrostatic gage pressure test (quality conformance inspection). Unless otherwise specified in the contract or order (see 6.2.1), the receptacle mating side of web section shall be exposed to fresh water pressure test of 6500 lb/in² for a period of 1 hour minimum.

4.7.6 Thermal shock. Receptacle assemblies and mated connectors shall be subjected to thermal shock tests as specified in method 107 of MIL-STD-202, with the test conditions as shown in table VI.

TABLE VI. Thermal shock test conditions.

Step	Temperature (°C)	Time (hours per pound)
1	- 54	1/2
2	+ 20 <u>+5</u>	---
3	+ 74	1/2
4	+ 20 <u>+5</u>	---

4.7.7 Vibration. Mated connectors shall be vibrated in accordance with test condition A, method 204 of MIL-STD-202 to determine conformance with 3.5.7. Contacts shall be wired in series as shown on figure 4, and shall be connected with a testing circuit. Any voltage or current within the connector rating shall be applied throughout the vibration test. The mated connector shall be held together by the normal locking device. Wires shall be supported on a stationary frame not closer than 8 inches from the connectors. The connector assembly shall be examined to determine that they have retained full engagement.

4.7.8 High impact shock. Mated connectors and unmated receptacles shall be tested in accordance with method 207 of MIL-STD-202. Three blows shall be applied in each direction of the three major axes of the connectors or receptacles. Receptacles shall be mounted on the shock device or carriage. For the mated connector tests, molded plugs shall be engaged to the receptacles and only held by normal locking means. Contacts shall be wired in series as shown on figure 4, and the cables or wire bundles shall be clamped to structures that move with the connectors. A minimum of 8 inches of cables shall be unsupported behind the rear of each connector. An instrument shall be employed to indicate any discontinuity exceeding 10 ms in the circuit.

4.7.9 Hydraulic shock. The unmated receptacle and mated, wired and molded connector assembly shall be subjected to hydraulic shock (see 3.5.9). Failure to pass this test shall be cause for rejection.

4.7.10 Hydrostatic gage pressure-cycling. The unmated receptacle and mated connector assembly shall be subjected to the hydrostatic pressure test in accordance with 4.7.5 and the cycling test schedule as shown in table VII.

TABLE VII. Hydrostatic gage pressure cycling schedule.

Step	Low (lb/in ²)	High (lb/in ²)	Hold time	Number of cycles
1	0	10,000	1 minute	25
2	0	10,000	24 hours	1

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4.7.11 Humidity. Unmated receptacles and plug assemblies shall be subjected to humidity test method 103, test condition A, in accordance with MIL-STD-202, except that the temperature shall be $73.8 \pm 15^{\circ}\text{C}$. Immediately after exposure and without forced drying, the individual assemblies shall be subjected to the insulation resistance test as specified in 4.7.1.

4.7.12 Life. A life test shall be conducted as follows: The two test samples shall consist of mated, wired and molded plugs and receptacles. Samples shall be visually examined for chips, cracks, tears, loose or missing parts, proper lubrication, proper assembly and matability. Parts which show degradation, wear or any other physical defects shall be replaced before testing. The receptacle shall be secured to a test plate in accordance with its intended application. The samples shall be wired with conductor sizes matching the contacts. Where possible, a single continuous circuit shall be established, as shown on figure 4, through the connector. The mated wired connectors shall be connected between a source and a load such that the circuit will carry rated voltage plus 10 percent, and 10 percent of the rated current (see table VIII).

TABLE VIII. Connector current - voltage ratings.

Contact size	Number of contacts	Rated voltage (Va.c.)	Rated current (amperes)
16	3	625	8
	5		7
	8		6
	9		
	14		
	24		
	37		4
	48		
12	3		15
	4		10
	5		
	9		8
8	3		40
4	2		70
0	2		100
	3		

4.7.12.1 The two test specimens shall be marked sample no. 1 and sample no. 2. With both samples initially at room temperature, subject sample no. 1 to cycle no. 1 and sample no. 2 to cycle no. 2 as specified in 4.7.12.1.1 and 4.7.12.1.2.

4.7.12.1.1 Cycle no. 1:

- (a) Initial chamber condition $20 \pm 5^{\circ}\text{C}$, 50 ± 5 percent relative humidity (RH) for 10 hours.
- (b) Within 1/2 hour change the chamber conditions to $74 \pm 5^{\circ}\text{C}$, 50 ± 5 percent RH and maintain this condition for the remainder of a 10-hour period.
- (c) Within 1/2 hour place the samples in a chamber at minus $54 \pm 5^{\circ}\text{C}$ and maintain this condition for the remainder of a 4-hour period.

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4.7.12.1.2 Cycle no. 2:

- (a) Submerge samples in synthetic seawater in accordance with ASTM D 1141 at room temperature at a gage pressure of 10,000 lb/in² \pm 5 percent for 23 hours.
- (b) Remove samples from the pressure vessel and allow to air-dry for 1 hour.

4.7.12.2 After each sample has completed one cycle as described herein, the no. 1 sample shall be unmated, remated and switched so no. 1 sample goes through the cycle 2 test and no. 2 sample goes through the cycle 1 test to provide a 48-hour test cycle. The transfer of samples shall be accomplished within the first hour. Provisions shall be made to remove power from connectors while they are being unmated and mated.

4.7.13 Permeability test. The receptacle assemblies and mated connectors shall be checked to determine conformance with a permeability indicator low- μ (go-no go) in accordance with MIL-I-17214.

4.8 Inspection of packaging. Sample packages and packs, and the inspection of the preservation-packaging, 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 preparation for delivery requirements specified herein apply only for direct Government acquisition. For the extent of applicability of the preparation for delivery requirements of referenced documents listed in section 2, see 6.8.)

5.1 Connector assemblies.

5.1.1 Preservation and packaging. Except as specified herein, for particular connector assembly parts, preservation and packaging which may be the contractors commercial practice, shall afford adequate protection against corrosion, deterioration and physical damage during shipment from the supply source to the using activity and until early installation. Connector assemblies or component parts shall be individually packaged.

5.1.1.1 Receptacles. Each receptacle shall be supplied with a plastic cap fitted over the solder pot end of the receptacle and a receptacle protective cap and O-ring shall be securely screwed to the receptacle threads, as specified in the applicable specification sheet (see 3.1). The shell barrel O-ring shall be separately packaged in accordance with method IA-8 of MIL-P-116.

5.1.1.1.1 Plug assembly. Each plug shall be furnished with a plastic cap fitted over the rear end of the plug shell and shall have a plug protective cap securely screwed into the coupling ring as specified on the applicable specification sheet (see 3.1). Plug parts shall be individually packaged and shipped disassembled.

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5.1.1.1.2 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. They 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 method of packing shall conform to the Uniform Freight Classification Ratings, Rules and Regulations 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 national stock number or manufacturer's part number, contract or order number, contractor's name, federal code numbers, year and quarter of manufacture and destination.

5.2 Domestic shipment and storage or overseas shipment. Unless otherwise specified in the contract order (see 6.2.1), the requirements and levels of preservation, packaging, packing and marking for shipment shall be as specified by the contracting activity.

5.2.1 The following provides various levels for protection during domestic shipment and storage or overseas shipment which may be required when acquisition is made (see 6.2.1).

