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SUPERSEDING
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MILITARY SPECIFICATION

WIRE, ELECTRICAL, SOLDERLESS WRAP, INSULATED AND UNINSULATED, 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 both insulated and uninsulated solid conductor wire, designed for solderless wrap connections in electrical and electronic devices and equipment. The terminations of the wire are intended to be made with hand or automatic tools which wrap the wire, under tension, around terminal pins (commonly called wrapposts) to form solderless wrapped connections.

1.2 Classification. The wires shall be as described in the applicable military specification sheets.

1.2.1 Part numbers. Part numbers of the wires shall be coded as in the following example:

M81822/1	-	A30	-	9
Specification sheet number (see 3.1)		Conductor type (see 3.3.1.1) and size (AWG) (see table I)		Insulation color code (Insulated wire only) (see table III)

* In the event that a wire is specified in the applicable specification sheet with two alternative finished wire diameters for the same conductor size, the hyphen preceding the color indicator in the part number shall be replaced by the designator "V" (variation) to form the part number of the additional permitted construction.

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.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Engineering Specifications and Standards Department (Code 93), Naval Air Engineering Center, Lakehurst, NJ 08733, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

SPECIFICATIONS

FEDERAL

TT-I-735	-	Isopropyl Alcohol.
UU-T-450	-	Tissue, Facial.

MILITARY

MIL-H-5606	-	Hydraulic Fluid, Petroleum Base; Aircraft, Missile and Ordnance.
MIL-C-12000	-	Cable, Cord, and Wire, Electric, Packaging of.
MIL-M-20693	-	Molding Plastic, Polyamide (Nylon), Rigid.
MIL-G-45204	-	Gold Plating, Electrodeposited.
MIL-P-46112	-	Plastic Sheet and Strip, Polyimide.
MIL-P-46122	-	Plastic Molding and Extrusion Material, Polyvinylidene Fluoride Polymer and Copolymer.
MIL-C-81302	-	Cleaning Compound, Solvent, Trichlorotrifluoroethane.
MIL-T-81533	-	1, 1, 1 Trichloroethane (Methyl Chloroform), Inhibited, Vapor Degreasing.

(See supplement 1 for list of associated military specification sheets.)

STANDARDS

FEDERAL

FED-STD-228	-	Cable and Wire, Insulated; Methods of Testing.

MILITARY

MIL-STD-104	-	Limits for Electrical Insulation Color.
MIL-STD-105	-	Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-109	-	Quality Assurance Terms and Definitions.
MIL-STD-129	-	Marking for Shipment and Storage.
MIL-STD-454	-	Standard General Requirements for Electronic Equipment.

(Copies of specifications, standards, handbooks, drawings, and publications required by manufacturers 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 effective issues of the documents shall be the issues which are listed as DoD adopted in the current DoDISS and, if applicable, the supplement thereto.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B 3	-	Soft or Annealed Copper Wire, Specification for.
ASTM B 33	-	Tinned Soft or Annealed Copper Wire for Electrical Purposes, Specification for.

ASTM B 170 - Oxygen-Free Electrolytic Copper - Refinery Shapes, Specification for.
ASTM B 298 - Silver-Coated Soft or Annealed Copper Wire, Specification for.
ASTM B 577 - Hydrogen Embrittlement of Copper, Test for.
ASTM B 624 - High-Strength, High-Conductivity, Copper-Alloy Wire for Electronic Application, Specification for.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

* 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 over all references except the associated military specification sheets (see 3.1).

3. REQUIREMENTS

3.1 Specification sheets. The requirements for the wire covered by this specification shall be as specified herein and in accordance with the applicable military specification sheets. In the event of any conflict between this specification and the requirements of the specification sheet, the requirements of the specification sheet shall govern.

3.2 Classification of requirements. The requirements applicable to all wire are classified herein as follows:

Requirement	Paragraph
Materials	3.3
Construction	3.4
Finished wire	3.5

3.3 Materials.

3.3.1 Conductor.

3.3.1.1 Conductor types. All conductors shall be solid conductors of the following types, as specified in the acquisition contract or order (see 6.2.1), and indicated in the part numbers of the wire. The conductors of the finished wire shall meet the requirements of table I for the applicable type. The composition of the three types prior to application of the conductor coating shall be as follows:

Type A - Soft or annealed copper solid wire in accordance with ASTM B 3.

Type B - Soft or annealed oxygen-free copper solid wire in accordance with grade 2 of ASTM B 170.

* Type C - High strength, high conductivity, copper alloy solid wire in accordance with ASTM B 624.

* 3.3.1.2 Conductor coating. The conductor coating shall be tin, silver, or gold as specified in the applicable military specification sheet. The coating shall be in accordance with ASTM B 33 for tin coating, ASTM B 298 for silver coating, or MIL-G-45204, type I, grade A, class 1 for gold coating, except that the requirement of MIL-G-45204 for completion of all mechanical operations before plating shall not apply (i.e., wires may be drawn after plating). Silver coatings shall be a minimum of 40 microinches thick, when determined in accordance with ASTM B 298.

3.3.1.3 Continuity and adherence of conductor coating (finished wire). Tin coated conductors taken from finished wire shall pass the coating continuity and coating adherence tests of ASTM B 33. Silver or gold coated conductors taken from finished wire shall pass the coating continuity test of ASTM B 298.

* 3.3.1.4 Conductor diameter. The diameter of conductors taken from finished wire shall conform to the requirements of table I.

3.3.1.5 Conductor tensile strength and elongation. The tensile strength and elongation of conductors taken from finished wire shall conform to the requirements of table I.

3.3.1.6 Conductor resistance. The electrical resistance of conductors in the finished wire shall conform to the requirements of table I.

3.3.1.7 Hydrogen embrittlement (type B conductors only). When conditioned and tested as specified in 4.6.8, type B conductors taken from the finished wire shall withstand the minimum number of bends specified in table I without cracking or breaking.

