INCH-POUND

MIL-DTL-15370G
24 January 2002
SUPERSEDING
MIL-C-15370F
7 September 1994

DETAIL SPECIFICATION

COUPLERS, DIRECTIONAL
GENERAL SPECIFICATION FOR

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

1. SCOPE

1.1 Scope. This specification covers the general requirements for radio and microwave frequency directional couplers (see 6.1).

2. APPLICABLE DOCUMENTS

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

2.2 Government documents.

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

SPECIFICATIONS

FEDERAL

A-A-59126	-	Terminals, Feedthru (Insulated) and Terminals, Stud (Insulated and Noninsulated).
TT-P-645	-	Primer, Paint, Zinc-Molybdate, Alkyd Type.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: (Defense Supply Center Columbus, ATTN: DSCC-VAT, Post Office Box 3990, Columbus, OH 43216-5000), by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 5985

DEPARTMENT OF DEFENSE

MIL-DTL-3922 - Flanges, Waveguide, General Purpose, General Specification for.
MIL-C-5541 - Chemical Conversion Coatings on Aluminum and Aluminum Alloys.
MIL-DTL-15090 - Enamel, Equipment, Light Gray (Navy Formula No. 111).
MIL-P-19834 - Plate, Identification, Metal Foil, Adhesive Backed.
MIL-P-24691/3 - Pipe and Tube, Corrosion-Resistant, Stainless Steel, Seamless or Welded.
MIL-C-26074 - Coating, Electroless Nickel, Requirements for.
MIL-H-28719 - Header, Hermetically Sealed.
MIL-PRF-39012 - Connectors, Coaxial, Radio Frequency, General Specification for.
MIL-C-55302 - Connectors, Printed Circuit Subassembly and Accessories.
(See supplement 1 for list of associated specification sheets.)

STANDARDS

FEDERAL

FED-STD-H28 - Screw Thread Standards for Federal Services.
FED-STD-595 - Colors Used in Government Procurement.

DEPARTMENT OF DEFENSE

MIL-STD-202 - Test Methods for Electronic and Electrical Component Parts.
MIL-STD-464 - Electromagnetic Environmental Effects Requirements for Systems.
MIL-STD-889 - Dissimilar Metals.
MIL-STD-1276 - Leads for Electronic Component Parts.
MIL-STD-1285 - Marking of Electrical and Electronic Parts.
MIL-STD-2073-1 - Standard Practice for Military Packaging.

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Defense Automation and Production Service, Building 4D (DPM-DODSSP), 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

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

DRAWINGS

DEPARTMENT OF THE NAVY

REA 49330 - UG-45/U Connector for Use with 7/8 Coaxial Air Dielectric Line.
REA 49331 - UG-46/U Connector for Use with 7/8 Coaxial Air Dielectric Line.

(Application for copies may be addressed to: Commander, Code 4.1.4, Highway 547, Lakehurst, NJ 08733-5100.)

2.3 Non-Government publications. The following document(s) 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 SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM-A484/A484M	-	Steel, Bars, Billets and Forgings, Stainless.
ASTM-A582/A582M	-	Free-Machining Stainless and Heat-Resisting Steel Bars.
ASTM-B16/B16M	-	Free Cutting Brass Rod, Bar and Shapes for Use in Screw Machines.
ASTM-B26/B26M	-	Aluminum-Alloy Sand Castings.
ASTM-B36	-	Plate Brass, Sheet, Strip, and Rolled Bar.
ASTM-B85	-	Aluminum-Alloy Die Castings.
ASTM-B108	-	Aluminum-Alloy Permanent Mold Castings.
ASTM-B121/B121M	-	Leaded Brass Plate, Sheet, Strip, and Rolled Bar.
ASTM-B124	-	Copper and Copper Alloy Forging Rod, Bar, and Shapes.
ASTM-B194	-	Copper Beryllium Alloy Plate, Sheet, Strip, and Rolled Bar (DoD adopted).
ASTM-B196/B196M	-	Copper Beryllium Alloy Rod and Bar (DoD adopted).
ASTM-B197/B197M	-	Copper Beryllium Alloy Wire (DoD adopted).
ASTM-B209	-	Aluminum and Aluminum-Alloy Sheet and Plate (DoD adopted).
ASTM-B211	-	Aluminum and Aluminum-Alloy Bar, Rod, and Wire (DoD adopted).
ASTM-B221	-	Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes (DoD adopted).
ASTM-B241/B241M	-	Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube (DoD adopted).
ASTM-B308/B308M	-	Aluminum-Alloy 6061-T6 Standard Structural Shapes (DoD adopted).
ASTM-B339	-	Pig Tin.
ASTM-B545	-	Tin, Electrodeposited Coatings of.
ASTM-B700	-	Electrodeposited Coatings of Silver for Engineering Use.
ASTM-D1457	-	Polytetrafluoroethylene (PTFE) Molding and Extrusion Materials (DoD adopted).
ASTM-D1710	-	Rod and Heavy-Walled Tubing, Extruded and Compression Molded, Polytetrafluoroethylene (PTFE).
ASTM-G21	-	Materials to Fungi, Synthetic Polymeric, Determining Resistance of (DoD adopted).

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

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI-Z540.1	-	Laboratories, Calibration and Measuring and Test Equipment (DoD adopted).

(Application for copies should be addressed to the American National Standards Institute, 11 West 42nd Street, New York, NY 10036.

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE-287	-	Connectors, Coax, Precision, Standard for.

(For copies: address to IEEE Service Center, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331.)

SOCIETY OF AUTOMOTIVE ENGINEERS, INC. (SAE)

SAE-AMS 2422	-	Plating, Gold, Electronic and Electrical Applications.
SAE-AMS-4290	-	Castings, Aluminum Alloy Die 9.5Si -0.5Mg - (360.0) As Cast.
SAE-AMS-4377	-	Sheet and Plate, Magnesium Alloy 3.0Al - 1.0Zn - 0.20Mn (AZ31B-H24) Cold Rolled, Partially Annealed (DoD adopted).
SAE-AMS-I-23011	-	Iron-Nickel Alloys for Sealing Glasses and Ceramics.
SAE-AMS-M-3171	-	Magnesium Alloy, Processes for Pretreatment and Prevention of Corrosion (DoD adopted).
SAE-AMS-QQ-A-200	-	Aluminum Alloy, Bar, Rod, Shapes, Structural Shapes, Tube, and Wire, Extruded: General Specification for (DoD adopted).
SAE-AMS-QQ-A-225	-	Aluminum and Aluminum Alloy, Bar, Rod, Wire, or Spectral Shapes, Rolled, Drawn or Cold Finished; General Specification for (DoD adopted).
SAE-AMS-QQ-A-250	-	Aluminum and Aluminum Alloy, Plate and Sheet (DoD adopted).
SAE-AMS-QQ-S-763	-	Steel Bars, Wire, Shapes, and Forgings, Corrosion Resistant (DoD adopted).

