INCH-POUND

MIL-W-29606
30 August 1994

MILITARY SPECIFICATION

WIRE, ELECTRICAL, STRANDED, UNINSULATED COPPER, COPPER ALLOY, OR ALUMINUM, OR THERMOCOUPLE EXTENSION, 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 concentric lay stranded and rope-lay stranded round electrical conductor fabricator from copper, copper alloy or aluminum. This specification also covers thermocouple extension conductor fabricated from nickel/chromium or nickel/aluminum/manganese. The conductors in this specification are suitable for use in insulated wires used in aerospace and other applications.

1.2 Classification. Stranded conductors shall be classified herein. The classification shall be by:

Conductor Material	Conductor Stranding
Conductor Coating	Conductor Dimensions

1.2.1 Military part number designation. Example:

M29606	-	20	-	SCC	-	GP
Basic Part No. (1.2.1.1)		Conductor Size (1.2.1.2)		Conductor Material and Coating (1.2.1.3)		Conductor Diameter Tolerance (1.2.1.4)

The above conductor is a size 20 conductor of silver coated annealed copper conductor with general purpose diameter control.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commanding Officer, Naval Air Warfare Center Aircraft Division Lakehurst, Systems Requirements Department (Code SR33), Lakehurst, NJ 08733-5100, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 6145

1.2.1.1 Basic part number. The conductor military part number shall consist of the letter "M," the basic number of the applicable specification and the applicable alpha-numeric characters formulated in the example (see 1.2.1).

1.2.1.2 Conductor size. A one- or two-digit designator from Table II shall be used to designate the conductor size.

1.2.1.3 Conductor material and coating designator. An alphabetic designator from Table I shall be used to designate the conductor material and conductor coating.

1.2.1.4 Conductor diameter tolerance. The conductor diameter dimensional tolerance shall be designated as follows:

GP - General Purpose (see Table II).

SD - Small Diameter (see Table II).

Note: The GP conductors shall be inactive for new design for copper and copper alloy conductors. All conductors without a distinct diameter tolerance (GP or SD) shall be designated as general purpose (GP) diameter tolerance conductors.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specification, 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

MILITARY

MIL-C-3993 - Copper and Copper-Base Alloy Mill Products; Packaging of.

STANDARDS

FEDERAL

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

MILITARY

MIL-STD-105	-	Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-109	-	Quality Assurance Terms and Definitions
MIL-STD-202	-	Test Methods for Electronic and Electrical Components Parts.
MIL-STD-45662	-	Calibration Systems Requirements.

(Unless otherwise indicated, copies of federal and military specifications, standards and handbooks are available from the DODSSP - Customer Service, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.2 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-A380	-	Standard Practice for Cleaning and Descaling Stainless Steel Parts, Equipment, and Systems. (DoD adopted)
ASTM-B33	-	Wire, Tinned Soft or Annealed Copper, for Electrical Purposes. (DoD adopted)
ASTM-B230	-	Aluminum 1350 - H19 Wire for Electrical Purposes. (DoD adopted)
ASTM-B263	-	Determination of Cross-Sectional Area of Stranded Conductors. (DoD adopted)
ASTM-B298	-	Wire, Copper, Silver-Coated Soft or Annealed. (DoD adopted)
ASTM-B355	-	Nickel Coated Soft or Annealed Copper Wire. (DoD adopted)
ASTM-B624	-	Wire Copper Alloy, High Strength, High Conductivity, for Electronic Application. (DoD adopted)

(Application for copies should be addressed to the American Society for Testing and Materials (ASTM), 1916 Race Street, Philadelphia, PA 19103-1137.)

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI-MC96.1	-	Temperature Measurement Thermocouples.

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

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, 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 Detail specification. The individual item requirements shall be as specified herein and in accordance with the ASTM or ANSI document when applicable. In the event of any conflict between requirements of this specification and the ASTM or ANSI standards (see 2.2), this specification shall govern.

3.1.1 First article. When specified (see 6.2), a sample shall be subjected to first article inspection (see 6.3) in accordance with 4.4.