* 3.3.2 Insulation material (see 4.6.9 for certification of conformity to this requirement). Insulation material shall be as specified in the applicable specification sheet (see 3.1). The use of reclaimed or recycled insulation materials is not prohibited under this specification, but such materials, if used, shall have been reclaimed or recycled by such processes that the materials have not been degraded, are free of contaminants, and are identical with new material in performance characteristics. This rule shall apply to all ingredients and components used. The following requirements for specific materials are also applicable:

3.3.2.1 Fluorocarbon-polyimide tape. When fluorocarbon-polyimide tape is specified in the specification sheet, the material shall be type II of MIL-P-46112.

3.3.2.2 Extruded polyamide. When extruded polyamide is specified in the specification sheet, it shall be in accordance with MIL-M-20693, composition A, type III, grade E.

3.3.2.3 Extruded polyvinylidene fluoride. When extruded polyvinylidene fluoride is specified in the specification sheet, the material shall be in accordance with MIL-P-46122.

3.4 Construction. Construction of the wire shall be as specified herein and in the applicable military specification sheet. The wire shall consist of a single solid conductor, coated in accordance with the specification sheet, and shall be either uninsulated or covered with a uniform concentric insulation as specified in the specification sheet.

3.5 Finished wire. The finished insulated wire shall conform to the requirements of table II and those of the applicable military specification sheet. The requirements of 3.5.1 through 3.5.11 also apply. The requirements of table II and of 3.5.1 through 3.5.11, which are applicable to uninsulated wire, shall be as specified in the specification sheet.

* 3.5.1 Concentricity of insulation. The concentricity of the wire insulation, when determined as specified in 4.6.13, shall be 80 percent, minimum. In addition, for insulations comprising two or more layers, the concentricity of the primary insulation, when determined as specified in 4.6.13, shall be 70 percent, minimum.

3.5.2 Color of insulated wire. The finished insulated wire shall be of a uniform solid color as specified in the acquisition contract. Unless otherwise specified in the contract or specification sheet, the color shall conform to MIL-STD-104, class 1, when examined in accordance with 4.6.15. When code numbers are used in acquisition documents, part numbers, or elsewhere to indicate the insulation colors, the code shall be in accordance with table III. Fastness of color to heat exposure shall be in accordance with 3.5.7.

* 3.5.3 Splices (see 4.6.16 for certification of conformity to this requirement).

* 3.5.3.1 Splices in insulated wire. Unless otherwise specified in the acquisition contract (see 6.2.1), all insulated wire in any unit package shall be a single continuous length or shall be joined by conductor splicing to form a single continuous length. All wire spliced to form such a continuous length shall be taken from the same inspection lot (see 4.5.1.1). Splices of the conductor shall be butt brazed and shall not cause the conductor diameter to exceed the outside diameter of the insulated wire. Splices shall be marked by stripping the insulation 2 to 4 inches on each side of the splice. The minimum length of wire between any two splices, counting spark test failures also as splices (see 3.5.4), or between a splice or spark test failure and a wire end shall be 100 feet. Unless otherwise specified in the contract or applicable specification sheet, the minimum average length of wire between splices (including spark test failures and wire ends as equivalent to splices) shall be 1000 feet in any drum, reel or spool.

3.5.3.2 Splices in uninsulated wire. Splices shall not be permitted in uninsulated wire. The wire in each unit package of uninsulated wire shall be in one continuous length with no splices.

* 3.5.4 Spark test. Spark test in accordance with 4.6.17 shall be performed upon 100 percent of the insulated wire supplied under this specification. All insulation failures in this test shall be cut out of the wire or shall be marked by stripping the insulation 2 to 4 inches on each side of the failure. Each failure shall be considered equivalent to a splice in determining conformity to the requirements of 3.5.3.1 for distance between splices.

3.5.5 Curl. The curl of wire, taken from the unit package, shall be a minimum of 10 inches in diameter, when determined as specified in 4.6.18.

3.5.6 Cold bend. There shall be no evidence of physical or electrical damage to the wire insulation, when tested as specified in 4.6.21.

3.5.7 Heat resistance. When tested as specified in 4.6.22, the insulation shall not shrink more than the value specified in the applicable specification sheet, shall not show evidence of physical damage and shall not show electrical breakdown under the specified voltage. Unless otherwise specified in the specification sheet, the color of the finished wire after heat exposure shall still meet the color requirements of 3.5.2

3.5.8 Insulation cut-through. When the insulated wire is tested as specified in 4.6.23, the cutting edge of the testing instrument shall not penetrate to the conductor and there shall be no electrical breakdown of the insulation.

3.5.9 Resistance to fluids. When tested as specified in 4.6.25, the insulated wires shall not increase in diameter by more than 10 percent and shall not show dielectric failure.

* 3.5.10 Fungus resistance. The finished wire shall be fungus resistant in accordance with Requirement 4 of MIL-STD-454, either by the recognized inherent fungus-inertness of all components (Group 1 materials of Requirement 4), or for wires with components not included in Group 1 of Requirement 4, by passing the fungus resistance test specified in that requirement (see 4.6.28).

3.5.11 Workmanship. All details of workmanship shall be in accordance with manufacturing practice for high grade wire for electronic purposes. The wire insulation shall be smooth and free of cracks, splits, irregularities and imbedded foreign material.

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.

* 4.1.1 Certification of quality. When specified (see 4.5.1.5, 4.6.9 and 4.6.16), certification of quality may be submitted by the contractor. Such certification, however, shall not relieve the contractor from the obligation of meeting, with his finished wire, all performance requirements of this specification and applicable specification sheet, including the requirement for which the certification of quality was submitted. The submitting of the certification of quality shall not restrain the Government from exercising the inspection prerogatives reserved under 4.1.

4.2 Inspection conditions. Except as otherwise specified in the applicable test method or specification sheet, the conditions of temperature and humidity for all tests shall be in accordance with section 6 of FED-STD-228.

4.3 Classification of inspections. The inspection requirements specified herein are classified as quality conformance inspection and shall consist of the following:

a. Process control inspection (see 4.4).

b. Inspection of finished wire (see 4.5).

c. Inspection of packaging (see 4.7).

4.4 Process control inspection. Process control inspection comprises tests and examinations of such a nature that they cannot be performed on the finished wire as submitted for inspection and therefore must be conducted at the most appropriate stage of the manufacturing operations. The process control tests shall consist of the tests listed in table IV. Process control inspection shall be performed on every lot of wire acquired under this specification.