5.2.1.1 Preservation and packaging, packing and marking. The equipment, accessories, repair parts and technical publications shall be preserved and packaged level A or C, packed level A, B or C as specified (see 6.2.1), and marked in accordance with MIL-E-17555.

6. NOTES

6.1 Intended use. Connectors described under this specification are used primarily on submarines outboard of the pressure hull. Receptacle assemblies must be installed in an approved hull fitting for penetration of the pressure hull.

6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

- (a) Title, number and date of this specification.
- (b) Type of connector required (see 1.2).
- (c) Title, number and date of the applicable specification sheet and the complete part number.
- (d) Whether first article inspection is required (see 3.2).
- (e) Material certification (see 3.3.2.1 and 4.6.1).
- (f) Hydraulic shock requirement (see 3.5.9).

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- (g) Test conditions if other than specified (see 4.3).
- (h) Hydrostatic pressure quality conformance test requirements if intended working pressure is to exceed 6500 lb/in² (see 4.7.5.2).
- (i) Level of preservation and packaging, packing and marking if other than specified in 5.1 (see 5.2).
- (j) Polarization requirements if other than specified on the applicable specification sheet (see figure 2).

6.2.2 Data requirements. When this specification is used in an acquisition which incorporates a DD Form 1423, Contract Data Requirements List (CDRL), the data requirements identified below shall be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved CDRL incorporated into the contract. When the provisions of FAR 52.227-7031 are invoked and the DD Form 1423 is not used, the data specified below shall be delivered by the contractor in accordance with the contract or purchase order requirements. Deliverable data required by this specification is cited in the following paragraph.

<u>Paragraph no.</u>	<u>Data requirement title</u>	<u>Applicable DID no.</u>	<u>Option</u>
3.3.2.1	Certification data for level I material	UDI-T-23191	----

(Data item descriptions related to this specification, and identified in section 6 will be approved and listed as such in DoD 5000.19L., Vol. II, AMSDL. Copies of data item descriptions required by the contractors in connection with specific acquisition functions should be obtained from the Naval Publications and Forms Center or as directed by the contracting officer.)

6.2.2.1 The data requirements of 6.2.2 and any task in sections 3, 4 or 5 of this specification required to be performed to meet a data requirement may be waived by the contracting/acquisition activity upon certification by the offeror that identical data were submitted by the offeror and accepted by the Government under a previous contract for identical item acquired to this specification. This does not apply to specific data which may be required for each contract regardless of whether an identical item has been supplied previously (for example, test reports).

6.3 Definitions.

6.3.1 Connector assembly. A complete connector assembly consists of one or more mated plugs and receptacle.

6.3.1.1 Bulkhead connector assembly. A bulkhead connector assembly consists of one plug and one bulkhead type receptacle.

6.3.1.2 Union connector assembly. A union connector assembly consists of two plugs and a union type receptacle.

6.3.1.3 In line connector assembly. An in line connector assembly consists of one plug and one in line receptacle.

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6.3.2 Receptacle. The receptacle is the portion of the connector which is fixed to a supporting surface by welding, flange and bolts, or flange and locking ring methods, and is provided with hermetically sealed pin contacts.

6.3.3 Plug. The plug is the part of the connector assembly which is removable after disengagement of the threaded coupling ring. It is provided with socket contacts.

6.3.4 Shell. A shell is a plug case into which the socket contacts and insulators are assembled.

6.3.5 Insulators (front-rear). The front insulator is the part of plug assembly which holds the socket contacts in the proper arrangement in the plug. The insulators electrically separate the conductors from each other and from the sleeve.

6.3.6 Pin contact. A pin contact is a male contact located in the receptacle.

6.3.7 Socket contact. The socket contact is the female contact located in the plug.

6.3.8 Coupling ring. A coupling ring is the threaded collar which secures the plug assembly to the receptacle assembly.

6.4 First article inspection. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection as 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.

6.5 The connectors of this specification will accommodate cables shown in table IX. This table is not all inclusive; other cables may be used at the discretion of the installing activity.

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TABLE IX. Cable range accommodations.

Cable type	Contact size	Conductor size	Conductor diameter (inches)	Cable specification sheet	Cable overall diameter (inches)	Number condition
DCOP-2	16	1-1/2 (16)	0.049	MIL-C-915/3	$\frac{0.310}{.330}$	2
DSS-2	16	2 (7)	.048	MIL-C-915/8	$\frac{.370}{.390}$	2-1S
DSS-3	16	3 (7)	.060	MIL-C-915/8	$\frac{.480}{.500}$	2-1S
FSS-2	16	2 (7)	.048	MIL-C-915/8	$\frac{.480}{.500}$	4-1S
7SS-2	16	2 (7)	.048	MIL-C-915/8	$\frac{.600}{.625}$	7-1S
MWF-7	16	#18	.050	MIL-C-915/58	$\frac{.480}{.500}$	7
MWF-10	16	#18	.050	MIL-C-915/58	$\frac{.605}{.635}$	10
MWF-14	16	#18	.050	MIL-C-915/58	$\frac{.605}{.635}$	14
MWF-24	16	#18	.050	MIL-C-915/58	$\frac{.800}{.836}$	24
TTOP-5	16	1 (10)	.038	MIL-C-915/24	.590	10
1SWF-2	16	22-7	.033	MIL-C-915/47	$\frac{.600}{.625}$	2-2S
2SU-14	16	22-7	.033	MIL-C-915/45	$\frac{.860}{.930}$	28-14S
2SWF-3	16	22-7	.033	MIL-C-915/48	$\frac{.600}{.625}$	6-3S
2SWF-4	16	22-7	.033	MIL-C-915/48	$\frac{.600}{.625}$	8-4S
2SWF-7	16	22-7	0.033	MIL-C-915/48	$\frac{0.780}{.815}$	14-7S
2SWU-1	16	#18	.050	MIL-C-915/49	$\frac{.240}{.255}$	2-1SS

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TABLE IX. Cable range accommodations. - Continued

Cable type	Contact size	Conductor size	Conductor diameter (inches)	Cable specification sheet	Cable overall diameter (inches)	Number condition
THOF-3	12	2-1/2 (26)	.061	MIL-C-915/6	<u>.430</u> .450	3
THOF-9	8	9 (90)	.120	MIL-C-915/9	<u>.570</u> .600	3
THOF-42	4	42 (209)	.260	MIL-C-915/9	<u>1.200</u> 1.250	3
DHOF-83	0	83 (418)	.380	MIL-C-915/6	<u>1.390</u>	2

6.6 Harness assemblies. Cable types, lengths, molded elastomeric plug boots, wiring and molding procedures, and so forth, are not covered by this specification (except to the extent required for quality assurance tests on the basic items (see section 4)). Requirements and quality assurance provisions for complete harness assemblies shall be the responsibility of the contracting or using activity.

6.7 Cleaning samples.

6.7.1 Normal cleaning. Where referred to, normal cleaning consists of washing salt contaminants first with warm distilled water when necessary. Excess water should be blown dry with dry air. The air may be warmed to 52°C. Next the component should be washed with clean alcohol and parts scrubbed with a small bristle brush. Excess alcohol should be blown dry with dry air. Normal cleaning should be used prior to control tests.