3.2 Conductor strand material. All strands used in conductors specified herein shall conform to the applicable ASTM or ANSI standards for the proper material listed in Table I. Strands shall be free from lumps, kinks, splits, scraped or corroded surfaces, and skin impurities. In addition, the strands shall conform to the following requirements as applicable.

3.2.1 Tin coated copper strands (type TCC). The tin coating shall be as specified in ASTM-B33.

3.2.2 Silver coated copper strands (type SCC). The strands shall have a coating thickness of not less than 40 microinches of silver when measured in accordance with ASTM-B298.

3.2.3 Nickel coated copper strands (type NCC). The strands shall have a coating thickness of not less than 50 microinches of nickel when measured in accordance with ASTM-B355.

3.2.4 Heavy nickel coated copper strands (type NHC). The copper strands shall have a coating thickness of not less than 27 percent by weight of nickel when measured in accordance with ASTM-B355.

3.2.5 Silver coated copper alloy strands (type SCA). The copper alloy strand base material shall conform to ASTM-B624. The strands shall have a coating thickness of not less than 40 microinches of silver when measured in accordance with ASTM-B298.

3.2.6 Nickel coated copper alloy strands (type NCA). The copper alloy strand base material shall conform to ASTM-B624. The strands shall have a coating thickness of not less than 50 microinches of nickel when measured in accordance with ASTM-B355.

3.2.7 Heavy nickel coated copper strands (type NHA). The copper alloy strand base material shall conform to ASTM-B624. The copper strands shall have a coating thickness of not less than 27 percent by weight of nickel when measured in accordance with ASTM-B355.

3.2.8 Silver coated ultra-high strength copper alloy strands (type SCU). The ultra-high strength copper alloy strands shall be made of a copper alloy material capable of meeting all requirements herein. The strands shall have a coating thickness of not less than 40 microinches of silver when measured in accordance with ASTM-B298.

3.2.9 Nickel coated ultra-high strength copper alloy strands (type NCU). The ultra-high strength copper alloy strands shall be made of a copper alloy material capable of meeting all requirements herein. The strands shall have a coating thickness of not less than 50 microinches of nickel when measured in accordance with ASTM-B355.

3.2.10 Aluminum strands (type ALU). The aluminum strand material shall conform to ASTM-B230.

3.2.11 Type K Thermocouple Extension Conductor (Type KPH, KPS, KNH, and KNS). Type KPH and KPS strands shall be made from an alloy of 90 percent nickel - 10 percent chromium and type KNH and KNS strands shall be made from an alloy of 95 percent nickel - 2 percent aluminum - 2 percent manganese - 1 percent silicon and minor traces of other materials and shall conform to ANSI-MC96.1.

3.3 Conductor stranding. Conductor stranding shall be in accordance with Tables II-A thorugh II-F. No metallic coatings or platings are permitted over the stranded conductor after stranding.

3.3.1 Concentric stranding. The conductors with 7, 19, or 37 strands shall be concentric-lay stranded as specified in Table II. The direction of lay shall be alternately reversed (true concentric lay) or in the same direction (unidirectional lay). The strands shall be assembled in a geometric arrangement of concentric layers, producing a smooth and uniform conductor, circular in cross-section and free of any crossovers of adjacent strands, high strands, or other irregularities. The direction of lay of the individual strands in the outer layer of the concentrically stranded conductors of the finished wire shall be left hand. The length of lay of the outer layer shall be 8-16 times the maximum conductor diameter as specified in Table II.

3.3.2 Rope-lay stranding. The conductors with more than 37 strands shall be rope-lay stranded as specified in Table II. Rope-lay stranded conductors shall be laid up concentrically with a central member surrounded by one or more layers of helically wound members. The direction of lay of successive layers shall be alternately reversed (true concentric lay), or in the same

direction (unidirectional lay). The length of the lay of the outer layer of rope-lay stranded conductor shall be 8-14 times the outside diameter of the completed conductor. The direction of lay of the outside layer shall be either left or right hand.

3.3.2.1 Rope-lay members. The individual members of the rope-lay stranded conductors may be either bunched or concentric stranded. The length of lay of the stranded members shall not be greater than 16 times the outside diameter of the member.