4.4.1 Sampling for process control inspection.

4.4.1.1 Conductor type and coating. From the conductor to be used in each inspection lot (see 4.5.1.1) of finished wire, four 20-foot lengths shall be selected in such a manner as to be a representative sample.

4.4.1.2 Insulation material. If the acquisition contract requires test of the insulation material, rather than certification of conformity (see 4.6.9), a representative sample, sufficient for determining conformity to the applicable material specification or for any testing required by the acquisition contract, shall be selected from the insulation extrusion material to be used for each lot of finished wire. When tapes or yarns are to be tested, four representative lengths, sufficient for determining conformity of the material, shall be selected.

* 4.4.1.3 Splices. If the acquisition contract requires final inspection of splices rather than certification of conformity (see 4.6.16), the sample for this inspection shall be 100 percent of the wire of each lot and 100 percent of the wire shall be inspected at the stage of manufacture and by the procedure specified in 4.6.16.

4.4.1.4 Spark test. The sample for spark test of the insulated wire shall be 100 percent of the wire of each lot. One hundred percent of the insulated wire shall be subjected to this test at the stage of manufacture and by the procedure specified in 4.6.17.

* 4.4.2 Effect of process control inspection. No lot of conductor, which fails to conform to the process control requirements of table IV, shall be used in wire which is to be furnished under this specification. No insulation material, which fails to conform to the process control requirements, either by an accepted certification of conformity or by test (see 4.6.9), shall be used in insulated wire of this specification. No unit package of insulated wire shall be offered for acceptance unless 100 percent of the wire in the package has been subjected to the specified spark

test procedure and has also, by an accepted certification of conformity (see 4.6.16), or by inspection (see 4.6.16), been determined to comply with the splicing requirements of 3.5.3.1. No unit package of uninsulated wire shall be offered for acceptance unless it has been by certification of conformity (see 4.6.16), or by inspection (see 4.6.16), been determined to comprise one continuous length of wire with no splices.

4.5 Inspection of the finished wire. Inspection of the finished wire shall consist of the examinations and tests listed in table V. Except as provided in 4.5.1.5, complete inspection of the finished wire shall be performed on every lot of wire acquired under this specification.

4.5.1 Sampling for inspection of the finished wire. MIL-STD-109 shall apply for definition of inspection terms used herein. For purposes of this specification, the following shall apply:

4.5.1.1 Inspection lot. All finished wire of one part number produced in a continuous production run without process change or raw material change and shipped at the same time shall be considered an inspection lot. Any interruption of the product run due to material or process change shall constitute a new lot. Any shipment containing more than one lot shall have the separate lots identified to facilitate inspection (see 5.3).

4.5.1.2 Unit of product. The unit of product for determining lot size for sampling shall be one unit package of finished wire, whether drum, reel or spool, except that when the unit package contains more than 30,000 feet of wire, each 30,000 feet or residual fraction thereof in the unit package shall be considered a unit of product.

* 4.5.1.3 Sample unit. The sample unit for quality conformance inspection shall be a piece of finished wire selected so as to be representative of the inspection lot and of sufficient length to permit all applicable examinations and tests. Unless otherwise specified in the acquisition contract (see 6.2.1), the length of the sample unit shall be two hundred feet. Not more than one sample unit shall be taken from a single unit of product. Unless otherwise specified in the contract, the sample unit, except for the curl test specimen, may be obtained either during the winding operation of the unit package or from the finished unit package. The curl test specimen shall be obtained from the finished unit package (see 4.6.18).

4.5.1.4 Inspection level and acceptable quality level (AQL). Except as provided in 4.5.1.5 and 4.6.12.2, the inspection level for all examinations and tests of finished wire, including group A characteristics and group B characteristics of table V, shall be S-3 and the AQL shall be 2.5 percent defective units in accordance with MIL-STD-105.

* 4.5.1.5 Certification of group B characteristics. Unless otherwise specified in the acquisition contract (see 6.2.1), the test requirements for group B characteristics of table V may be satisfied by the contractor's certificate of conformity to these requirements, supported by certification that wire of the same part number, manufactured within the preceding two years by the same manufacturer by identical processes and of identical formulation, has been subjected to and has passed these tests. Such certification, however, shall not restrain the Government from exercising the inspection prerogatives reserved under 4.1.

4.5.1.6 Rejection criteria. If the quality conformance sample for any inspection lot of finished wire contains more defective sample units than permitted by the AQL specified in 4.5.1.4, the inspection lot represented by that sample shall be rejected. Disposition of inspection lots found unacceptable under initial quality conformance inspection shall be in accordance with MIL-STD-105.

4.6 Methods of examination and test.

4.6.1 Examination of product. All samples of wire shall be examined carefully to determine conformance to this specification and to the applicable specification sheets with regard to requirements not covered by specific test methods.

4.6.2 Conductor type. Conformity of types A, B and C conductor to the conductor type requirements of 3.3.1.1 shall be determined by ASTM B 3, ASTM B 170 and ASTM B 624, respectively.

4.6.3 Conductor coating. Conformity of tin, silver and gold conductor coatings to 3.3.1.2 shall be determined by the methods of ASTM B 33, ASTM B 298 or MIL-G-45204, respectively.

* 4.6.4 Continuity and adherence of conductor coating (finished wire). The tests for conformity to the requirements of 3.3.1.3 for continuity and adherence of tin coatings and for continuity of silver or gold coatings shall be performed on specimens of coated conductor taken from the finished wire. Tin coatings shall be tested for continuity and adherence by the applicable procedures of ASTM B 33. Silver or gold coatings shall be tested for continuity by the procedure of ASTM B 298. When preparing the conductor specimens from insulated wire, extreme care shall be exercised that the conductor coating is not damaged in removing the wire insulation. One specimen shall be subjected to each applicable test from each sample unit and the sample unit shall be considered defective if the specimen fails to pass a test.