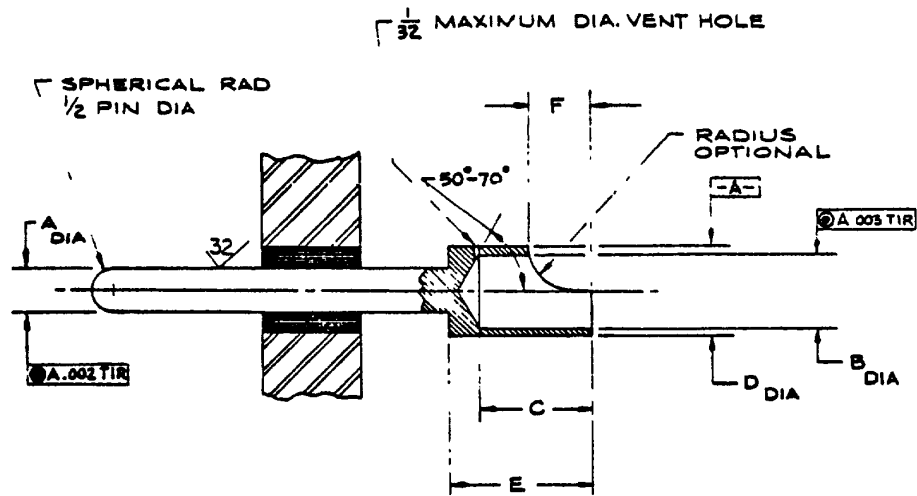
6.7.2 Abnormal cleaning. Air drying at temperatures elevated above 52°C and requiring more than three cycles as specified in 6.7.1 are considered abnormal, and should not be permitted.

6.8 Sub-contracted material and parts. The preparation for delivery 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.

6.9 Changes from previous issue. Asterisks 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-N246)

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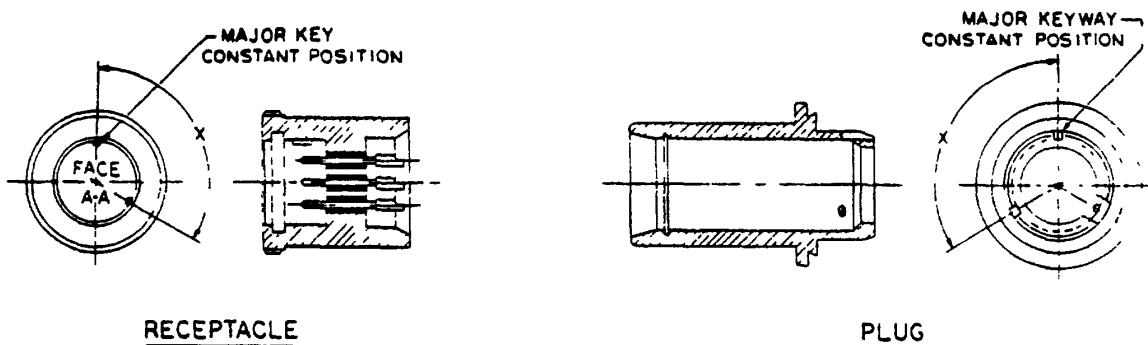
SH 12573

TABLE OF DIMENSIONS (INCHES)						
Pin contact size	A * Dia $\pm .001$	B Dia	C Dim	D Dia	E Dim	F Dim
16	0.0625	$\frac{0.069}{.073}$	$\frac{0.250}{.280}$	$\frac{0.108}{.116}$	$\frac{0.370}{.400}$	$\frac{0.156}{.187}$
12	.094	$\frac{.112}{.116}$	$\frac{.375}{.405}$	$\frac{.150}{.158}$	$\frac{.550}{.600}$	$\frac{.218}{.265}$
8	.142	$\frac{.205}{.209}$	$\frac{.500}{.530}$	$\frac{.252}{.260}$	$\frac{.650}{.700}$	$\frac{.296}{.359}$
4	.225	$\frac{.328}{.332}$	$\frac{.540}{.570}$	$\frac{.380}{.390}$	$\frac{.650}{.700}$	$\frac{.328}{.390}$
0	.357	$\frac{.464}{.469}$	$\frac{.540}{.570}$	$\frac{.546}{.554}$	$\frac{.650}{.700}$	$\frac{.328}{.390}$

* Dimensions "A" is measured after plating.

FIGURE 1. Solder type pins.

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RECEPTACLE

PLUG

SH 12574

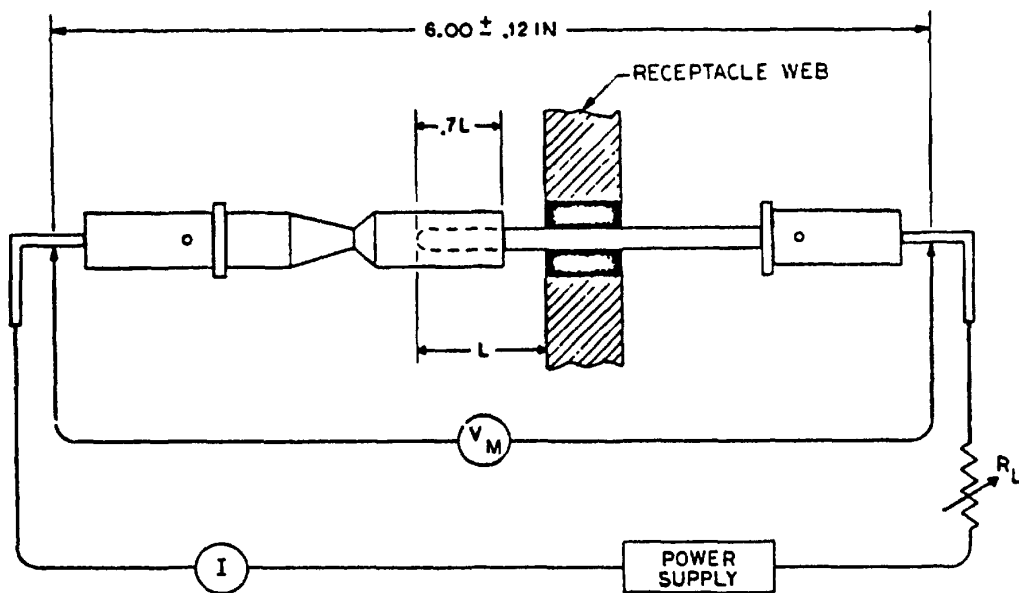
ALTERNATE CONNECTOR POLARIZATION				
No. of contacts and pin size	"X" degrees			
	-A	-B	-C	-D
3 no. 16	90°	135°	150°	165°
5 no. 16	90°	135°	150°	165°
9 no. 16	90°	135°	150°	165°
14 no. 16	90°	135°	150°	165°
24 no. 16	90°	135°	150°	165°
37 no. 16	90°	135°	150°	165°
48 no. 16	90°	135°	150°	165°
3 no. 12	90°	135°	150°	165°
5 no. 12	90°	135°	150°	165°
9 no. 12	90°	135°	150°	165°
3 no. 8	90°	135°	150°	165°
3 no. 4	90°	135°	150°	165°
3 no. 12	90°	135°	150°	165°
3 no. 8				
2 no. 0	90°	135°	150°	165°
4 no. 12				

NOTES:

- Standard receptacle or connector plug polarization is specified on the applicable specification sheet. Alternate polarization shall be specified in the contracting documents (see 6.2.1).
- Alternate polarization arrangements shall not be used unless specified in contract or order.
- Consult specification sheet MIL-C-24217/1 for location of major key for each contact arrangement.

FIGURE 2. Alternate connector polarization.