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

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

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein (except for related associated specifications, specification sheets, or MS 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 directional coupler requirements shall be as specified herein and in accordance with the applicable specification sheets. In the event of any conflict between requirements of this specification and the specification sheet, the latter shall govern.

3.1.1 Reference to specification sheet. For the purpose of this specification, when the terms, "as specified", "when specified" or "when applicable" are used without additional reference to a specific location or document, the intended reference shall be to the specification sheet. When the specification sheet does not contain the information, the requirement is not applicable to that specific PIN or specification sheet.

3.2 First article. Directional couplers furnished under this specification shall be products which have been tested and have passed the first article inspection specified in 4.6 (see 6.3).

3.3 Material. The material shall be as specified in table I herein, and in the applicable specification sheets (see 3.1). When a definite material is not specified, a material shall be used which will enable the directional coupler to meet the performance requirements of this specification. Acceptance or approval of any constituent material shall not be construed as a guaranty of the acceptance of the finished product.

3.3.1 Brass. Brass shall conform to ASTM-B16/B16M, ASTM-B36, ASTM-B121/B121M, or ASTM-B124, whichever is applicable.

3.3.2 Copper alloy. Copper alloy sheet shall conform to ASTM B36 or ASTM-B121/B121M, whichever is applicable.

3.3.3 Copper beryllium. Beryllium copper shall conform to ASTM-B194, ASTM-B196/B196M, or ASTM-B197/B197M, whichever is applicable.

3.3.4 Corrosion-resisting steel. Corrosion-resisting steel plates, sheets, and strips shall consist of extra low carbon type 304. Corrosion-resisting forgings shall conform to SAE-AMS-QQ-S-763, ASTM A484/A484M, or ASTM A582/A582M and corrosion-resisting steel pipes shall conform to MIL-P-24691/3.

3.3.5 Aluminum alloy. Aluminum alloy plates and sheets shall conform to composition 6061 of SAE-AMS-QQ-A-250 or ASTM-B209, extruded aluminum alloy shall conform to composition 6063 of SAE-AMS-QQ-A-200, ASTM-B241, ASTM-B221, and ASTM-B308, composition 6061 of SAE-AMS-QQ-A-250 and ASTM-B209, or to composition 4047. Aluminum alloy casting shall conform to alloy A360 of ASTM-B85 or SAE-AMS-4290, whichever is applicable, class 8 of ASTM-B108, alloy 40E of ASTM-B26/B26M, or 2011 of SAE-AMS-QQ-A-225 and ASTM-B211.

3.3.6 Magnesium alloy. Magnesium alloy shall be composition AZ31B, condition H24, in accordance with SAE-AMS-4377. Unless otherwise specified (see 6.2), magnesium couplers shall not be supplied for Naval applications.

3.3.7 Dissimilar metals. Unless suitably protected against electrolytic corrosion, dissimilar metals as defined in MIL-STD-889 shall not be in intimate contact.

3.3.8 Fungus inert material. Material used in the construction of directional couplers shall be fungus inert (reference ASTM-G21 for assistance).

3.3.9 Bonding. Bonding shall conform to class R of MIL-STD-464.

3.3.10 Insulating compounds. Insulating compounds shall satisfy commercially accepted criteria for printed circuit board assembly coatings.

3.3.11 Plastics. Plastics shall conform to ASTM-D1457 or PTFE of ASTM-D1710.

3.3.12 Rubber. Rubber shall be suitable for use over the specified temperature range.

3.3.13 Iron-nickel alloy. Iron-nickel alloys shall conform to SAE-AMS-I-23011.

3.4 Design and construction. Directional couplers shall be of the design, construction, and physical dimensions specified (see 3.1). Directional couplers shall be of the lightest practicable weight consistent with the strength required for sturdiness, safety, and reliability.

3.4.1 Operating frequency range. The frequency range shall be as specified (see 3.1).

3.4.2 Flanges. Flanges shall be designed and manufactured as to provide the mating characteristics of the flange specified in accordance with MIL-DTL-3922.

3.4.3 RF connectors. The connectors shall be as specified (see 3.1). The material and gauging for receptacle connectors shall conform to the requirements of MIL-PRF-39012 or Drawing REA 49330 or Drawing REA 49331, whichever is applicable. When specified, precision connectors shall be in accordance with IEEE287.

3.4.3.1 Connector metal parts. Unless otherwise specified (see 3.1), the male center contact pins shall be captivated and made of corrosion-resisting steel or beryllium copper. Corrosion-resisting steel pins shall be type 302 or type 304 in accordance with SAE-AMS-QQ-S-763, or type 303 in accordance with ASTM A582/A582M. Beryllium copper pins shall conform to ASTM-B194, ASTM-B196/B196M, or ASTM-B197/B197M, whichever is applicable and shall be silver plated in accordance with ASTM-B700 or gold plated in accordance with SAE-AMS-2422, type II, class 1. The female center contact pins shall be captivated and made of beryllium copper in accordance with ASTM-B194, ASTM-B196/B196M, or ASTM-B197/B197M and silver plated in accordance with ASTM-B700, or gold plated in accordance with SAE-AMS-2422, type II, class 1. All other connector parts and finishes shall be in accordance with MIL-PRF-39012.

3.4.4 Printed-circuit connectors. Printed-circuit connectors shall conform to MIL-C-55302.

3.4.5 External leads. Unless otherwise specified, external lead connections shall be a chemical composition conforming to MIL-STD-1276 or SAE-AMS-I-23011 and shall be solderable (see 3.1).