* 4.6.5 Conductor diameter. The diameter of conductor removed from the finished wire shall be determined by method 1431 of FED-STD-228. One specimen shall be tested from each sample unit. The sample unit shall be considered defective if the specimen fails to meet the requirements of 3.3.1.4.

4.6.6 Conductor tensile strength and elongation. The determination of these characteristics shall be made on conductor specimens removed, undamaged, from the finished wire. The test procedure shall be method 3211 of FED-STD-228. Five specimens from each sample unit shall be tested and the results averaged to determine compliance of the sample unit.

4.6.7 Conductor resistance. The conductor resistance test shall be performed in accordance with method 6021 of FED-STD-228, except that the period of immersion for insulated wire shall be one hour and uninsulated wire shall be tested dry without immersion. The test shall be made at a temperature of 20°C (68°F) or the result shall be corrected to that temperature. One specimen shall be tested from each sample unit. (NOTE: For insulated wire, it is convenient to use the same 50-foot, minimum, wire specimen for the conductor resistance test, the insulation resistance test and the wet dielectric strength test. If the same specimen is used for the three tests, the tests shall be performed in that order.)

4.6.8 Hydrogen embrittlement (type B conductors only). Specimens approximately three inches in length shall be taken from the finished wire and the insulation, if any, shall be removed. For tin coated conductors, the conductor coating also shall be removed from the specimens prior to hydrogen conditioning and bend testing, but silver coated and gold coated specimens may be conditioned and tested without prior removal of the coating. The specimens shall be tested in accordance with procedure D (reverse bend test) of ASTM B 577. Three specimens shall be tested from each sample unit and the unit shall be considered defective if any specimen fails to withstand the specified minimum number of bends without cracking or breaking.

4.6.9 Insulation material. Unless otherwise specified in the acquisition contract (see 6.2.1), the contractor's certification of conformity shall be acceptable as meeting the requirements of 3.3.2. Such certification, however, shall not relieve the supplier from the obligation of meeting, with his finished wire, all performance requirements, including insulation performance requirements, of this specification and the specification sheet, and it shall not restrain the Government from exercising the inspection prerogatives reserved under 4.1. If the acquisition contract requires evidence of insulation material conformity other than certification, the material shall be tested for conformity to the applicable material specification referenced in this specification or to any requirements listed in the acquisition contract.

4.6.10 Insulation tensile strength and elongation. These tests shall be made on five-inch insulation specimens prepared by cutting specimens of finished insulated wire of that length and removing the conductor without damage to the insulation. The test procedure for tensile strength shall be method 3021 of FED-STD-228 and for elongation shall be method 3031 of FED-STD-228, except that the rate of travel of the power-actuated grip of the testing machine for both tests shall be 8 inches, maximum, per minute. The initial separation of the gage marks for elongation shall be 1.000 ± .003 inch. Calculation of the cross-sectional area of the specimens shall be as follows:

$$\text{Area} = 0.7854\ (X^2 - Y^2) \text{ square inches.}$$

Where:

X = diameter of finished wire in inches.

Y = diameter of conductor in inches.

Five specimens from each sample unit shall be tested and the results averaged to determine compliance of the sample unit.

4.6.11 Finished wire diameter. The diameter of the finished wire shall be determined with a micrometer caliper having a vernier scale graduated to indicate 0.0001 inch. Each sample unit of the wire shall be measured at three places, one measurement near each end of the unit and one measurement near the midpoint. The sample unit shall be considered defective if any measurement fails to conform with the specified diameter.

* 4.6.12 Wire weight. The weight of each lot of finished wire shall be determined by procedure I (see 4.6.12.1). Lots failing to meet the wire weight requirement of the applicable specification sheet, when tested in accordance with procedure I, shall be subjected to procedure II (see 4.6.12.2). All drums, reels or spools failing to meet the requirements of the applicable specification sheet shall be rejected. The sampling plan of 4.5.1.4 is not applicable in procedure II.

4.6.12.1 Procedure I. The length and weight of a specimen at least 10 feet long shall be accurately measured and the resultant measurements converted to pounds per 1,000 feet.

4.6.12.2 Procedure II. The net weight of the finished wire on each drum, reel or spool shall be obtained by subtracting the tare weight of the drum, reel or spool from the gross weight of the drum, reel or spool containing the finished wire. Each net weight of wire shall be divided by the corresponding, accurately determined length and the resultant figure converted to pounds per 1,000 feet. When wood or other moisture absorbent materials are used for reel or spool construction, weight determinations shall be made under substantially uniform conditions of relative humidity.

4.6.13 Concentricity of insulation. The concentricity of the insulation shall be measured on a cross-section of the finished wire at suitable magnification. If the wire construction includes additional layers (e.g., jacket or insulation coating) outside the primary insulation, separate determinations shall be made for the primary insulation and finished wire. In making the determination, the minimum thickness of the primary insulation or total insulation wall, as applicable, shall be located and measured in the cross-section. The maximum thickness of the primary insulation or total insulation wall shall be located and measured in the same cross-section. The percent concentricity is 100 times the ratio of the minimum measurement to the corresponding maximum measurement. Three cross-sections shall be measured in each sample unit and the unit shall be considered defective if the concentricity of the primary insulation or the finished wire of any cross-section fails to conform to 3.5.1.

4.6.14 Insulation pull-off force. The determination of insulation pull-off force shall be made as follows:

* 4.6.14.1 Apparatus. The testing machine shall be as specified in method 3021 of FED-STD-228, except that the rate of travel of the power-actuated grip shall be 8 inches, maximum, per minute. The insulation stripping tool shall be a metal plate with a clearance hole which shall be larger than the conductor diameter of the test specimen by not more than 0.001 inch for wire sizes 30 through 26, 0.002 inch for sizes 24 and 22 and 0.003 inch for sizes 20 and 18. This stripping tool shall be fixed immovably opposite the power-actuated grip in such a manner that the center of the clearance hole is in the pull force axis. For measuring the force necessary to pull the insulation from the conductor, the apparatus shall be equipped with a force gage accurate to within ± 5 percent and designed to hold at the maximum obtained value.