3.4 Splices. For conductor types TCC, SCC, NCC, NHC, SCA, NCA, NHA, SCU, and NCU, splices in individual strands or members shall be butt brazed or welded. There shall not be more than one strand-splice in any two lay lengths of a stranded concentric-lay conductor or in any two lay lengths of any member in a rope-lay conductor, except that not more than one splice of the entire member shall be permitted in any two lay lengths of a rope-lay conductor. Splices in members of a rope-lay construction shall be so finished that the conductor diameter is not increased at the point of joining. In no case shall the whole conductor be spliced at any one point.

For conductor type ALU, splices in individual strands shall not be closer than two lay lengths of member. Splices in members of rope-lay constructions shall not be closer than 10 feet. In no case shall the whole conductor be spliced at any one point.

For conductor types KPH, KPS, KNH, and KNS, splices in individual strands or groups of individual strands shall be butt brazed with silver solder. Splices shall be so constructed and disposed throughout the conductor that the diameter, configuration, conductor resistance, flexibility, and mechanical strength of the completed conductor are not adversely affected.

3.5 Properties of individual strands before stranding. The individual strands must comply to the ASTM or ANSI requirements when applicable (see Table I), and the plating thickness requirements for the specific conductor.

3.6 Properties of stranded conductors.

3.6.1 Conductor diameter. The diameter of the conductor shall be as specified in Table II. Applicability of the "general purpose" or of the "small diameter" Table II requirements for the maximum conductor diameter shall be as indicated by the part number. All measurements shall fall within the specified range. The diameter shall be measured in accordance with 4.6.2. All conductors without a distinct diameter tolerance (GP or SD) shall be designated as general purpose (GP) diameter tolerance conductors as specified in 1.2.1.

3.6.2 Solderability. The stranded conductor shall have a minimum coverage of 95 percent when examined after testing to the method specified in 4.6.3. Solderability requirements are not applicable to aluminum, thermocouple extension, or nickel coated conductors.

3.6.3 Elongation. The elongation of the entire conductor shall be measured on size 22 and smaller annealed copper, and size 20 and smaller copper alloy conductors. Elongation measurements on single strands removed from the stranded constructions shall be measured on larger sizes of annealed copper, copper alloys, and all sizes of aluminum. The minimum elongation shall be not less than the values in Table II as measured in accordance with 4.6.4. Elongation requirements are not applicable to thermocouple extension conductors.

3.6.4 Tensile strength. The break strength of all copper alloy conductors shall be measured. The minimum break strength shall not be less than the values in Table II. Tensile strength values of aluminum conductors shall be as specified in Table II. There are no requirements for tensile strength on the annealed copper conductors and thermocouple extension conductors. The tensile strength or break strength shall be measured in accordance with 4.6.4.

3.6.5 Conductor resistance. The DC resistance of the conductor shall be not greater than the values in Table II as measured in accordance with 4.6.5. In addition, for thermocouple extension conductors only, the DC resistance of the conductor shall be greater than the minimum values in Table II as measured in accordance with 4.6.5.

3.6.5.1 Electromotive force (thermocouple extension conductor only). The temperature-electromotive force relationship of the type K positive and negative legs formed together as a thermocouple shall conform to requirements of ANSI-MC96.1 for type K compositions when measured in accordance with 4.6.5.1.

3.6.6 Continuity of coating. For coated conductors, the coating on the strands shall be continuous. The continuity of the coating shall be determined in accordance with the sodium polysulfide test of 4.6.6. A specimen is considered to have failed if blackening due to exposed copper is revealed due to the stranding operation or as a pre-existing condition prior to stranding. The failure should fall into one or both of the following categories:

a. Failure on one strand due to a defective condition in the strand prior to the stranding process; e.g., scraped single strand. This type of fault appears to the unaided eye as a spiral blackening around the conductor.

b. Failure along one side of the sample due to excessive, local abrasion to that side during stranding. This type of failure appears to the unaided eye as a continuous blackening along the axis of the conductor.

3.6.7 Cross-sectional area. The minimum cross-sectional area of the stranded conductor shall conform with the Table II requirements, as measured in accordance with 4.6.7.