3.4.6 Socket pins. Socket pins shall conform to MIL-H-28719.

3.4.7 Terminals. Terminals shall conform to A-A-59126.

3.4.8 Headers. Headers shall conform to MIL-H-28719.

3.4.9 Epoxy The use of epoxy shall be restricted to the following:

a. Impregnation of couplers to seal porous casting and braze joints after brazing.

b. Repair of pin-hole type leaks.

c. Component staking.

d. Cavity encapsulation.

e. Printed-circuit (PC) board and component attachment.

f. PC board material.

g. Capture of connector parts.

h. Sealing for moisture and EMI seal.

3.4.10 Housing. The housing shall be sealed to prevent entry of moisture and leakage of radiated electromagnetic interference (EMI).

3.4.11 Finish. Unless otherwise specified (see 3.1), the finish shall be as specified in 3.4.11.1 through 3.4.11.3.

3.4.11.1 RF mating surfaces. Mating surfaces shall be finished in gold, silver, or tin in accordance with SAE-AMS-2422, or passivated stainless steel. The minimum thickness for gold and nickel plating shall be 10 microinches and 30 microinches, respectively. Nickel shall be used only when requirements can not be met using other materials.

3.4.11.2 Plating. All metal parts of directional couplers which are not corrosion-resistant shall have a plating of silver, type I or II, grade A, palladium, gold, nickel, or tin, in accordance with ASTM-B700, ASTM-B679, SAE-AMS-2422, MIL-C-26074, or ASTM-B545, ASTM-B339, whichever is applicable (see 3.1). The minimum thickness for gold and nickel plating shall be 10 microinches and 30 microinches, respectively. Aluminum alloy surfaces shall be chemically treated in accordance with MIL-C-5541 or equivalent corrosion prevention method. Magnesium-alloy surfaces shall be given a chrome-nickel treatment in accordance with type I of SAE-AMS-M-3171. Nickel plating shall be used only when other plating cannot meet the intended performance requirements.

3.4.11.3 External finish. External finish shall be applied to connectorized or waveguide couplers only regardless of plating or chemical treatment, except that the mating surfaces shall not be coated. The primer coat shall be zinc chromate in accordance with TT-P-645. Two finish coats of enamel, in accordance with type III, class 2, of MIL-DTL-15090, shall be applied. External coating shall be applied as continuous film.

3.4.12 Weight. The weight of the directional coupler shall be as specified (see 3.1).

3.4.13 Temperature range. The operating and nonoperating temperature ranges shall be as specified (see 3.1).

3.4.14 Pre-seal bake. Hermetically sealed directional couplers shall have a pre-seal bake in an inert atmosphere or vacuum at the maximum specified storage or operating temperature, whichever is greater, for a minimum of 16 hours. There shall be a direct transfer to the seal chamber with an inert atmosphere that has a monitored moisture content of less than 0.1 percent.

3.4.15 Connection cap. All connections that are not normally sealed shall be capped with push-on plastic caps to prevent both damage and the entrance of moisture and foreign material during shipment and storage.

3.4.16 Threaded parts. All screw threads used in the construction of directional couplers shall be in accordance with FED-STD-H28.

3.4.17 RF input power to primary. Directional couplers shall be designed to meet the electrical requirements with the specified RF input power to the primary.

3.5 Performance.

3.5.1 Coupling. When directional couplers are tested as specified in 4.9.5, the measured value of coupling shall be within the tolerance specified for the nominal value. This specified tolerance includes the allowed variation of coupling over the specified frequency ranges.

3.5.2 Coupling variation (frequency sensitivity). When directional couplers are tested as specified in 4.9.6, the variation in coupling (in dB) over the specified frequency range shall not exceed the maximum specified (see 3.1).

3.5.3 Effective directivity. When directional couplers are tested as specified in 4.9.7, the effective directivity (in dB) over the specified frequency range shall not exceed the value specified.

3.5.4 Insertion loss (see 6 4 2). When directional couplers are tested as specified in 4.9.8, the insertion loss (excluding coupling power loss) shall not exceed the value specified.

3.5.5 Voltage standing wave ratio (VSWR).

3.5.5.1 Primary line (see 6 4 3). When directional couplers are tested as specified in 4.9.9.1, the VSWR over the specified frequency range shall not exceed the value specified.

3.5.5.2 Secondary line (see 6 4 4). When directional couplers are tested as specified in 4.9.9.2, the VSWR over the specified frequency range shall not exceed the value specified.

3.5.6 Power dissipation of secondary-line termination. When directional couplers are tested as specified in 4.9.10, the VSWR of the secondary line at mid-frequency (see 6.4.5) of the specified frequency range shall be as specified in 3.5.5.2.

3.5.7 Coaxial connector wear resistance. When directional couplers are tested as specified in 4.9.11, there shall be no damage to the connectors that will cause an electrical failure. During and after cycling, neither lubrication nor removal of excess material shall be permitted. After this test, directional couplers shall meet the requirements of 3.5.4 and 3.5.5. This test may be omitted if military specification connectors (i.e., MIL-PRF-39012) are used in the manufacturing of the end product.

3.6 Solderability. When directional couplers with solderable connections are tested as specified in 4.9.12, there shall be no evidence of pin holes and blistering.

3.7 Resistance to soldering heat. When directional couplers with solderable connections are tested as specified in 4.9.13, there shall be no damage to the directional coupler or to the terminal insulator that will cause electrical failure. Chipping of the terminal insulator shall not be cause for failure unless the chipping extends to the outer periphery. After this test, directional couplers shall meet the requirements of 3.5.5.

3.8 Terminal strength-lead integrity. When directional couplers with terminals or leads are tested as specified in 4.9.14, there shall be no evidence of a broken terminal or lead elongation greater than one-half of the thread pitch, or breakage, loosening or relative motion between the terminal and the directional coupler body when viewed through a magnification of at least 10X. Any of these shall be considered a failure.

3.9 Resistance to solvents. When directional couplers are tested as specified in 4.9.15, there shall be no evidence of illegible marking, mechanical damage, or deterioration of material or finishes to the extent that they can be readily identified from a distance of at least 6 inches with normal room lighting and without the aid of magnification or with a viewer having a magnification no greater than 3X.