4.6.14.2 Procedure. The specimen shall be prepared by carefully removing (without damage to the conductor) 4 inches of the insulation from one end of a 6-inch length of the wire under test and trimming the insulation and conductor flush at the other end so as to have 1-5/8 inches ± 1/16 inch of undamaged insulation left on the conductor. The stripped end of the specimen shall be passed through the hole in the stripping plate and attached to the grip or hook of the force gage, using care not to apply load to the insulated end of the specimen during this operation. The power activated grip of the testing machine shall then be activated, moving at 8 inches, maximum, per minute and applying tension in line with the wire and the center of the hole in the stripping plate until the insulation is pulled completely from the wire. The maximum force registered by the gage during the test shall be considered the insulation pull-off force. Three specimens shall be tested from each sample unit and the sample unit shall be considered defective unless the pull-off force for each specimen falls within the range specified in the specification sheet.

4.6.15 Color of insulated wire. The insulated wire shall be examined visually for conformity to 3.5.2. When applicable, the standard color chips of MIL-STD-104, class 1, shall be employed for visual comparison with the insulation color of the wire.

4.6.16 Splices. Unless otherwise specified in the acquisition contract (see 6.2.1), the contractor's certification of conformity shall be acceptable as meeting the requirements of 3.5.3. Such certification, however, shall not restrain the Government from exercising the inspection prerogatives reserved under 4.1. If the acquisition contract requires inspection of splicing, one hundred percent of the wire shall be examined for conformity to the requirements for splices in insulated wire (see 3.5.3.1), or for absence of splices in uninsulated wire (see 3.5.3.2). The final inspection of splices shall be made either subsequent to, or concurrently, with the spark test (see 4.6.17), if applicable, as the wire is wound into the shipping drums or on shipping reels or spools. For insulated wire, determination shall be made that all wire in any unit package has been spliced into one continuous length, unless otherwise specified (see 6.2.1), and that wire of separate lots is not present in the same unit package. Splices not conforming to the specified construction in insulated wire shall be corrected. Any portions of the insulated wire which measure less than 100 feet between splices or equivalent (spark test failures or wire ends, see 3.5.3.1), or which cause the average distance between splices or equivalent to fall below the specified minimum average for the drum, reel or spool (see 3.5.3.1) shall be cut out and the residual portions shall be respliced. For uninsulated wire, determination shall be made that all wire in any unit package is in one continuous splice-free length.

4.6.17 Spark test. The spark test shall be the final test made on the insulated wire as the wire is wound into the shipping drums or on shipping reels or spools, except that it shall precede or be made concurrently with the inspection of splices, if the latter inspection is required in the acquisition contract (see 4.6.16). The test shall be conducted by method 6211 of FED-STD-228, using a bead chain electrode at the test voltage specified in the applicable specification sheet (see 3.1) with the wire moving at a rate which subjects each point on the insulation to 9 cycles of voltage at 60 Hz or 12 cycles of voltage at 3,000 Hz. All insulation failures shall be cut out of the wire or shall be marked by stripping the insulation 2 to 4 inches on each side of the failure (see 3.5.4). One hundred percent of the insulated wire shall be subjected to this test.

4.6.18 Curl. This test shall be made only on specimens cut from unit packages. The number of specimens tested shall correspond as nearly as possible to the number of sample units required by the specified inspection level (see 4.5.1.4), except that not more than one specimen shall be taken from any unit package. In making the test, an undisturbed 30 inch specimen of wire cut from a unit package shall be placed on a smooth flat surface. The diameter of the circular curl of the wire shall then be determined to the nearest 1/4 inch.

* 4.6.19 Insulation resistance. The insulation resistance test shall be performed in accordance with method 6031 of FED-STD-228, modified as follows:

a. A suitable megohm bridge with comparable accuracy may be substituted for the measuring apparatus described in the method.

b. The specimen shall be a 50-foot, minimum, length of insulated wire (see note in 4.6.7).

c. The test voltage shall be 500 volts DC with the conductor maintained at high potential.

d. The period of immersion before test shall be a minimum of 4 hours.

e. The resistance shall be determined after one minute of electrification at the test potential.

f. The test temperature shall be 20 ± 2°C (68 ± 3.6°F), the test result for the specimen in this temperature range being recorded without application of a temperature correction factor and converted to megohms-1,000 feet by the following calculation:

$$\text{Megohms-1,000 feet} = \frac{\text{Total specimen resistance (megohms) X immersed length (feet)}}{1{,}000}$$

One specimen shall be tested from each sample unit.

* 4.6.20 Wet dielectric strength. The wet dielectric test shall be conducted by method 6111 of FED-STD-228, except that the immersion period before test shall be four hours, minimum, and that at least 1-1/2 inches, at each end of the specimen, shall extend above the water during the immersion period and during performance of the test. For test of the wire in initial condition, the specimen length shall be 50 feet (see note in 4.6.7) and one specimen shall be tested per sample unit. As a supplementary test (e.g., after cold bend or fluid immersion), the specimen length shall be as specified in the applicable test procedure. Test voltage for wet dielectric strength shall be as specified in the specification sheet.

4.6.21 Cold bend. One end of a vertically suspended 18-inch specimen of insulated wire shall be fastened to a horizontally positioned rotatable mandrel in a cold chamber and the other end of the specimen shall be weighted with the load weight specified in the applicable specification sheet. The diameter of the mandrel shall also be as specified in the specification sheet. Provision shall be made for rotating the mandrel by means of a handle or control located outside the cold

box. After the conditioning specified in the specification sheet and while specimen and mandrel are still at the specified low temperature, the specimen shall be wrapped helically about the mandrel by revolving the mandrel at approximately 1/4 revolution per second until 12 inches of the specimen have been wrapped. The specimen shall then be unwound and rewound for the same length in the opposite direction in a similar manner. The coiled specimen shall be removed from the cold chamber without straightening and allowed to stabilize to room temperature. The specimen shall be examined visually for cracks or other physical damage to the insulation and shall be subjected to the wet dielectric test of 4.6.20. One specimen shall be tested from each sample unit.