3.7 Disposal of in-process waste. Caution must be taken during any plating, cleaning, descaling, passivation, or similar process. The contractor shall be responsible for the safe re-utilization and disposal of all material generated by these processes in accordance with ASTM-A380, sections 8.2 and 8.7.

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

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

4.1.2 Test equipment and inspection facilities. Test and measuring equipment and inspection facilities shall be established and maintained by the contractor. The establishment and maintenance of a calibration system to control the accuracy of the measuring and test equipment shall be in accordance with MIL-STD-45662.

4.1.3 Inspection conditions. Unless otherwise specified herein, all inspections shall be performed in accordance with the test conditions specified in The General Requirements of FED-STD-228.

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

a. Strand inspection (see 4.3).

b. First article inspection (see 4.4).

c. Quality conformance inspections (see 4.5).

4.3 Strand inspection. Strand inspection shall consist of certification to the ASTM or ANSI standard when applicable (see Table I), verification of coating thickness (if applicable), and any additional inspections required to ensure the strands meet the requirements of the individual strand specification (if applicable).

4.3.1 Coating thickness. Coating thickness of nickel and silver coated strands shall be measured in accordance with the ASTM-B355 and ASTM-B298 test procedures respectively.

4.4 First article inspection. First article inspection shall consist of verification of all requirements specified herein, including all examinations and tests specified in 4.6. First article inspection shall include the solderability test on silver coated conductors (see 4.6.3.1). When required, the supplier shall prepare and provide a first article test report to the purchaser (see 6.2, 6.3, and 6.4).

4.4.1 First article acceptance criteria. Failure to meet the requirements specified herein shall be cause for rejection of the first article sample. Acceptance or rejection of the first article sample will be based on the objective quality evidence and as defined in MIL-STD-109.

4.5 Quality conformance inspection. Quality conformance inspection shall consist of all tests specified in 4.6 and shall be performed on every lot of conductors purchased in accordance with this specification.

4.5.1 Sampling for visual and dimensional inspection. From each lot (see 6.6.1), sample units (see 6.6.4) shall be selected at random in accordance with MIL-STD-105. The inspection level shall be S-2 unless otherwise specified in the ordering data (see 6.2). No allowance will be made for defects.

4.5.2 Sampling for performance inspection. From each lot, sample units shall be selected at random in accordance with MIL-STD-105. The inspection level shall be S-2 unless otherwise specified in the ordering data (see 6.2).

4.5.3 Inspection of packaging. The sampling and inspection of the preservation, packaging, and container marking shall be in accordance with the requirements of MIL-C-3993.

4.6 Test methods.

4.6.1 Visual examination. The conductor shall be visually inspected to determine conformance to the conductor strand materials requirement and any other requirements herein not covered by specific test methods.

4.6.2 Diameter. The diameter shall be measured at three locations along the length of each sample. Each measurement shall be the average of two readings taken 90 degrees apart on the conductor. Micrometers, calipers, or optical measurement devices capable of reading to the nearest 0.0001 inch for sizes 12 and smaller or to the nearest 0.001 inch for sizes 10 and larger shall be used.

4.6.3 Solderability. Samples shall be tested per MIL-STD-202, Method 208 except as noted below, according to the plating/coating material and base material, as applicable.

4.6.3.1 Silver coated conductor. Exceptions to MIL-STD-202, Method 208:

a. Wrapping wire is not necessary.

b. For first article tests, the test shall require steam aging as specified in MIL-STD-202, Method 208. For quality conformance testing, no steam aging is required.

4.6.3.2 Tin coated conductor. Exceptions to MIL-STD-202, Method 208:

a. Wrapping wire is not necessary.

b. Steam aging shall not be required.