3.10 Thermal shock. When directional couplers are tested as specified in 4.9.16, there shall be no evidence of physical damage. Upon completion of this test, directional couplers shall meet the requirements of 3.5.1, 3.5.3, 3.5.4, and 3.5.5.

3.11 Vibration. When directional couplers are tested as specified in 4.9.17, there shall be no evidence of physical damage.

3.12 Shock. When directional couplers are tested as specified in 4.9.18, there shall be no evidence of physical damage. Upon completion of this test, directional couplers shall meet the requirements of 3.14 or 3.15, as applicable.

3.13 Acceleration. When directional couplers are tested as specified in 4.9.19, there shall be no evidence of physical damage. Upon completion of this test, directional couplers shall meet the requirements of 3.5.1, 3.5.3, 3.5.4, and 3.5.5.

3.14 Seal. When hermetically sealed directional couplers are tested as specified in 4.9.20, the applicable amount of leakage rate shall not be exceeded nor shall there be evidence of physical damage. Upon completion of this test, directional couplers shall meet the requirements of 3.5.1, 3.5.3, 3.5.4, and 3.5.5.

3.15 Pressurization. When waveguide type directional couplers are tested as specified in 4.9.21, there shall be no leakage, as detected by the continuous formation of escaping air bubbles. Upon completion of this test, directional couplers shall meet the requirements of 3.5.1, 3.5.3, 3.5.4, and 3.5.5.

3.16 Barometric pressure. When directional couplers are tested as specified in 4.9.22, there shall be no evidence of physical damage. During this test, directional couplers shall meet the requirements of 3.5.1, 3.5.3, 3.5.4, and 3.5.5.

3.17 Moisture resistance. When directional couplers are tested as specified in 4.9.23, there shall be no destructive corrosion. Destructive corrosion shall be construed as any type of corrosion which in any way interferes with mechanical performance or appearance.

3.18 Salt spray. When directional couplers are tested as specified in 4.9.24, there shall be no evidence of warping, cracking, peeling, or corrosion that has passed through the plating and exposed the base metal, or any lead breakage when viewed through a magnification of at least 10X. Any of these shall be considered a directional coupler failure.

3.19 Electromagnetic interference (EMI). When directional couplers (excluding flatpacks, TO configurations, and printed circuit configurations) are tested as specified in 4.9.25, the RF leakage from the directional coupler shall be at least 65 dB below the incoming signal level.

3.20 Life. When directional couplers are tested as specified in 4.9.26, there shall be no evidence of damage. Upon completion of this test, directional couplers shall meet the requirements of 3.5.1 through 3.5.6.

3.21 Marking. Directional couplers and their individual shipping containers shall be marked in accordance with MIL-STD-1285 with the military PIN (see 6.8), manufacturer's CAGE code, or logo, the coupling value (in dB), date code, and serialization in the location specified. The following may be omitted from the body of the device but must be specified on the shipping container:

a. Serial number.

b. Coupling value (in dB).

3.21.1 Signal power flow. On unidirectional couplers, an arrow shall be placed so as to point in the direction in which incident power flows. On bidirectional couplers which have two different couplings, the coupling of each secondary line shall be indicated separately in a manner that will make clear which coupling is associated with each secondary line. Bidirectional couplers shall be marked to indicate which of the secondary lines has a nominal response to each direction of incident power flows. Marking shall be accomplished by reverse etching on metal identification plates, by engraving, by photo etching in accordance with MIL-P-19834, with permanent ink stamping in accordance with MIL-STD-130, or silk screen. The marking shall be placed on the directional coupler, or other means of identification shall be used if the package size (i.e., small to series) does not permit the above marking manner.

3.21.2 Date code. Directional couplers shall be marked by a unique code to identify the period during which they were manufactured. The first two numbers in the code shall be two digits of the number of the year, and the third and fourth numbers shall be two digits indicating the calendar week of the year. When the number of the week is a single digit, it shall be preceded by a zero reading from left to right or from top to bottom, the code number shall designate the year and week, in that order. The date code shall not be altered or removed from the directional coupler. A new date code followed by the letter R shall be marked on all reworked directional couplers.

3.21.3 Serialization. Each directional coupler shall be marked with a unique serial number assigned consecutively within the inspection lot allowing traceability of the directional coupler.

3.21.4 Laser marking. Laser marking is permitted, provided it meets the requirements of this specification.

3.22 Workmanship. Directional couplers shall be manufactured and processed in a careful and workmanlike manner. (MIL-HDBK-454, guideline 9 may be used for guidance.)

4. VERIFICATION

4.1 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. 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 inspections specified herein are classified as follows:

a. First article inspection (see 4.6).

b. Conformance inspection (see 4.7).

4.3 Materials inspection. Materials inspection shall consist of certification supported by verifying data that the materials listed in table I, used in fabricating the directional coupler, are in accordance with the applicable referenced specifications or requirements prior to such fabrication.

4.4 Inspection conditions. Unless otherwise specified herein, all inspections shall be performed in accordance with the test conditions specified in the "GENERAL REQUIREMENTS" of MIL-STD-202.

TABLE I. Materials inspection.

Material	Replacement Paragraph	Applicable specification/standard/handbook
Brass	3.3.1	ASTM-B16/B16M, ASTM-B36, ASTM-B121/B121M, ASTM-B124
Copper alloy	3.3.2	ASTM-B36, ASTM-B121/B121M
Copper beryllium	3.3.3	ASTM-B194, ASTM-B196/B196M, ASTM-B197/B197M
Corrosion-resisting steel	3.3.4	MIL-P-24691/3, SAE-AMS-QQ-S-763, ASTM-A484/A484M, ASTM-A582/A582M, SAE-AMS-QQ-A-200, ASTM-B241, ASTM-B221,
Aluminum alloy	3.3.5	ASTM-B308, SAE-AMS-QQ-A-225 and ASTM-B211, SAE-AMS-QQ-A-250, ASTM B209, SAE-AMS-4290, ASTM-B26/B26M, ASTM-B85, ASTM-B108
Magnesium alloy	3.3.6	SAE-AMS-4377
Dissimilar metals	3.3.7	MIL-STD-889
Fungus inert material	3.3.8	ASTM-G21
Bonding	3.3.9	MIL-STD-464
Insulating compounds	3.3.10	
Plastics	3.3.11	ASTM-D1457, ASTM-D1710
Iron-nickel alloy	3.3.13	SAE-AMS-I-23011
Flanges	3.4.2	MIL-DTL-3922
Connectors	3.4.3, 3.4.4	MIL-PRF-39012, REA 49330, REA 49331, SAE-AMS-QQ-S-763, ASTM A582/582M, MIL-C-55302
External leads	3.4.5	MIL-STD-1276, SAE-AMS-I-23011
Socket pins	3.4.6	MIL-H-28719
Terminals	3.4.7	A-A-59126
Headers	3.4.8	MIL-H-28719
Finish	3.4.11	SAE-AMS-2422, MIL-P-27418, ASTM-B545, ASTM-B339, MIL-C-26074, MIL-C-5541, TT-P-645, MIL-DTL-15090, SAE-AMS-M-3171
Threaded parts	3.4.16	FED-STD-H28