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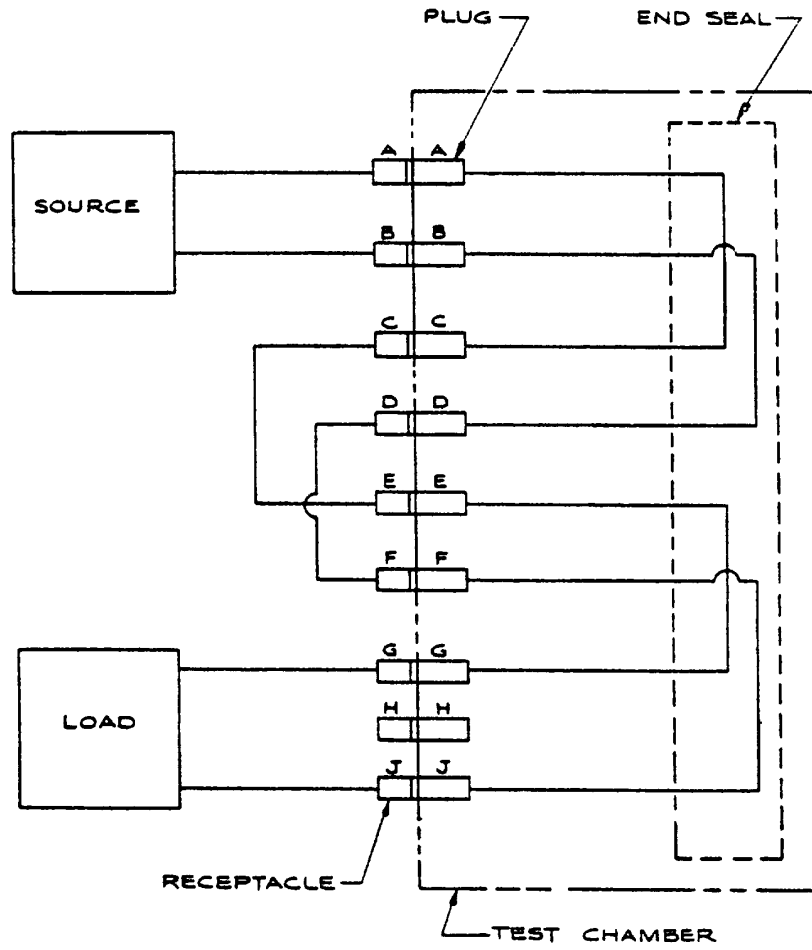


SH 12575

NOTE: Voltage-drop measurement connection points may be permanent connections and may be protected by potting or equivalent means. Dimensions are in inches.

FIGURE 3. Test circuit for measurement of contact resistance.

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SH12576

FIGURE 4. Life test circuit.

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APPENDIX

USAGE DATA

10. SCOPE

10.1 The purpose of this appendix is to show in tabular form the mating connectors and to list the electrical standard drawings which are superseded by this specification.

20. APPLICABLE DOCUMENT

This section is not applicable to this appendix.

30. USAGE

30.1 Table X provides a sequential listing of receptacles, plugs and pressure proof plug and receptacle covers by assembly part numbers. It also lists the superseded drawing and symbol numbers and provides a cross index by assembly part number to the mating connector.

30.2 Table XI is a cross-reference listing of the superseded symbol numbers and drawing numbers and their corresponding new assembly part numbers.

MIL-C-24217A(SH)
APPENDIXTABLE X. Cross index of receptacles, mating plugs, and pressure proof receptacle and plug covers.

Assembly part number symbol M24217/	Number of contacts	Description	Use or mate with M24217/	Supersedes	
				Drawing	Symbol
1-001	3 no. 16	Receptacle assembly (welded type)	7-001; 7-002; 8-001; 8-002	1197348	1241.1
1-002	5 no. 16		7-003; 7-004; 8-003; 8-004	1197349	1249
1-003	9 no. 16		7-005; 7-006; 8-005; 8-006	1197352	1253
1-004	14 no. 16		7-007; 7-008; 8-007; 8-008	1197353	1255
1-005	24 no. 16		7-009; 7-010; 8-009; 8-010	1197354	1251
1-006	37 no. 16		7-011; 7-012; 8-011; 8-012	1197398	1303
1-007	48 no. 16		7-013; 7-014; 8-013; 8-014	1197443	1295
1-008	3 no. 12		7-015; 8-015	1197410	1291
1-009	5 no. 12		7-016; 8-016	1197411	1293
1-010	9 no. 12		7-017; 8-017	1197419	1289
1-011	3 no. 8		7-018; 8-018	1197400	1283

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TABLE X. Cross index of receptacles, mating plugs, and pressure proof receptacle and plug covers. - Continued

Assembly part number M24217/	Number of contacts	Description	Use or mate with M242177	Supersedes	
				Drawing	Symbol
1-012	3 no. 4	Receptacle assembly (welded type)	7-019; 8-019	1197397	1281
1-013	3 no. 12 W 3 no. 8		7-020; 8-020	1197408	1287
1-014	2 no. 0 W 4 no. 12		7-021; 8-025	1197412	1285
1-015	5 no. 16 special		7-022; 7-023	1197377	1245
2-001	3 no. 16		Receptacle assembly (flanged-welded type)	7-001; 7-002; 8-001; 8-002	1197348
2-002	5 no. 16	7-003; 7-004; 8-003; 8-004		1197349	1249.1
2-003	9 no. 16	7-005; 7-006; 8-005 8-006		1197352	1253.1
2-004	14 no. 16	7-007; 7-008; 8-007; 8-008		1197353	1255.1
2-005	24 no. 16	7-009; 7-010; 8-009 8-010		1197354	1251.1

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APPENDIX

TABLE X. Cross index of receptacles, mating plugs, and pressure proof receptacle and plug covers. - Continued

Assembly part number M24217/	Number of contacts	Description	Use or mate with M24217/	Supersedes		
				Drawing	Symbol	
2-006	37 no. 16	Receptacle assembly (flanged- welded type)	7-011; 7-012; 8-011; 8-012 7-013; 7-014; 8-013; 8-014 7-015; 8-015 7-016; 8-016 7-017; 8-017 7-018; 8-018 7-019; 8-019 7-020; 8-020 7-021; 8-025	1197398	1303.1	
2-007	48 no. 16			1197443	1295.2	
2-008	3 no. 12			1197410	1291.2	
2-009	5 no. 12			1197411	1293.2	
2-010	9 no. 12			1197419	1289.2	
2-011	3 no. 8			1197400	1283.1	
2-012	3 no. 4			1197397	1281.2	
2-013	3 no. 12 W 3 no. 8			1197408	1287.2	
2-014	2 no. 0 W 4 no. 12			1197412	1285.2	
3-001	3 no. 16			Receptacle assembly (inline type)	1197437	1301
3-002	5 no. 16				11197437	1301.1

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APPENDIX

TABLE X. Cross index of receptacles, mating plugs, and pressure proof receptacle and plug covers. - Continued