4.6.3.3 Nickel coated conductor. No solderability testing is required for nickel coated conductors.

4.6.3.4 Aluminum conductor. No solderability testing is required for aluminum conductors.

4.6.3.5 Thermocouple extension conductor. No solderability testing is required for thermocouple conductors.

4.6.4 Conductor elongation, tensile strength, and break strength.

4.6.4.1 Soft or annealed copper. Elongation tests of soft or annealed copper conductors shall be performed in accordance with FED-STD-228, Method 3211, except that the elongation at break of the individual strand or of the first strand of the whole conductor, as applicable, shall be determined by means of a recording chart, or other means, on the testing machine rather than

by measuring the specimen after the break. For sizes 22 and smaller, the tests shall be performed upon the whole conductor and the elongation measured when the first strand of the conductor breaks. For conductors larger than 22, strands shall be carefully removed from the conductor and tested for elongation. Tensile or break strength measurements are not required for annealed copper conductors.

4.6.4.2 High strength copper alloy. Elongation and tensile strength tests of high strength copper alloy conductors shall be performed in accordance with FED-STD-228, Method 3211, except that the tensile strength (reported as the tensile breaking strength of the conductor rather than in pounds per square inch) and elongation at break of the individual strand or of the first strand of the whole conductor, as applicable, shall be determined by means of a recording chart, or other means, on the testing machine. For sizes 20 and smaller, the tests shall be performed upon the whole conductor and the break strength and elongation measured when the first strand of the conductor breaks. For conductors larger than size 20, strands shall be carefully removed from the conductor and tested for break strength and elongation. Total conductor break strength of these sizes shall be calculated by multiplying the number of strands by the single strand break strength.

4.6.4.3 Aluminum conductors. Elongation and tensile strength tests of aluminum conductors shall be performed in accordance with FED-STD-228, Method 3211. A sample of single strands shall be carefully removed from the conductor and tested for tensile strength and elongation.

4.6.5 Conductor resistance. The DC resistance of the conductor shall be measured in accordance with FED-STD-228, Method 6021, except that the wire shall be tested dry without immersion.

4.6.5.1 Electromotive force (thermocouple extension only). A thermocouple shall be formed between the positive and negative leg conductors from a sample taken from each coil or reel to be supplied in the contract or purchase order. The electromotive force characteristics of the wire shall be determined at 0°C, 200°C, 400°C, 600°C, 800°C, and 1000°C.

The electromotive force characteristics shall meet the following tolerances:

LIMITS OF ERROR FOR THERMOCOUPLE

Thermocouple Range °C	Standard Limits (Whichever is greater)	Special Limits (Whichever is greater)
0 to 1250°	±2.2°C or ±0.75% xT	±1.1°C or ±0.4% xT

Where T= Test temperature

4.6.6 Sodium polysulfide test. The stranded samples of annealed copper or copper alloy base material shall be tested in accordance with the applicable ASTM requirement (ASTM-B33, B298, B355) with the following exceptions:

NOTE: The ASTM polysulfide test applies to single-end wires "taken before stranding" (see for example, ASTM-B298). The applicability of the polysulfide test is thus restricted by the ASTM in recognition of the abrasion to the wire inherent in the stranding process. The following exceptions and criteria shall be applied when testing stranded product:

a. Examination of the samples shall be immediately after the solution cycle.

b. Samples shall be immersed into the solutions in the as-stranded condition.

- Unilay constructions shall be tested as the whole conductor.

- Concentric constructions shall be tested as the whole conductor.

- Two members from each layer of rope constructions shall be tested after they have been carefully removed from the finished rope.

4.6.7 Cross sectional area. The stranded conductor shall be tested according to ASTM-B263. Use K-values given in Table II. If no K-value is given, then use K=0.

5. PACKAGING

5.1 Packaging requirements. Wire shall be packaged in accordance with MIL-C-3993.

5.1.1 Additional package marking.

Thermocouple extension conductors shall contain the additional package markings:

"Caution: Thermocouple extension wires contained herein are calibrated for use together in fabricating thermocouples. If each leg of the thermocouple extension wire is from a different lot, recalibration of the thermocouple pair will be required."

6. NOTES

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

6.1 Intended use. Wires covered by this specification are intended to be used for electrical conductors in insulated wires.

6.1.1 Metric cross-reference tables. Soft metric conversions provided in Tables III-A, III-B, III-C, III-D, III-E, and III-F provides a cross reference for corresponding titled Tables II-A, II-B, II-C, II-D, II-E, and II-F for information.