4.4.1 Test method variation. Variation from the specified test methods used to verify the electrical parameters are allowed provided that it is demonstrated to the preparing activity or to their agent that such variations in no way relax the requirements of this specification and that they are approved before testing is performed. For proposed test variations, a test method comparative error analysis shall be made available for checking by the preparing activity or by their agent.

4.4.2 Test equipment and inspection facilities. Test and measuring equipment and inspection facilities of sufficient accuracy, quality, and quantity to permit performance of the required inspection shall be established and maintained by the supplier. The establishment and maintenance of a calibration system to control the accuracy of the measuring and test equipment shall be in accordance with ANSI-Z540.1.

4.4.3 Accuracy of test equipment. The frequency-measuring device used shall have an accuracy of ±0.1 percent or better. The overall accuracy in the determination of VSWR shall be better than ±2 percent. The coupling-measuring system used shall have an accuracy of ±0.1 dB up to 10 dB and ±0.1 dB per 10 dB above 10 dB or better.

4.5 Inspection conditions. Unless otherwise specified herein, all measurements and tests shall be made at room ambient temperature, pressure, and humidity.

4.6 First article inspection. First article inspection shall consist of the tests specified in table II and shall be performed by the supplier, after award of contract and prior to production, at a location acceptable to the Government. First article inspection shall be performed on sample units which have been produced with equipment and procedures normally used in production. First article approval is valid only on the contract or purchase order under which it is granted, unless extended by the Government to other contracts or purchase orders.

4.6.1 Sample size. Four couplers of the same type shall be subjected to first article inspection.

4.6.2 Inspection routine. The sample shall be subjected to the inspections specified in table II in the order shown. All sample units shall be subjected to group I inspection. The sample shall then be divided into 2 groups of 2 units each as specified in table II for groups II and III.

4.6.3 Failures. One or more failures shall be cause for refusal to grant first article approval.

4.6.4 Disposition of sample units. Sample units which have been subjected to first article testing shall not be delivered on the contract.

TABLE II. First article inspection.

Examination or test	Requirement paragraph	Test paragraph
Group I (4 sample units)		
Visual and mechanical inspection	3.1, 3.3 to 3.4.12, 3.4.15, 3.4.16, 3.21, and 3.22	4.9.1
Effective directivity	3.5.3	4.9.7
Coupling	3.5.1	4.9.5
Coupling variation	3.5.2	4.9.6
VSWR of primary line	3.5.5.1	4.9.9.1
VSWR of secondary line	3.5.5.2	4.9.9.2
Insertion loss (when applicable)	3.5.4	4.9.8
Power dissipation of secondary-line termination	3.5.6	4.9.10
Group II (2 sample units)		
Coaxial connector wear resistance	3.5.7	4.9.11
Terminal strength - lead integrity	3.8	4.9.14
Thermal shock	3.10	4.9.16
Acceleration	3.13	4.9.19
Seal	3.14	4.9.20
Pressurization	3.15	4.9.21
Barometric pressure	3.16	4.9.22
Life	3.20	4.9.26
Group III (2 sample units)		
Solderability	3.6	4.9.12
Resistance to soldering heat	3.7	4.9.13
Resistance to solvents	3.9	4.9.15
Vibration	3.11	4.9.17
Shock	3.12	4.9.18
Moisture resistance	3.17	4.9.23
Salt spray	3.18	4.9.24
Electromagnetic interference (EMI)	3.19	4.9.25

4.7 Conformance inspection.

4.7.1 Inspection of product for delivery. Inspection of product for delivery shall consist of group A and B inspections.

4.7.1.1 Inspection lot. An inspection lot shall consist of all couplers of one type produced under essentially the same conditions, and offered for inspection at one time.

4.7.1.2 Group A inspection. Group A inspection shall consist of the examination and tests specified in table III, and shall be performed in the order shown.

TABLE III. Group A inspection.

Examination or test	Requirement paragraph	Test paragraph
Visual and mechanical examination - - - - - -	3.1, 3.3 to 3.4.12, 3.4.15, 3.4.16, 3.21, and 3.22	4.9.1
Coupling -	3.5.1	4.9.5
Coupling variation - - - - - - - - - - - - - - - - - - -	3.5.2	4.9.6
VSWR of primary line - - - - - - - - - - - - - - - -	3.5.5.1	4.9.9.1
VSWR of secondary line - - - - - - - - - - - - - -	3.5.5.2	4.9.9.2
Insertion loss -	3.5.4	4.9.8

1/ See 6.4.6 and 6.4.7 for definitions.

4.7.1.2.1 Sampling plan. The group A sampling plan for accept on zero defects shall be as specified in table IV.

TABLE IV. Group A Sampling plan.

Lot size	Sample size
2 to 12	100 % of lot
13 to 150	13
151 to 280	20
281 to 500	29
501 to 1200	34

4.7.1.2.2 Rejected lots. If an inspection lot is rejected, the supplier may rework it to correct the defects, or screen out the defective units, and resubmit for reinspection. Resubmitted lots shall have all devices reinspected. Such lots shall be separated from new lots, and shall be clearly identified as reinspected lots. Resubmitted lots indicating device failures shall constitute a rejected lot.

4.7.1.3 Group B inspection. Group B inspection shall consist of the tests specified in table V and the sample shall be selected from inspection lots that have passed the group A inspection.