Assembly part number M24217/	Number of contacts	Description	Use or mate with M24217/	Supersedes	
				Drawing	Symbol
3-003	9 no. 16	Receptacle assembly (inline type)	7-005; 7-006	1197437	1301.2
3-004	14 no. 16		7-007; 7-008	1197437	1301.3
3-005	24 no. 16		7-009; 7-010	1197437	1301.4
3-006	37 no. 16		7-011; 7-012	1197437	1301.5
3-007	48 no. 16		7-013; 7-014	1197437	1301.6
3-008	3 no. 12		7-015	1197437	1301.7
3-009	5 no. 12		7-016	1197437	1301.8
3-010	9 no. 12		7-017	1197437	1301.9
3-011	3 no. 8		7-018	1197437	1301.10
3-012	3 no. 4		7-019	1197437	1301.11
3-013	3 no. 12 W		7-020	1197437	1301.12
3-014	2 no. 0 W 4 no. 12		7-021	1197437	1301.13

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APPENDIX

TABLE X. Cross index of receptacles, mating plugs, and pressure proof receptacle and plug covers. - Continued

Assembly part number M24217/	Number of contacts	Description	Use or mate with M24217/	Supersedes	
				Drawing	Symbol
4-001	3 no. 16	Receptacle assembly (mid-flanged bolted type)	7-001; 7-002; 8-001; 8-002	1197444	1300
4-002	5 no. 16		7-003; 7-004; 8-003; 8-004	1197444	1300.1
4-003	9 no. 16		7-005; 7-006; 8-005; 8-006	1197444	1300.2
4-004	14 no. 16		7-007; 7-008; 8-007; 8-008	1197444	1300.3
4-005	24 no. 16		7-009; 7-010; 8-009; 8-010	1197444	1300.4
4-006	37 no. 16		7-011; 7-012; 8-011; 8-012	1197444	1300.5
4-007	48 no. 16		7-013; 7-014; 8-013; 8-014	1197444	1300.6
4-008	3 no. 12		7-015; 8-015	1197444	1300.11
4-009	5 no. 12		7-016; 8-016	1197444	1300.9
4-010	9 no. 12		7-017; 8-017	1197444	1300.7
4-011	3 no. 8		7-018; 8-018	1197444	1300.10

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TABLE X. Cross index of receptacles, mating plugs, and pressure proof receptacle and plug covers. - Continued

Assembly part number M24217/	Number of contacts	Description	Use or mate with M24217/	Supersedes	
				Drawing	Symbol
4-012	3 no. 4	Receptacle assembly (mid-flanged, bolted type)	7-019; 8-019	1197444	1300.12
4-013	3 no. 12 W 3 no. 8		7-020; 8-020	1197444	1300.13
4-014	2 no. 0 W 4 no. 12		7-021; 8-025	1197444	1300.8
5-001	3 no. 16	Receptacle assembly (end flanged, bolted type)	7-001; 7-002; 8-001; 8-002	1197445	1299
5-002	5 no. 16		7-003; 7-004; 8-003 8-004	1197445	1299.1
5-003	9 no. 16		7-005; 7-006; 8-005; 8-006	1197445	1299.2
5-004	14 no. 16		7-007; 7-008; 8-007; 8-008	1197445	1299.3
5-005	24 no. 16		7-009; 7-010; 8-009; 8-010	1197445	1299.4
5-006	37 no. 16		7-011; 7-012; 8-011; 8-012		

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TABLE X. Cross index of receptacles, mating plugs, and pressure proof receptacle and plug covers. - Continued

Assembly part number M24217/	Number of contacts	Description	Use or mate with M24217/	Supersedes		
				Drawing	Symbol	
5-007	48 no. 16	Receptacle assembly (end flanged, bolted type)	7-013; 7-014; 8-013 8-014	1197445	1299.6	
5-008	3 no. 12		7-015; 8-015	1197445	1299.11	
5-009	5 no. 12		7-016; 8-016	1197445	1299.9	
5-010	9 no. 12		7-017; 8-017	1197445	1299.7	
5-011	3 no. 8		7-018; 8-018	1197445	1299.10	
5-012	3 no. 4		7-019; 8-019	1197445	1299.12	
5-013	3 no. 12 W		7-020; 8-020	1197445	1299.13	
5-014	2 no. 0 W 4 no. 12		7-021; 8-025	1197445	1299.8	
6-001	3 no. 16		Receptacle assembly (locknut, flanged type)	7-001; 7-002; 8-001; 8-002	1197434	1298
6-002	5 no. 16			7-003; 7-004; 8-003; 8-004	1197434	1298.1
6-003	9 no. 16			7-005; 7-006; 8-005; 8-006	1197434	1298.2

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TABLE X. Cross index of receptacles, mating plugs, and pressure proof receptacle and plug covers. - Continued

Assembly part number M24217/	Number of contacts	Description	Use or mate with M24217/	Supersedes	
				Drawing	Symbol
6-004	14 no. 16	Receptacle assembly (locknut, flanged type)	7-007; 7-008; 8-007; 8-008	1197434	1298.3
6-005	24 no. 16		7-009; 7-010; 8-009; 8-010	1197434	1298.4
6-006	37 no. 16		7-011; 7-012; 8-011; 8-012	1197434	1298.5
6-007	48 no. 16		7-013; 7-014; 8-013; 8-014	1197434	1298.6
6-008	3 no. 12		7-015; 8015	1197434	1298.7
6-009	5 no. 12		7-016; 8-016	1197434	1298.8
6-010	9 no. 12		7-017; 8-017	1197434	1298.9
6-011	3 no. 8		7-018; 8-018	1197434	1298.10
6-012	3 no. 4		7-019; 8-019	1197434	1298.11
6-013	3 no. 12 W		7-020; 8-020	1197434	1298.12
6-014	2 no. 0 W		7-021; 8-025	1197434	1298.13
6-015	4 no. 12 8 no. 16		8-021	1197376	1244

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TABLE X. Cross index of receptacles, mating plugs, and pressure proof receptacle and plug covers. - Continued

Assembly part number M24217/	Number of contacts	Description	Use or mate with M24217/	Supersedes	
				Drawing	Symbol
7-001	3 no. 16	Plug assembly (straight)	1-001; 2-001 3-001; 4-001 5-001; 6-001; 11-001; 12-001	1197348	1240.1 1240.2
7-002					
7-003	5 no. 16		1-002; 2-002; 3-002; 4-002; 5-002; 6-002; 11-002; 12-002; 13-001	1197349	1248.2 1248
7-004					
7-005	9 no. 16		1-003; 2-003; 3-003; 4-003 5-003; 6-003; 11-003; 12-003	1197352	1252.1 1252
7-006					
7-007	14 no. 16		1-004; 2-004; 3-004; 4-004; 5-004; 6-004; 11-004; 12-004; 13-002	1197353	1254.2 1254
7-008					
7-009	24 no. 16		1-005; 2-005; 3-005; 4-005 5-005; 6-005; 11-005	1197354	1250.1 1250
7-010					
7-011	37 no. 16		1-006; 2-006; 3-006; 4-006; 5-006; 6-006 11-006	1197398	1302.1 1302
7-012					

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APPENDIXTABLE X. Cross index of receptacles, mating plugs, and pressure proof receptacle and plug covers. - Continued