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 2.1.1 and 2.2).

c. Part number (see 1.2.1).

d. Quantity of conductor required.

e. Inspection responsibility, if other than specified (see 4.1).

f. Inspection conditions and classification of inspection, if other than specified (see 4.1.3 and 4.2).

g. Additional strand inspection/requirements (see 4.3).

h. Inspection level (see 4.5).

i. Requirement for first article inspection, if necessary (see 3.1.1 and 6.4).

6.3 Consideration of data requirements. The following data requirements should be considered when this specification is applied on a contract. The applicable Data Item Descriptions (DID's) should be reviewed in conjunction with the specific acquisition to ensure that only essential data are requested/provided and that the DID's are tailored to reflect the requirements of the specific acquisition. To ensure correct contractual application of the data requirements, a Contract Data Requirements List (DD Form 1423) must be prepared to obtain the data, except where DOD FAR Supplement 227.405-70 exempts the requirement for a DD Form 1423.

Reference Paragraph	DID Number	DID Title	Suggested Tailoring
4.4, 4.6	DI-NDTI-80809A	Test Insp Report	None

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

6.4 First article. When first article inspection is required, the contracting officer should provide specific guidance to offerors whether the item(s) should be a first article sample, a first production item, or a standard production item from the contractor's current inventory and the number of items to be tested as specified in 4.4. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results and disposition of first articles. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract.

6.5 Conductor cross-sectional area. The conductor cross-sectional area is expressed as a Circular Mill Area (CMA) value. One circular mill is equal to the area of a circle with a diameter of .001 inch (1 mil). The nominal CMA was determined by calculating the CMA of a single strand and multiplying it by the number of strands in the conductor. The minimum CMAs were determined by different methods depending on the wire size. For sizes 8 and larger the minimum strand size from the ASTM for the strand was determined and the minimum strand CMA calculated. The minimum strand CMA was multiplied by the number of strands excluding allowable missing strands, to obtain the minimum CMA of the stranded conductor. The values for sizes 10 and smaller were set lower than that required by the ASTM minimum strand size and higher than that required by the maximum conductor resistance requirements. Other factors considered included military specification insulated wire weight and conductor diameter requirements. The K-values needed to calculate the CMAs from the stranded conductor weights were calculated by the Naval Air Warfare Center Aircraft Division, Indianapolis, based on the conductor stranding requirements, including length of lay, in this specification.

6.6 Definitions.

6.6.1 Concentric lay. Concentric lay is defined as a central strand surrounded by one or more layers of helically wound strands.

6.6.2 Lot. All the stranded conductors of one part number made under the same essential conditions, produced on a substantially continuous basis, and offered for inspection at one time shall be considered a lot for purposes of sampling.

6.6.3 Sample. The sample is the group of sample units selected from the lot for the purpose of inspection.

6.6.4 Sample unit. The sample unit shall consist of a single piece of finished conductor of sufficient length to permit all applicable examinations and tests. Not more than one sample unit for each group of tests shall be taken from a single unit of product.

6.6.5 Unit of product. A unit shall be one continuous length of conductor.

6.7 Subject term (key word) listing.

Concentric
Conductor
Rope lay
Stranding

TABLE I. Conductor strand material and coating.

Designator	Strand Material	Coating	Application ASTM or ANSI Standard
SCC	Annealed Copper	Silver	ASTM-B298
SCA	High Strength Copper Alloy 1/	Silver	ASTM-B624
SCU	Ultra-high Strength Copper Alloy 1/	Silver	None
NCC	Annealed Copper	Nickel	ASTM-B355
NCA	High Strength Copper Alloy 1/	Nickel	ASTM-B624
NCU	Ultra-high Strength Copper Alloy 1/	Nickel	None
NHC	Annealed Copper	Nickel (27%)	ASTM-B355
NHA	High Strength Copper Alloy 1/	Nickel (27%)	ASTM-B624
TCC	Annealed Copper	Tin	ASTM-B33
ALU	Aluminum 1350-H19 (extra hard)	None	ASTM-B230
KPH	Special Limits Type K - Thermocouple Extension Nickel/Chromium (Positive Leg)	None	ANSI-MC96.1
KPS	Standard Limits Type K - Thermocouple Extension Nickel/Chromium (Positive Leg)	None	ANSI-MC96.1
KNH	Special Limits Type K - Thermocouple Extension Nickel/Aluminum (Negative Leg)	None	ANSI-MC96.1
KNS	Standard Limits Type K - Thermocouple Extension Nickel/Aluminum (Negative Leg)	None	ANSI-MC96.1