TABLE V. Group B inspection.

Test	Requirement paragraph	Test paragraph	Sample size
Effective directivity - - - - - - - - - -	3.5.3	4.9.7	2
VSWR - - - - - - - - - - - - - - - - -	3.5.5	4.9.9.1	2
Thermal shock - - - - - - - - - - - -	3.10	4.9.16	2
VSWR - - - - - - - - - - - - - - - - -	3.5.5	4.9.9.1	
Insertion loss - - - - - - - - - - - -	3.5.4	4.9.8	
Shock - - - - - - - - - - - - - - - - - - -	3.12	4.9.18	2
VSWR - - - - - - - - - - - - - - - - -	3.5.5	4.9.9.1	
Insertion loss - - - - - - - - - - - -	3.5.4	4.9.8	
Moisture resistance - - - - - - - - -	3.17	4.9.23	2
VSWR - - - - - - - - - - - - - - - -	3.5.5	4.9.9.1	
Insertion loss - - - - - - - - - - - -	3.5.4	4.9.8	

4.7.1.3.1 Sampling plan. The group B sampling plan shall be as specified in table V.

4.7.1.3.2 Rejected lots. If an inspection lot is rejected, the supplier may rework it to correct the defects, or screen out the defective units, and resubmit for reinspection. Resubmitted lots shall have all devices reinspected. Such lots shall be separate from new lots, and shall be clearly identified as reinspected lots. Resubmitted lots indicating device failures shall constitute a rejected lot.

4.7.1.3.3 Disposition of sample units. Sample units which have passed all the group B inspection may be delivered on the contract or purchase order if the lot is accepted and the sample units are still within specified electrical tolerances.

4.8 Inspection of packaging. The sampling and inspection of the preservation and interior package marking shall be in accordance with the group A and B conformance inspection requirements of MIL-STD-2073-1. The sampling and inspection of the packing and marking for shipment and storage shall be in accordance with the quality assurance provisions of the applicable container specification.

4.9 Methods of inspection and test.

4.9.1 Visual and mechanical inspection (see 3.1, 3.4, 3.21, and 3.22). Directional couplers shall be inspected to verify that the materials, design, construction, physical dimensions, marking, and workmanship are in accordance with the applicable requirements.

4.9.2 Test procedures. Directional couplers shall be tested as specified in 4.9.3 through 4.9.26.

4.9.3 Visual and mechanical inspection. Visual and mechanical inspection of directional couplers shall be as specified in 4.9.1.

4.9.4 Thermal shock. With the connections uncovered, directional couplers shall be tested in accordance with method 107 of MIL-STD-202. The following details and exception shall apply:

a. Mounting: When applicable, directional couplers may be mounted on a heat sink.

b. Test condition: B, except the temperature extremes shall be those specified (see 3.1), and the number of cycles shall be 10 (either one or two chamber method may be used. Directional couplers shall be positioned so that they are exposed to freely circulating chamber air.

4.9.5 Coupling (see 3 5 1). The coupling of directional couplers shall be determined by obtaining the midpoint between the maximum and minimum coupling over the specified frequency range. The coupling of unidirectional couplers shall be determined as the ratio, expressed in dB, of the power input to the primary line to the power available at the output of the secondary line, with the output end of the primary line properly terminated. The coupling of bidirectional couplers shall be determined separately for each secondary line.

4.9.6 Coupling variation (see 3 5 2). The coupling variation of directional couplers shall be determined over the specified frequency range (see 3.1). The coupling variation of unidirectional couplers shall be determined by taking the difference between the maximum and the minimum coupling over the specified frequency range. Such difference shall be taken as a positive number or zero. The coupling variation of bidirectional couplers shall be determined separately for each secondary line.

4.9.7 Effective directivity (see 3 5 3). The effective directivity of directional couplers shall be determined over the specified frequency (see 3.1). The effective directivity of unidirectional couplers shall be computed from the ratio, taken as greater than unity and expressed in dB, of the available power at the output of the secondary line for the two directions of excitation, at equal power levels, of the primary line; the secondary line shall be terminated in a matched termination. The effective directivity of bidirectional couplers shall be determined separately for each secondary line. The alternate test (see 4.9.7.1) may be used as a substitute test with the prior approval of the preparing activity.

4.9.7.1 Alternate test. The effective directivity of directional couplers shall be determined over the specified frequency range. The effective directivity shall be computed from the difference between measurements of minimum and maximum outputs of a secondary line, when a short circuit is displaced through one-half a wave-length in the primary line. The generator at the primary line shall be matched to the primary line. The effective directivity of bidirectional couplers shall be determined separately for each secondary line with the remaining secondary lines terminated by an impedance equal to the characteristic impedance of the secondary line.

4.9.8 Insertion loss (see 3 5 4). The insertion loss shall be measured by a substitution technique using radio, audio, or intermediate frequency (RF, AF, or IF). An average of three test runs shall be used as a final result. The insertion loss (dB) to be applied shall be determined from the following formula:

$$\text{(dB) Insertion loss} = P(in) - P(out) - \text{coupling split loss}$$

4.9.9 VSWR (see 3 5 5).

4.9.9.1 Primary line (see 3 5 5 1). The VSWR of directional couplers shall be measured over the specified frequency range (see 3.1). The VSWR of unidirectional couplers shall be measured at the input end of the primary line, with the output end of the primary line and the secondary line terminated in matched loads. The VSWR of bidirectional couplers shall be measured at one end of the primary line, with the other end terminated in a matched load; the secondary lines shall be terminated in matched loads.

4.9.9.2 Secondary line (see 3 5 5 2). The VSWR of directional couplers shall be measured over the specified frequency range (see 3.1). The VSWR of unidirectional couplers shall be measured at the output of the secondary line with both ends of the primary line terminated in matched loads. The VSWR of each secondary line of bidirectional couplers shall be measured at the output of the secondary line with the other secondary line and both ends of the primary line terminated in matched loads.

4.9.10 Power dissipation of secondary-line termination (see 3 5 6). The power dissipation of the secondary-line termination shall be determined over the specified frequency range (see 3.1). The power (P) to be applied shall be determined from the following formula:

$$P_1 = \frac{P_o}{antilog_{10}\left(\frac{\alpha}{10}\right)}$$

Where:

P_1 = Power.
P_O = Continuous-wave power rating of primary line (see 6.2).
α = Coupling in dB.