4.6.22 Heat resistance. A 12-inch specimen of insulated wire, cut so that the insulation and conductor are flush at both ends of the wire, shall be subjected to the heat conditioning specified in the applicable specification sheet. During conditioning, the specimen shall be suspended in such a manner as not to touch other specimens or the sides of the conditioning chamber. The specimen shall then be removed from the conditioning chamber and allowed to cool to room temperature. The shrinkage of the insulation shall be measured as the distance the primary insulation has receded from the end of the conductor at the specimen end where the greater shrinkage has occurred. The specimen shall then be wound manually, at room temperature, for five close turns of its mid-portion or for its entire length, whichever is lesser, around a mandrel of the diameter specified in the specification sheet and shall be removed from the mandrel as a helical coil. The insulation shall be examined visually for cracking, delamination, or other evidence of physical damage and for color change, and shall be subjected to the wet dielectric test of 4.6.20. Three specimens shall be tested from each sample unit and the sample unit shall be considered defective if any specimen fails to meet the requirements of 3.5.7.

4.6.23 Insulation cut-through. A specimen of insulated wire, 12 inches in length, shall be subjected to cut-through at room temperature by penetration of a 0.0030 ± 0.0005 inch radius cutting edge on a 90 degree corner with the load specified in the applicable specification sheet at the point of contact for 60 minutes. The center-line of the cutting edge shall be perpendicular to the axis of the wire. The wire shall be supported on a smooth, flat, unyielding surface. After completion of the 60-minute period and while still under load, the specimen shall withstand, for one minute, the dielectric test voltage specified in the specification sheet, from cutting edge to conductor. Three specimens from each sample unit shall be tested and the sample unit shall be considered defective if any specimen fails to meet the requirements of 3.5.8 under this test.

4.6.24 Insulation dielectric constant and power factor. The specimen shall be of sufficient length that the measured capacitance shall be not less than 100 picofarads. The external surface shall be grounded by application of sprayed metal or by immersion in mercury. The power factor and the capacitance shall be determined by either the bridge method or the resonant circuit substitution method, at room temperature, at a frequency specified in the specification sheet. The method shall permit determination of the power factor with an accuracy of ± 5 percent. The power factor shall be measured directly; the effective dielectric constant shall be calculated from the capacitance measurement and the configuration of the specimen as follows:

$$K_e = 136\ C \log_{10} (D/d).$$

Where:

K_e = Dielectric constant (effective).

C = Capacitance of specimen in microfarads per 1,000 feet.

D = Average outside diameter over dielectric (diameter of finished wire).

d = Average diameter of conductor.

One specimen shall be tested from each sample unit.

* 4.6.25 Resistance to fluids. Twelve-inch specimens of insulated wire shall be gaged accurately to determine their initial diameters. The specimens shall be bent into a U-shape on a radius of bend not less than fourteen times the finished diameter of the wire and shall be immersed for 24 hours to within two inches of their ends in each applicable fluid of the following list (using a separate specimen for each fluid) at a temperature of 25° ± 5°C (77° ± 9°F). The fluids required for the wire of each specification sheet shall be as specified in the applicable specification sheet. The fluids shall be as follows:

a. Isopropyl alcohol, TT-I-735.

b. Hydraulic fluid, petroleum base, aircraft, missile, and ordnance, MIL-H-5606.

c. Cleaning compound, solvent, trichlorotrifluoroethane, MIL-C-81302.

d. 1, 1, 1 trichloroethane (methyl chloroform), inhibited, vapor degreasing, MIL-T-81533.

After removal from the test fluids, the specimens shall be conditioned in air at room temperature for one hour. Excess fluid shall be removed by wiping carefully with a dry cloth. The diameters of the specimens shall be determined again and the percent change from the initial diameters shall be computed. The specimens shall then be subjected to the wet dielectric test of 4.6.20. From each sample unit, one specimen for each applicable test fluid shall be subjected to the fluid resistance test.

4.6.26 Flammability.

* 4.6.26.1 Apparatus. The test shall be performed within a test chamber approximately one foot square by two feet in height, open at top and front to provide adequate ventilation but to prevent drafts. Means shall be provided to hold a 16-inch specimen taut at an angle of 60 degrees from horizontal in a vertical plane parallel to and about 6 inches in front of the rear wall of the chamber. The test flame shall be from a Bunsen-type gas burner with a 1/4-inch inlet, a needle valve in the base for gas adjustment, a bore of 3/8 inch nominal, and a length of approximately 4 inches from top to primary inlets. The burner shall be adjusted to furnish

a 3 inch conical flame with an inner cone approximately 1 inch in height. A sheet of facial tissue conforming to UU-T-450 shall be suspended horizontally 5 inches below the lower end of the test specimen and at least 1/2 inch from the chamber floor so that any material dripping from the test specimen shall fall upon the tissue.

* 4.6.26.2 Procedure. A 16-inch specimen of insulated wire shall be marked at a distance of 6 inches from its lower end to indicate the point for flame application and shall be placed in the specified 60 degree position in the test chamber. With the burner held perpendicular to the specimen and at an angle of approximately 30 degrees from the vertical plane of the specimen, the hottest portion of the flame shall be applied to the lower side of the wire at the test mark. The period of test flame application shall be 30 seconds and the test flame shall be withdrawn immediately at the end of that period. The distance of flame travel upward along the specimen from the test mark and the time of burning after removal of the test flame shall be recorded; also the presence or absence of flame in the facial tissue due to incendiary drip from the specimen. Charred holes or charred spots in the tissue shall be ignored in the absence of actual flame. Breaking of the wire specimens shall not be considered as failure provided the requirements for flame travel limits, duration of flame, and absence of incendiary drippings are met. One specimen shall be tested from each sample unit.

4.6.27 Surface resistance. The insulation surface resistance shall be determined in accordance with method 6041 of FED-STD-228, except that a suitable megohm bridge of comparable accuracy may be substituted for the measuring apparatus described and the test voltage shall be 500 volts. Three specimens from each sample unit shall be tested and the results averaged to determine compliance of the sample unit.