1/ High strength and ultra-high strength copper alloy conductors have a higher conductor resistance (lower conductivity) than annealed copper conductors of the same size.

TABLE II-A. Details of annealed copper conductors.

Size Designation	Conductor Area (Circular Mils)		K-value	Stranding (No. of Strands X AWG of Strands)	Allowable No. of Missing Strands (Max)	Nominal Dia. of Individual Strands (Inch) 1/	Diameter of Stranded Conductor					Max Resistance of Conductor (Ohms/1000 Ft at 20°C)			Elongation % Min)
							Min (Inch)	Max (Inch)							
								Sm Dia		Gen'l Purpose					
	Nominal 1/ (All)	Minimum						(SCC)	(NCC/ TCC)	(SCC)	(NCC/ TCC)	Silver Coated (SCC)	Nickel Coated (NCC)	Tin Coated (TCC)	
30	112	102	.77	7x31	0	0.0040	0.0105	0.0124	0.0134	0.0124	0.0134	100.7	110.7	108.4	6
28	175	161	1.05	7x36	0	0.0050	0.0135	0.0154	0.0164	0.0154	0.0164	63.8	67.9	68.6	6
26	304	275	1.34	19x31	0	0.0040	0.0175	0.0194	0.0204	0.0204	0.0214	38.4	42.2	41.3	6
24	475	434	1.18	19x36	0	0.0050	0.0225	0.0244	0.0244	0.0254	0.0264	24.3	25.9	26.2	6
22	754	694	1.87	19x34	0	0.0063	0.0285	0.0304	0.0314	0.0324	0.0334	15.1	16.0	16.2	10
20	1,216	1,127	1.34	19x32	0	0.0080	0.0363	0.0384	0.0394	0.0404	0.0414	9.19	9.77	9.88	10
18	1,900	1,770	1.34	19x30	0	0.0100	0.0455	0.0484	0.0494	0.0504	0.0514	5.79	6.10	6.23	10
16	2,426	2,251	1.19	19x29	0	0.0113	0.0515	0.0544	0.0554	0.0574	0.0584	4.52	4.76	4.81	10
14	3,831	3,570	1.38	19x27	0	0.0142	0.0645	0.0684	0.0694	0.0724	0.0734	2.88	3.00	3.06	10
12*	6,038	5,672	1.67	19x25	0	0.0179	0.0815	0.0854	0.0864	0.0904	0.0924	1.81	1.89	1.92	10
12*	5,874	5,473	1.25	37x28	0	0.0125	0.0835	0.0874	0.0894	0.0894	0.0904	1.90	1.98	2.02	10
10	9,354	8,716	1.35	37x26	0	0.0159	0.106	0.110	0.112	0.112	0.114	1.19	1.24	1.26	10
8	16,983	16,645	2.29	133x29	0	0.0113	0.158	0.166	0.169	0.169	0.173	0.658	0.694	0.701	10
6	26,818	25,234	2.31	133x27	0	0.0142	0.198	0.208	0.212	0.213	0.217	0.418	0.436	0.445	10
4	42,615	41,767	2.55	133x25	0	0.0179	0.250	0.263	0.268	0.268	0.274	0.264	0.275	0.280	10
2	66,500	64,931	3.21	665x30	2	0.0100	0.320			0.340	0.340	0.170	0.177	0.183	10
1	81,700	79,878	2.89	817x30	2	0.0100	0.366			0.380	0.380	0.139	0.144	0.149	10
01	104,500	102,126	3.24	1,045x30	3	0.0100	0.395			0.425	0.425	0.108	0.113	0.116	10
02	133,000	130,059	3.13	1,330x30	3	0.0100	0.440			0.475	0.475	0.085	0.089	0.091	10
03	166,500	162,793	3.09	1,665x30	4	0.0100	0.500			0.540	0.540	0.068	0.071	0.071	10
04	210,900	206,213	3.32	2,109x30	5	0.0100	0.565			0.605	0.605	0.054	0.056	0.056	10

1/ Nominal values are for information only. Nominal values are not requirements.