The power (P_I) shall be applied for a period of one hour to the output of the secondary line, with both ends of the primary line terminated in matched loads. Within 3 minutes after the 1-hour period, the VSWR of the secondary line shall be measured as specified in 4.9.9.2, at mid-frequency in the specified frequency range. At the option of the Government, the alternate test specified in 4.9.10.1 may be used.

4.9.10.1 Alternate test. The power dissipation of the secondary-line termination shall be determined over the specified frequency range. Rated continuous-wave power (see 6.2) shall be applied for a period of one hour to the input end of the primary line, with the output end of the primary line and the output of the secondary line terminated in matched loads. After the 1-hour period, the VSWR of the secondary line shall be measured as specified in 4.9.9.2, at mid-frequency in the specified frequency range (see 3.1).

4.9.11 Coaxial connector wear resistance (see 3 5 7). The connectors shall be subjected to 500 cycles of connection and disconnection. A cycle shall consist of a firm connection made to the connectors of the directional coupler with the coupling means tightened to normal tightness and the connectors then completely disconnected and removed from the test circuit.

4.9.12 Solderability (see 3 6). The terminals of the directional coupler shall be tested in accordance with method 208 of MIL-STD-202.

4.9.13 Resistance to soldering heat (see 3.7). Directional couplers shall be tested in accordance with method 210 of MIL-STD-202. The following details and exceptions shall apply:

a. Special preparation: The terminals shall not have been soldered previously.

b. Depth of immersion in the molten solder: To a point .062 inch (1.57 mm) + .031 inch (0.79 mm), -0 inch (0.00 mm) from the body.

c. Test condition: A.

d. Cooling time: Stabilize to +25°C.

4.9.14 Terminal strength-lead integrity (see 3.8). Directional couplers shall be tested as specified in 4.9.14.1 or 4.9.14.2.

4.9.14.1 Terminal strength. Directional couplers with terminals shall be tested in accordance with method 211 of MIL-STD-202, test condition A, applied force 1.5 pounds.

4.9.14.2 Lead integrity. Directional couplers with leads shall be tested in accordance with method 211 of MIL-STD-202, test condition C. The applied force shall be 8 ounces ± 0.5 ounce. For leads with a section modulus equal to or less than that of a lead with a cross-section of 0.006 x 0.20, the force shall be 3 ounces ± 0.3 ounce.

4.9.15 Resistance to solvents (see 3.9). Directional couplers shall be tested in accordance with method 215 of MIL-STD-202. All portions of the directional coupler shall be brushed.

4.9.16 Thermal shock (see 3.10). Directional couplers shall be tested as specified in 4.9.4. After this test, the requirements of 3.5.1, 3.5.3, 3.5.4, and 3.5.5 shall be measured at the inspection conditions specified in 4.5.

4.9.17 Vibration (see 3.11). Directional couplers shall be tested as specified in 4.9.17.1 or 4.9.17.2. When no method is specified, directional couplers shall be tested as specified in 4.9.17.1.

4.9.17.1 High frequency (nonoperating) (see 3.11). Directional couplers shall be tested in accordance with method 204 of MIL-STD-202. The following details shall apply:

a. Mounting of specimens: Couplers shall be attached to the vibration table by means of clamps. A clamp shall be placed around the center of each coupler, and no part of the coupler shall touch any object other than the clamp.

b. Test condition: D.

c. Resonance: There shall be no resonances at or below 40 hertz (Hz).

4.9.17.2 Random vibration. Directional couplers shall be tested in accordance with method 214 of MIL-STD-202, test condition F for 15 minutes duration, mounted by normal means.

4.9.18 Shock (see 3.12). Directional couplers shall be tested as specified in 4.9.18.1, 4.9.18.2, 4.9.18.3, or 4.9.18.4.

4.9.18.1 Coaxial and dual-in-line types. Directional couplers shall be tested in accordance with method 213 of MIL-STD-202, test condition H, mounted by normal means.

4.9.18.2 Header and TO types. Directional couplers shall be tested in accordance with method 213 of MIL-STD-202, test condition C, mounted by normal means.

4.9.18.3 Flat pack type. Directional couplers shall be tested in accordance with method 213 of MIL-STD-202, test condition F, mounted by normal means.

4.9.18.4 Waveguide type. Directional couplers shall be tested in accordance with method 213 of MIL-STD-202, test condition I, mounted by normal means.

4.9.19 Acceleration (see 3.13). Unless otherwise specified (see 3.1), directional couplers shall be tested in accordance with method 212 of MIL-STD-202. The following details shall apply:

a. Mounting: Mounted by normal means.

b. Test condition: A, with 100g level.

4.9.20 Seal (see 3.14).

4.9.20.1 Hermetic seal. Hermetically sealed items shall be tested in accordance with method 112 of MIL-STD-202, test condition D.

4.9.20.2 O-ring seal, solder seal, or encapsulated seal. O-ring sealed, solder sealed, or encapsulated sealed items shall be tested in accordance with method 112 of MIL-STD-202, test condition B.

4.9.20.3 Cover seal. Cover sealed items shall be tested in accordance with method 103 of MIL-STD-202.

4.9.21 Pressurization (see 3.15). Waveguide-type directional couplers shall be subjected to an internal gas pressure of 30 pounds per square inch for at least 20 seconds while immersed in water at approximately 20°C. The ends of the primary line shall be appropriately sealed.

4.9.22 Barometric pressure (see 3.16). Directional couplers shall be tested in accordance with method 105 of MIL-STD-202, test condition D.

4.9.23 Moisture resistance (see 3.17). Directional couplers shall be tested in accordance with method 106 of MIL-STD-202, step 7B shall be performed.

4.9.24 Salt spray (see 3.18). Directional couplers shall be tested in accordance with method 101 of MIL-STD-202, test condition B. The RF ports of the directional coupler shall be sealed for this test. After this test, the directional couplers are allowed to be washed and dried before being inspected.