* 4.6.28 Fungus resistance. A statement on the applicable specification sheet, that all materials specified for the wire of that sheet are listed in table I of Requirement 4, MIL-STD-454, as fungus inert or are suitable in fungus-inertness characteristics to be so listed shall be considered as satisfying the requirements of 3.5.10 for fungus resistance. Wires not thus identified on the applicable specification sheet as fungus-inert shall be subjected to the fungus resistance test specified in Requirement 4, MIL-STD-454, to determine their conformity to 3.5.10. Three specimens shall be tested from the wire lot under test and all specimens must pass the test.

4.7 Inspection of packaging. The packaging of materials ready for shipment shall be examined to determine conformity to the requirements of section 5.

5. PACKAGING

* 5.1 Preservation-packaging. Preservation-packaging shall be level A or C, as specified in the contract or purchase order (see 6.2.1).

5.1.1 Level A. Level A preservation-packaging shall be in accordance with the level A packaging requirements of MIL-C-12000 and as follows:

* 5.1.1.1 Drum. When drum packaging is specified (see 6.2.1), wire shall be supplied in drums of 20 inches in diameter with a minimum core diameter of 12 inches. The interior walls of the drums shall be clean and free of sharp edges and abrasive surfaces. Means shall be employed within the drum to prevent uncoiling or tangling of the wire due to rolling or handling during shipment. The drums shall be suitably marked to reduce probability of mistreatment during shipping and shall be palletized to minimize handling. All wire in any one drum shall be from one inspection lot only. The wire in each drum of uninsulated wire shall be in one continuous splice-free length (see 3.5.3.2) and, unless otherwise specified in the acquisition contract (see 6.2.1), the wire in each drum of insulated wire shall be in one continuous length and, if spliced, shall conform to all requirements of 3.5.3.1 for construction and spacing of splices. Both ends of the wire in each drum shall be marked or tagged to facilitate sampling and utilization. Drums shall be packaged with a maximum of 55,000 feet of wire per drum. (Note: Drum packaging is recommended for insulated wire of AWG 26 and larger.)

* 5.1.1.2 Reel. When reel packaging is specified (see 6.2.1), wire shall be supplied on reels of 24 inches maximum reel diameter and a minimum core diameter of 8 inches. The interior walls of the reels shall be clean and free of sharp edges and abrasive surfaces. The wire shall traverse a distance of not less than 2 inches and not more than 12 inches on the reel. Means shall be employed on the reel to prevent uncoiling or tangling of the wire due to rolling or handling during shipment. All wire in any one reel shall be from one inspection lot only. The wire in each reel of uninsulated wire shall be in one continuous splice-free length (see 3.5.3.2) and, unless otherwise specified in the acquisition contract (see 6.2.1), the wire in each reel of insulated wire shall be in one continuous length and, if spliced, shall conform to all requirements of 3.5.3.1 for construction and spacing of splices. Both ends of the wire in each reel shall be marked or tagged to facilitate sampling and utilization. Reels shall be packaged with a maximum of 50,000 feet of wire. (Note: Reel packaging is recommended for insulated wire of AWG 28 and smaller and for all uninsulated wire.)

5.1.1.3 Spool. When spool packaging is specified (see 6.2.1), the wire shall be unit packaged on spools in the quantity specified in the order or contract. Uninsulated wire on each spool shall be in one continuous splice-free length (see 3.5.3.2) and, unless otherwise specified in the acquisition contract (see 6.2.1), insulated wire shall conform to all splicing requirements of 3.5.3.1.

5.1.2 Level C. Level C preservation-packaging shall be in accordance with the requirements of MIL-C-12000 for level C packaging.

5.2 Packing. Packing shall be level A, B or C in accordance with MIL-C-12000. Unless otherwise specified in the order (see 6.2.1), level C shall be applicable.

5.3 Marking. Interior packages and exterior shipping containers shall be marked in accordance with MIL-C-12000 and MIL-STD-129. The identification shall be composed of the following information listed in the order shown:

WIRE, ELECTRICAL, SOLDERLESS WRAP
Specification sheet part no.
MIL-W-81822A
Length_____feet
Size
Date of manufacture
Name of manufacturer
Lot identification

6. NOTES

6.1 Intended use. The wire covered by this specification is intended for use in panel wiring of electrical and electronic equipment employing solderless wrapped electrical connections.

6.1.1 Temperature rating. Temperature ratings, as specified in specification sheets pertaining to this specification, represent the maximum permissible continuous operating temperature of the conductor.

6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number and date of this specification.

b. Applicable specification sheet number, title and date.

c. Specification sheet part number of required wire.

d. Color required (see 3.5.2).

e. Type of conductor required (see 3.3.1.1).

f. Quantity of wire required.

g. Levels of packaging and packing required; also type of unit package required (drum, reel or spool) and wire length per package, if applicable.

h. Exceptions, if any, to the optional requirements of this specification, including:

(1) Exceptions, if applicable, to the insulation color requirements (see 3.5.2).

(2) Exceptions, if applicable, to the requirements for splices in the wire (see 3.5.3.1); also requirement, if applicable, that conformity to the splicing requirements be determined by inspection instead of certification (see 4.6.16).

(3) Exceptions, if applicable, to the specified sample unit length and the optional points for taking quality conformance samples (see 4.5.1.3).

(4) Requirement, if applicable, that the group B quality conformance characteristics of the inspection lot be determined by test instead of contractor's certification of conformity (see 4.5.1.5).

(5) Requirement, if applicable, that conformity of the insulation materials be determined by examination and test instead of by certification (see 4.6.9). (If examination and tests are required for insulation materials not covered by reference documents in this specification, the acquisition contract should list requirements to be met by the material.)

* 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 From 1664) and delivered in accordance with the approved CDRL incorporated into the contract. When the provisions of DAR 7-104.9 (n) (2) 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 paragraphs.

Paragraph no.	Data requirement	Applicable DID no.
4.1.1	Certificate of compliance	DI-E-2121

(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.)