Assembly part number M24217/	Number of contacts	Description	Use or mate with M24217/	Supersedes	
				Drawing	Symbol
7-013	48 no. 16	Plug assembly (straight)	1-007; 2-007 3-007; 4-007; 5-007; 6-007 11-007	1197433	1294.1
7-014					
7-015	3 no. 12		1-008; 2-008; 3-008; 4-008; 5-008; 6-008; 11-008; 13-003	1197410	1290
7-016	5 no. 12		1-009; 2-009; 3-009; 4-009; 5-009; 6-009; 11-009	1197411	1292
7-017	9 no. 12		1-010; 2-010; 3-010; 4-010; 5-010; 6-010;	1197419	1288
7-018	3 no. 8		1-011; 2-011; 3-011; 4-011; 5-011; 6-011; 11-011	1197400	1282
7-019	3 no. 4		1-012; 2-012; 3-012; 4-012; 5-012; 6-012; 11-012	1197397	1280

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TABLE X. Cross index of receptacles, mating plugs, and pressure proof receptacle and plug covers. - Continued

Assembly part number M24217/	Number of contacts	Description	Use or mate with M24217/	Supersedes	
				Drawing	Symbol
7-020	3 no. 12	Plug assembly (straight)	11-013	1197408	1286
	W				
	3 no. 8				
	2 no. 0				
7-021	W		1-013; 2-013; 3-013; 4-013; 5-013; 6-013		
	4 no. 12		1-014; 2-014; 3-014; 4-014; 5-014; 6-014; 11-014	1197412	1284
	5 no. 16 special		1-015	1197377	1245.1 1245.2
7-023					
8-001	3 no. 16	Plug assembly (right angle)	1-001; 2-001; 4-001; 5-001; 6-001; 11-001; 12-001	1197348	1240.3
8-002	5 no. 16		1-002; 2-002; 4-002; 5-002; 6-002; 11-002; 12-002; 13-001	1197349	1248.3 1248.1
8-003					
8-004					

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APPENDIXTABLE X. Cross index of receptacles, mating plugs, and pressure proof receptacle and plug covers. - Continued

Assembly part number M24217/	Number of contacts	Description	Use or mate with M24217/	Supersedes		
				Drawing	Symbol	
8-005	9 no. 16	Plug assembly (right angle)	1-003; 2-003; 4-003; 5-003; 6-003; 11-003; 12-003 1-004; 2-004; 4-004; 5-004; 6-004; 11-004; 12-004; 13-002 1-005; 2-005; 4-005; 5-005; 6-005; 11-005 1-006; 2-006; 4-006; 5-006; 6-006; 11-006 1-007; 2-007; 4-007; 5-007; 6-007; 11-007 1-008; 2-008; 4-008; 5-008; 6-008; 11-008; 13-003 1-009; 2-009; 4-009; 5-009; 6-009; 11-009	1197352	1252.2 1252.3	
8-006						
8-007	14 no. 16				1197353	1254.3 1254.1
8-008					1197463	1311
8-009	24 no. 16				1197354	1250.2 1250.3
8-010						
8-011	37 no. 16				1197398	1302.3 1302.2
8-012						
8-013	48 no. 16					
8-014						
8-015	3 no. 12					
8-016	5 no. 12					

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TABLE X. Cross index of receptacles, mating plugs, and pressure proof receptacle and plug covers. - Continued

Assembly part number M24217/	Number of contacts	Description	Use or mate with M24217/	Supersedes	
				Drawing	Symbol
8-017	9 no. 12	Plug assembly (right angle)	1-010; 2-010; 4-010; 5-010; 6-010; 11-010	—	—
8-018	3 no. 8		1-011; 2-011; 4-011; 5-011; 6-011; 11-011	1197400	1282.1
8-019	3 no. 4		1-012; 2-012; 4-012; 5-012; 6-012; 11-012	—	—
8-020	3 no. 12 W		1-013; 2-013 4-013; 5-013; 6-013; 11-013	—	—
8-021	8 no. 16		6-015	1197376	1244.1
8-022	14 no. 16 special		13-002	1197463	1311.3
8-025	2 no. 0 W		1-014; 2-014; 4-014; 5-014; 6-014; 11-014	1197412	1284.1
8-026	3 no. 0 style A		13-004	1197462	1309

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TABLE X. Cross index of receptacles, mating plugs, and pressure proof receptacle and plug covers. - Continued

Assembly part number M24217/	Number of contacts	Description	Use or mate with M24217/	Supersedes	
				Drawing	Symbol
8-027	3 no. 0 style B	Plug assembly (right angle)	13-005	1197462	1309.4
8-028	3 no. 0 style C		13-004	1197462	1309.3
8-029	3 no. 0 style D		13-005	1197462	1309.7
9-001	3 no. 16 5 no. 16 (special)	Plug cap assembly (pressure proof)	7-001; 7-002; 7-022; 7-023; 8-001; 8-002; 14-001; 14-002; 15-001; 15-002	1197407	1296
9-002	5 no. 16		7-003; 7-004; 8-003; 8-004; 14-003; 14-004; 15-003; 15-004	1197407	1296.1
9-003	9 no. 16, 3 no. 12		7-005; 7-006; 7-015; 8-005; 8-006; 8-015; 14-005; 14-006; 14-015; 15-005; 15-006; 15-015	1197407	1296.2

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TABLE X. Cross index of receptacles, mating plugs, and pressure proof receptacle and plug covers. - Continued

Assembly part number M24217/	Number of contacts	Description	Use or mate with M24217/	Supersedes	
				Drawing	Symbol
9-004	14 no. 16, 5 no. 12, 3 no. 8 14 no. 16 (special)	Plug cap assembly (pressure proof)	7-007; 7-008; 7-016; 7-018; 8-007; 8-008; 8-016; 8-018; 14-007; 14-008; 14-016; 14-018; 15-007; 15-008; 15-016; 15-018	1197407	1296.3
9-005	24 no. 16, 3 no. 4, 9 no. 12, 3 no. 8, W 3 no. 12		7-009; 7-010; 7-017; 7-019; 7-020; 8-009; 8-010; 8-017; 8-019; 8-020; 14-009; 14-010; 14-017; 14-019; 14-020; 15-009; 15-010; 15-017; 15-019; 15-020	1197407	1296.4
9-006	37 no. 16 2 no. 0 W 4 no. 12		7-011; 7-012; 7-021; 8-011; 8-012; 8-025; 14-011; 14-012; 14-021; 15-011; 15-012; 15-025	1197407	1296.5
9-007	48 no. 16		7-013; 7-014; 8-013; 8-014; 14-013; 14-014; 15-013; 15-014	1197407	1296.6

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TABLE X. Cross index of receptacles, mating plugs, and pressure proof receptacle and plug covers. - Continued

Assembly part number M24217/	Number of contacts	Description	Use or mate with M24217/	Supersedes		
				Drawing	Symbol	
9-008	8 no. 16	Plug cap assembly (pressure proof)	8-021	1197462	Pc 36	
9-009	3 no. 0		8-026; 8-027; 8-028; 8-029; 15-026; 15-029			
10-001	3 no. 16	Receptacle cover assembly (pressure proof)	1-001; 2-001; 3-001; 4-001; 5-001; 6-001; 11-001; 12-001	1197406	1297	
10-002	5 no. 16		1-002; 2-002; 3-002; 4-002; 5-002; 6-002; 11-002; 12-002; 13-001			1297.1
10-003	9 no. 16		1-003; 2-003; 3-003; 4-003; 5-003; 6-003; 11-003; 12-003			1297.2
10-004	14 no. 16		1-004; 2-004; 3-004; 4-004; 5-004; 6-004; 11-004; 12-004; 13-002	1197406	1297.3	

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TABLE X. Cross index of receptacles, mating plugs, and pressure proof receptacle and plug covers. - Continued