4.9.25 Electromagnetic interference (see 3.19). Test to be performed on units that are capable of 1 GHz or greater. The swept frequency measurement shall be made covering the total frequency range in steps not exceeding an octave band (the appropriate stub antenna should be tuned to a quarter wave at midoctave).

a. Place a fixed amount of RF power in a transmission line in series with available attenuator and spectrum analyzer.

b. Place specified value of attenuation (see 3.19 or 3.1) in the line and note the difference in reading on the spectrum analyzer.

c. Reset the attenuator to zero and place a λ/4 stub (at midband) at one end of the flexible coaxial cable and connect to the spectrum analyzer.

d. Place the test attenuator in a transmission line properly terminated and "SNIFF" the coupler with the λ/4 stub. The λ/4 stub should come as close to the coupler as possible without touching. Particular attention shall be given to RF connections.

e. Any attenuation in excess of the value specified in 4.9.25b shall be cause for rejecting the coupler.

4.9.26 Life (see 3.20). Directional couplers shall be placed within a temperature chamber. The chamber temperature shall be raised so that the measurement temperature is equal to the highest specified operating temperature (see 3.1). Directional couplers shall remain at this temperature for a period of 1,000 hours. At the end of this time, directional couplers shall be removed from the temperature chamber and allowed to cool down. Directional couplers shall be considered cooled when their body temperature is equal to the room temperature.

5. PACKAGING

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

6. NOTES

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

6.1 Intended use.

6.1.1 Directional couplers. Directional couplers may be used in conjunction with a radio-frequency source for injecting a radio-frequency wave into a transmission line so that it flows in one direction only. Directional couplers may also be used to sample a radio-frequency wave flowing in a particular direction in a transmission line while accepting relatively insignificant portions of a radio-frequency wave flowing in the opposite direction.

6.2 Acquisition requirements. Acquisition documents must specify the following:

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

b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2.1 and 2.3).

c. Title, number, and date of applicable specification sheet and complete PIN (see 3.1 and 6.8).

d. For naval applications, whether magnesium may be used in fabricating directional couplers (see 3.3.6).

e. Whether weatherproof caps are required (see 3.4.15).

f. Special marking required (see 3.21).

g. Specify when alternate test for effective directivity is required (see 4.9.7.1).

h. Continuous wave power rating of primary line (see 4.9.10).

i. Levels of preservation and packing required (see 5.1).

j. If special or additional identification marking is required.

6.3 First article. Invitations for bid should provide that the Government reserves the right to waive the requirement for first article samples 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 acquisition.

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

6.4.1 Directional coupler. A directional coupler is a transmission-line component characterized physically by two (or three, for certain bidirectional couplers) juxtaposed transmission lines and an associated coupling structure through which a transfer of RF energy from one to the other is effected; its electrical behavior is characterized ideally by such interaction between the two lines that excitation in a single direction in either line produces a response in the companion line in one direction only.

6.4.1.1 Unidirectional coupler. A unidirectional coupler is a directional coupler so designed as to provide a nominal response in the secondary line to propagation in the primary line, in one direction only.

6.4.1.2 Bidirectional coupler. A bidirectional coupler is a directional coupler so designed as to provide separate and simultaneous nominal responses in the secondary lines to each of the two directions of propagation in the primary line.

6.4.2 Insertion loss. The loss produced by adding (inserting) a device into a signal transmission path (excluding coupling power loss).

6.4.3 Primary line. The primary line of a directional coupler is the line designed to receive the principal flow of RF energy in the transmission line to which the directional coupler is adjunct. The input end of the primary line of a unidirectional coupler is the end into which power must flow in order to produce the maximum power at the output of the secondary line. The other end is called the output (antenna) end.

6.4.4 Secondary line. The secondary line of a directional coupler is the line that is coupled to the primary line by means of the coupling structure. In a unidirectional coupler there is one secondary line. In a bidirectional coupler the secondary lines have a nominal response to a different direction of propagation in the primary line. In some bidirectional couplers the secondary lines are physically separate; in others they run physically together.

6.4.5 Mid-frequency. The mid-frequency of a directional coupler is defined as the arithmetic mean of the limits of its frequency range.

6.5 Conditions for use of level B preservation When level B preservation is specified (see 5.1.2), this level of protection should be reserved for the acquisition of directional couplers for resupply worldwide under known favorable handling, transportation, and storage conditions.

6.6 Subject term (key word) listing.

Couplers, bi-directional	Flanges	Pressurization
Couplers, unidirectional	Insertion loss	RF connectors
Effective directivity	Line, primary	VSWR
Electromagnetic interference	Line, secondary	Waveguide

6.7 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.

6.8 Military Part or Identifying Number (PIN) classification. The military PIN consists 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:

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                    M15370/14-                          001
                        |                                |
                        |                                |
                        |                                |
Military designator and |                                |
specification sheet number_____|                         |
                                                         |
Dash number designated                                   |
on specification sheet___________________________________|
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Custodians:
Army - CR
Navy - EC
Air Force - 11
DLA - CC

Review activities:
Army - MI
Navy - AS, CG, MC, OS, SH
Air Force - 99

Preparing activity:
DLA - CC

(Project 5985-1232)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.

2. The submitter of this form must complete blocks 4, 5, 6, and 7, and send to preparing activity.

3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-DTL-15370G	2. DOCUMENT DATE (YYMMDD) 020124

3. DOCUMENT TITLE
COUPLERS, DIRECTIONAL, GENERAL SPECIFICATION FOR

4. NATURE OF CHANGE (Ident fy paragraph number and nc ude proposed rewr te, f poss b e. Attach extra sheets as needed.)

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (Last, First, Middle initial)	b. ORGANIZATION	
c. ADDRESS (Include Zip Code)	d. TELEPHONE (Include Area Code) (1) Commercial (2)DSN (if applicable)	7. DATE SUBMITTED (YYMMDD)

8. PREPARING ACTIVITY

a. NAME DSCC-VAT	b. TELEPHONE (Include Area Code) (1) Commercial 614-692-0506	 (2) DSN 850-0506
c. ADDRESS (Include Zip Code) Defense Supply Center Columbus P.O. Box 3990 Columbus, OH 43216-5000	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Standardization Program Office (DLSC-LM) 8725 John J. Kingman Road, Suite 2533 Fort Belvoir, Virginia 22060-6221 Telephone (703) 767-6888 DSN 427-6888	