6.3 Changes from previous issue. The margins of this specification are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

Custodians:
Navy - AS
Army - CR
Air Force - 85

Review activities:
Navy - EC, SH
Air Force - 11, 99
DSA - ES, IS

User activities:
Navy - MC, OS
Air Force - 17

Preparing activity:
Navy - AS

(Project No. 6145-0683)

* TABLE I. Conductor requirements. 1/

Conductor size (AWG) 2/	30	28	26	24	22	20	18
Conductor diameter (inch):							
Nominal	0.0100	0.0126	0.0159	0.0201	0.0253	0.0320	0.0403
Minimum	0.0099	0.0125	0.0157	0.0199	0.0250	0.0317	0.0399
Maximum 3/	0.0103	0.0130	0.0164	0.0207	0.0261	0.0330	0.0415
Maximum 4/	0.0101	0.0127	0.0161	0.0203	0.0256	0.0323	0.0407
Types A and B conductors:							
Tensile strength (max) (psi)	←		42,000		→	← 40,000	→
Elongation (min) (%) 5/	←12.0→	←	15.0	→	←	20.0	→
Resistance (20°C) (ohms/1000 ft) (max):							
Silver coated conductor	108.1	68.0	42.7	26.5	16.8	10.4	6.59
Gold coated conductor	109.5	68.7	43.1	26.6	16.9	10.5	6.61
Tin coated conductor	116.3	72.2	45.4	27.5	17.4	10.8	6.85
Hydrogen embrittlement (bends) (min) (type B only)	←		4				→
Type C conductor:							
Tensile strength (max) (psi)	←		55,000 min.; 73,000 max.				→
Elongation (min) (%)	←		6.0				→
Resistance (20°C) (ohms/1000 ft) (max):							
Silver coated conductor	126.4	79.4	50.4	31.0	19.7	12.2	7.74
Gold coated conductor	127.8	80.1	50.7	31.2	19.8	12.3	7.76

1/ Requirements apply to conductor taken from finished wire.

2/ American wire gage.

3/ Requirement applies to all insulated wire constructions and to uninsulated tin coated constructions.

4/ Requirement applies to uninsulated silver coated and uninsulated gold coated constructions only.

5/ For conductors with tin coating, the minimum elongation values specified for types A and B shall be reduced 5 percentage points (e.g., for 30 AWG type A or B conductor, 7.0 percent min in lieu of 12.0 percent min).

TABLE II. Properties of finished wire.

Examination or test	Requirement paragraph or reference	Method paragraph
Conductor type	3.3.1.1	4.6.2
Conductor coating	3.3.1.2	4.6.3
Coating continuity and adherence	3.3.1.3	4.6.4
Conductor diameter	3.3.1.4 and table I	4.6.5
Conductor tensile strength and elongation	3.3.1.5 and table I	4.6.6
Conductor resistance	3.3.1.6 and table I	4.6.7
Hydrogen embrittlement (type B conductor only)	3.3.1.7 and table I	4.6.8
Insulation material	3.3.2	4.6.9
Construction of insulation	Specification sheet	4.6.1
Insulation tensile strength and elongation	Specification sheet	4.6.10
Finished wire diameter	Specification sheet	4.6.11
* Finished wire weight	Specification sheet	4.6.12
Concentricity of insulation	3.5.1	4.6.13
Insulation pull-off force	Specification sheet	4.6.14
Color of insulated wire	3.5.2	4.6.15
Splices	3.5.3	4.6.16
Spark test	3.5.4	4.6.17
Curl	3.5.5	4.6.18
Insulation resistance	Specification sheet	4.6.19
Wet dielectric strength	Specification sheet	4.6.20
Cold bend	3.5.6	4.6.21
Heat resistance	3.5.7	4.6.22
Insulation cut-through	3.5.8	4.6.23
Insulation dielectric constant and power factor	Specification sheet	4.6.24
Resistance to fluids	3.5.9	4.6.25
Flammability	Specification sheet	4.6.26
Surface resistance	Specification sheet	4.6.27
* Fungus resistance	3.5.10	4.6.28
Workmanship	3.5.11	4.6.1

TABLE III. Insulation colors and color code.

Color	Code number	Color	Code number
Black	0	Green	5
Brown	1	Blue	6
Red	2	Purple	7
Orange	3	Gray	8
Yellow	4	White	9

TABLE IV. Process control inspection.

Examination or test	Requirement paragraph or reference	Method paragraph
Conductor type	3.3.1.1	4.6.2
Conductor coating	3.3.1.2	4.6.3
Insulation material	3.3.2	4.6.9
Splices	3.5.3	4.6.16
Spark test (insulated wire only)	3.5.4	4.6.17

TABLE V. Inspection of finished wire.

Examination or test	Requirement paragraph or reference	Method paragraph
Group A characteristics:		
Conductor coating continuity and adherence	3.3.1.3	4.6.4
Conductor diameter	3.3.1.4 and table I	4.6.5
Conductor tensile strength and elongation	3.3.1.5 and table I	4.6.6
Conductor resistance	3.3.1.6 and table I	4.6.7
Construction of insulation	Specification sheet	4.6.1
Insulation tensile strength and elongation	Specification sheet	4.6.10
Finished wire diameter	Specification sheet	4.6.11
* Finished wire weight	Specification sheet	4.6.12
Concentricity of insulation	3.5.1	4.6.13
Insulation pull-off force	Specification sheet	4.6.14
Color of insulated wire	3.5.2	4.6.15
Curl	3.5.5	4.6.18
Insulation resistance	Specification sheet	4.6.19
Wet dielectric strength	Specification sheet	4.6.20
Cold bend	3.5.6	4.6.21
Heat resistance	3.5.7	4.6.22
Insulation cut-through	3.5.8	4.6.23
Workmanship	3.5.11	4.6.1
Group B characteristics:		
Hydrogen embrittlement (type B conductor only)	3.3.1.7 and table I	4.6.8
Insulation dielectric constant and power factor	Specification sheet	4.6.24
Resistance to fluids	3.5.9	4.6.25
Flammability	Specification sheet	4.6.26
Surface resistance	Specification sheet	4.6.27
* Fungus resistance	3.5.10	4.6.28

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DOCUMENT IDENTIFIER (Number) AND TITLE

MIL-W-81822A WIRE, ELECTRICAL, SOLDERLESS WRAP, INSULATED AND UNINSULATED

NAME OF ORGANIZATION AND ADDRESS OF SUBMITTER

☐ VENDOR ☐ USER ☐ MANUFACTURER

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