Assembly part number M24217/	Number of contacts	Description	Use or mate with M24217/	Supersedes	
				Drawing	Symbol
10-005	24 no. 16	Receptacle cover assembly (pressure proof)	1-005; 2-005; 3-005; 4-005; 5-005; 6-005; 11-005	1197406	1297.4
10-006	37 no. 16		1-006; 2-006; 3-006; 4-006; 5-006; 6-006; 11-006	1197406	1297.5
10-007	48 no. 16		1-007; 2-007; 3-007; 4-007; 5-007; 6-007; 11-007	1197406	1297.6
10-008	3 no. 12		1-008; 2-008; 3-008; 4-008; 5-008; 6-008; 11-008; 13-003	1197406	1297.7
10-009	5 no. 12, 3 no. 8		1-009; 1-011; 2-009; 2-011; 3-009; 3-011; 4-009; 4-011; 5-009; 5-011; 6-009; 6-011; 11-009; 11-011	1197406	1297.8

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APPENDIXTABLE X. Cross index of receptacles, mating plugs, and pressure proof receptacle and plug covers. - Continued

Assembly part number M24217/	Number of contacts	Description	Use or mate with M24217/	Supersedes	
				Drawing	Symbol
10-010	9 no. 12, 3 no. 4, 3 no. 12, W 3 no. 8	Receptacle cover assembly (pressure proof)	1-010; 1-012; 1-013; 2-010; 2-012; 2-013; 3-010; 3-012; 3-013; 4-010; 4-012; 4-013; 5-010; 5-012; 5-013; 6-010; 6-012; 6-013; 11-010; 11-012; 11-013	1197406	1297.9
10-011	2 no. 0 W 4 no. 12		1-014; 2-014; 3-014; 4-014; 5-014; 6-014; 11-014 6-015	1197406	1297.10
10-012	8 no. 16				
10-013	3 no. 0		13-004; 13-005	1197462	Pc 35
11-001	3 no. 16	Receptacle assembly (union type)	7-001 or 7-002 and 14-001 or 14-002; 8-001 or 8-002 and 15-001 or 15-002	1197450	1304

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TABLE X. Cross index of receptacles, mating plugs, and pressure proof receptacle and plug covers. - Continued

Assembly part number M24217/	Number of contacts	Description	Use or mate with M24217/	Supersedes	
				Drawing	Symbol
11-002	5 no. 16	Receptacle assembly (union type)	7-003 or 7-004 and 14-003 or 14-004; 8-003 or 8-004 and 15-003 or 15-004	1197450	1304.1
11-003	9 no. 16		7-005 or 7-006 and 14-005 or 14-006; 8-005 or 8-006 and 15-005 or 15-006	1197450	1304.2
11-004	14 no. 16		7-007 or 7-008 and 14-007 or 14-008; 8-007 or 8-008 and 15-007 or 15-008	1197450	1304.3
11-005	24 no. 16		7-009 or 7-010 and 14-009 or 14-010; 8-009 or 8-010 and 15-009 or 15-010	1197450	1304.4
11-006	37 no. 16		7-011 or 7-012 and 14-011 or 14-012; 8-011 or 8-012 and 15-011 or 15-012	1197450	1304.5
11-007	48 no. 16		7-013 or 7-014 and 14-013 or 14-014; 8-013 or 8-014 and 15-013 or 15-014	1197450	1304.6

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TABLE X. Cross index of receptacles, mating plugs, and pressure proof receptacle and plug covers. - Continued

Assembly part number M24217/	Number of contacts	Description	Use or mate with M24217/	Supersedes		
				Drawing	Symbol	
11-008	3 no. 12	Receptacle assembly (union type)	7-015 and 14-015; 8-015 and 15-015	1197450	1304.7	
11-009	5 no. 12		7-016 and 14-016; 8-016 and 15-016	1197450	1304.8	
11-010	9 no. 12		7-017 and 14-017; 8-017 and 15-017	2297450	1304.9	
11-011	3 no. 8		7-018 and 14-018; 8-018 and 15-018	1197450	1304.10	
11-012	3 no. 4		7-019 and 14-019; 8-019 and 15-019	1197450	1304.11	
11-013	3 no. 8 W 3 no. 12		7-020 and 14-020 8-020 and 15-020	1197450	1304.12	
11-014	2 no. 0 W 4 no. 12		7-021 and 14-021; 8-025 and 15-025	1197450	1304.13	
12-001	3 no. 16		Receptacle assembly (mid-flanged, bolted, union type)	7-001 or 7-002 and 14-001 or 14-002; 8-001 or 8-002 and 15-001 or 15-002	1197509	Pc 1

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TABLE X. Cross index of receptacles, mating plugs, and pressure proof receptacle and plug covers. - Continued

Assembly part number M24217/	Number of contacts	Description	Use or mate with M24217/	Supersedes	
				Drawing	Symbol
12-002	5 no. 16	Receptacle assembly (mid-flanged, bolted, union type)	7-003 or 7-004 and 14-003 or 14-004; 8-003 or 8-004 and 15-003 or 15-004	1197509	Pc 2
12-003	9 no. 16		7-005 or 7-006 and 14-005 or 14-006; 8-005 or 8-006 15-005 or 15-006	1197509	Pc 3
12-004	14 no. 16		7-007 or 7-009 and 14-007 or 14-008 8-007 or 8-008 and 15-007 or 15-008	1197509	Pc 4
13-001	5 no. 16	Receptacle assembly (mid-flange, locknut, union type)	7-003 or 7-004 and 14-003 or 14-004; 8-003 or 8-004 15-003 or 15-004	1197465	1305
13-002	14 no. 16		8-007 or 8-008 and 15-007 or 15-021; 8-022 and 15-007 or 15-021	1197463	1310
13-003	3 no. 12		7-015 or 8-015 and 15-022	1197461	1306
13-004	3 no. 0 120 degree key		8-026 or 8-028 and 15-026 or 15-028	1197462	1308

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TABLE X. Cross index of receptacles, mating plugs, and pressure proof receptacle and plug covers. - Continued

Assembly part number M24217/	Number of contacts	Description	Use or mate with M24217/	Supersedes		
				Drawing	Symbol	
13-005	3 no. 0 150 degree key	Receptacle assembly (mid-flange, locknut, union type)	8-027 or 8-029 and 15-027 or 15-029	1197462	1308.1	
14-001 14-002	3 no. 16	Union plug assemblies, straight	11-001; 12-001	1197511	Pc 1 Pc 2	
14-003 14-004	5 no. 16		11-002; 12-002; 13-001	1197511		Pc 3 Pc 4
14-005 14-006	9 no. 16		11-003; 12-003	1197511		Pc 5 Pc 6
14-007 14-008	14 no. 16		11-004; 12-004; 13-002	1197511		Pc 7 Pc 8
14-009 14-010	24 no. 16		11-005	1197511		Pc 9 Pc 10
14-011 14-012	37 no. 16		11-006			
14-013 14-014	48 no. 16		11-007			
14-015	3 no. 12		11-008			
14-016	5 no. 12		11-009			

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TABLE X. Cross index of receptacles, mating plugs, and pressure proof receptacle and plug covers. - Continued

Assembly part number M24217/	Number of contacts	Description	Use or mate with M24217/	Supersedes	
				Drawing	Symbol
14-017	9 no. 12	Union plug assemblies, straight	11-010	_____	_____
14-018	3 no. 8		11-011	_____	_____
14-019	3 no. 4		11-012	_____	_____
14-020	3 no. 12		11-013	_____	_____
	W				
14-021	3 no. 8				
	2 no. 0				
	W				
	4 no. 12		11-014	_____	_____
15-001	3 no. 16	Union plug assemblies, right angle	11-001; 12-001	1197511	Pc 1 Pc 2
15-002					
15-003	5 no. 16		11-002; 12-002; 13-001	1197511	Pc 3
15-004					
15-005	9 no. 16		11-003; 12-003	1197511	Pc 5 Pc 6
15-006					
15-007	14 no. 16		11-004; 12-004; 13-002	1197463 1197511	1311.1 Pc 7 Pc 8
15-008					

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Assembly part number M24217/	Number of contacts	Description	Use or mate with M24217/	Supersedes	
				Drawing	Symbol
15-009 15-010	24 no. 16	Union plug assemblies, right angle	11-005	1197511	Pc 9 Pc 10
15-011	37 no. 16		11-006	_____	_____
15-013 15-014	48 no. 16		11-007	_____	_____
15-015	3 no. 12		11-008	_____	_____
15-016	5 no. 12		11-009	_____	_____
15-017	9 no. 12		11-010	_____	_____
15-018	3 no. 8		11-011	_____	_____
15-019	3 no. 4		11-012	_____	_____
15-020	3 no. 12 W 3 no. 8		11-013	_____	_____
15-021	14 no. 16 (special)		13-002	1197463	1311.2
15-022	3 no. 12 (special)		13-003	1197461	1307

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TABLE X. Cross index of receptacles, mating plugs, and pressure proof receptacle and plug covers. - Continued

Assembly part number M24217/	Number of contacts	Description	Use or mate with M24217/	Supersedes	
				Drawing	Symbol
15-025	2 no. 0 W 4 no. 12	Union plug assemblies, right angle	11-014	—	—
15-026	3 no. 0 style E		13-004	1197462	1309.1
15-027	3 no. 0 style F		13-005	1197462	1309.5
15-028	3 no. 0 style G		13-004	1197462	1309.2
15-029	3 no. 0 style H		13-005	1197462	1309.6

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TABLE XI. Cross index of symbol or drawing number to assembly part number.

Symbol number	Assembly part number M24217/
1240.1	7-001
1240.2	7-002
1240.3	8-002
1241.1	1-001
1242.1	2-001
1240.3	8-001
1244	6-015
1244.1	8-021
1245	1-015
1245.1	7-022
1245.2	7-023
1248	7-004
1248.1	8-004
1248.2	7-003
1248.3	8-003
1249	1-002
1249.1	2-002
1250	7-010
1250.1	7-009
1250.2	8-009
1250.3	8-010
1251	1-005
1251.1	2-005
1252	7-006
1252.1	7-005
1252.2	8-005
1252.3	8-006
1253	1-003
1253.1	2-003
1254	7-008
1254.1	8-008
1254.2	7-007
1254.3	8-007
1255	1-004
1255.1	2-004
1280	7-019
1281	1-012
1281.2	2-012
1282	7-018
1282.1	8-018
1283	1-011
1283.1	2-011

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TABLE XI. Cross index of symbol or drawing number to assembly part number. - Continued

Symbol number	Assembly part number M24217/
1284	7-021
1284.1	8-025
1285	1-014
1285.2	2-014
1286	7-020
1287	1-013
1287.2	2-013
1288	7-017
1289	1-010
1289.2	2-010
1290	7-015
1291	1-008
1291.2	2-008
1292	7-016
1293	1-009
1293.2	2-009
1294	7-014
1294.1	7-013
1295	1-007
1295.2	2-007
1296	9-001
1296.1	9-002
1296.2	9-003
1296.3	9-004
1296.4	9-005
1296.5	9-006
1296.6	9-007
1297	10-001
1297.1	10-002
1297.2	10-003
1297.3	10-004
1297.4	10-005
1297.5	10-006
1297.6	10-007
1297.7	10-008
1297.8	10-009
1297.9	10-010
1297.10	10-011
1298	6-001
1298.1	6-002
1298.2	6-003
1298.3	6-004
1298.4	6-005
1298.5	6-006
1298.6	6-007
1298.7	6-008

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TABLE XI. Cross index of symbol or drawing number to assembly part number. - Continued

Symbol number	Assembly part number M24217/
1298.8	6-009
1298.9	6-010
1298.10	6-011
1298.11	6-012
1298.12	6-013
1298.13	6-014
1299	5-001
1299.1	5-002
1299.2	5-003
1299.3	5-004
1299.4	5-005
1299.5	5-006
1299.6	5-007
1299.7	5-010
1299.8	5-014
1299.9	5-009
1299.10	5-011
1299.11	5-008
1299.12	5-012
1299.13	5-013
1300	4-001
1300.1	4-002
1300.2	4-003
1300.3	4-004
1300.4	4-005
1300.5	4-006
1300.6	4-007
1300.7	4-010
1300.8	4-014
1300.9	4-009
1300.10	4-011
1300.11	4-008
1300.12	4-012
1300.13	4-013
1301	3-001
1301.1	3-002
1301.2	3-003
1301.3	3-004
1301.4	3-005
1301.5	3-006
1301.6	3-007
1301.7	3-008
1301.8	3-009
1301.9	3-010
1301.10	3-011

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TABLE XI. Cross index of symbol or drawing number to assembly part number. - Continued

Symbol number	Assembly part number M24217/
1301.11	3-012
1301.12	3-013
1301.13	3-014
1302	7-012
1302.1	7-011
1302.2	8-012
1302.3	8-011
1303	1-006
1303.1	2-006
1304	11-001
1304.1	11-002
1304.2	11-003
1304.3	11-004
1304.4	11-005
1304.5	11-006
1304.6	11-007
1304.7	11-008
1304.8	11-009
1304.9	11-010
1304.10	11-011
1304.11	11-012
1304.12	11-013
1304.13	11-014
1305	13-001
1306	13-003
1307	15-022
1308	13-004
1308.1	13-005
1309	8-026
1309.1	15-026
1309.2	15-028
1309.3	8-028
1309.4	8-027
1309.5	15-027
1309.6	15-029
1309.7	8-029
1310	13-002
1311	8-007
1311.1	15-007
1311.2	15-021
1311.3	8-022

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TABLE XI. Cross index of symbol or drawing number to assembly part number. - Continued

Symbol number (drawing and picture or piece number)	Assembly part number M24217/	
1197462-35	10-013	
1197462-36	9-009	
1197509-1	12-001	
1197509-2	12-002	
1197509-3	12-003	
1197509-4	12-004	
1197511-1	14-001	15-001
1197511-2	14-002	15-002
1197511-3	14-003	15-003
1197511-4	14-004	15-004
1197511-5	14-005	15-005
1197511-6	14-006	15-006
1197511-7	14-007	15-007
1197511-8	14-008	15-008
1197511-9	14-009	15-009
1197511-10	14-010	15-010

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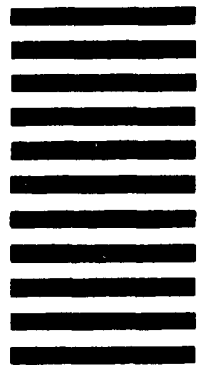
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