* - For size 12, 37x28 is the preferred construction. 19x25 is inactive for new design.

TABLE II-B. Details of aluminum conductors.

Size Designation	Conductor Area (Circular Mils)		Stranding (No. of Strands X AWG of Strands)	Allowable No. of Missing Strands (Max)	Nominal Dia. of Individual Strands (Inch) 1/	Diameter		Maximum Resistance (Ohms Per 1000 @ 20°C)	Tensile (KSI)	Elongation (%, Min)
	Nominal 1/	Minimum				Min (Inch)	Max (Inch)			
8	16,564	15,751	41x24	0	0.0201	0.150	0.160	1.093	23 - 35	1
6	28,280	26,891	70x24	0	0.0201	0.201	0.211	0.641	23 - 35	1
4	43,229	41,105	107x24	0	0.0201	0.248	0.262	0.427	23 - 35	1
2	67,874	63,771	168x24	2	0.0201	0.315	0.330	0.268	23 - 35	1
1	88,478	83,363	219x24	2	0.0201	0.353	0.368	0.214	23 - 35	1
01	104,639	98,345	259x24	3	0.0201	0.400	0.418	0.169	23 - 35	1
02	134,939	127,157	334x24	3	0.0201	0.454	0.478	0.133	23 - 35	1
03	172,512	162,500	427x24	4	0.0201	0.511	0.535	0.109	23 - 35	1
04	211,297	198,995	523x24	5	0.0201	0.563	0.587	0.085	23 - 35	1

1/ Nominal values are for information only. Nominal values are not requirements.

TABLE II-C. Details of high strength copper alloy conductors.

Size Designation	Conductor Area (Circular Mils)		K-value	Stranding (No. of Strands X AWG of Strands)	Allowable No. of Missing Strands (Max)	Nominal Dia. of Individual Strands (Inch) 1/	Diameter of Stranded Conductor					Max Resistance of Conductor (Ohm/ 1000 ft @ 20°C)		Min Breaking Strength (Lbs) (SCA/ NCA)	Elongation (%, Min)
							Min (Inch)	Max (Inch)							
								Sm Dia		Gen'l Purpose					
	Nominal (All) 1/	Minimum						(SCA)	(NCA)	(SCA)	(NCA)	Silver Coated (SCA)	Nickel Coated (NCA)		
30	112	102	.77	7x30	0	0.0040	0.0105	0.0124	0.0134	0.0124	0.0134	117.4	129.6	5.2	6
28	175	161	1.05	7x26	0	0.0050	0.0135	0.0154	0.0164	0.0154	0.0164	74.4	79.0	8.2	6
26	304	275	1.34	19x38	0	0.0040	0.0175	0.0204	0.0204	0.0204	0.0214	44.8	49.4	14.2	6
24	475	434	1.18	19x36	0	0.0050	0.0225	0.0244	0.0254	0.254	0.0264	28.4	30.1	22.4	6
22	754	694	1.87	19x34	0	0.0063	0.0285	0.0314	0.0314	0.0324	0.0334	17.5	18.6	35.8	6
20	1,216	1,127	1.34	19x32	0	0.0080	0.0365	0.0395	0.0404	0.0404	0.0414	10.7	11.4	58.1	6
18	1,900	1,770	1.34	19x30	0	0.0100	0.0465	0.0467	0.0467	0.0504	0.0514	6.43	6.79	90.3	6
16	2,426	2,251	1.19	19x29	0	0.0113	0.0515	0.0530	0.0530	0.0574	0.0584	4.90	5.16	115	6

1/ Nominal values are for information only. Nominal values are not requirements.

TABLE II-D. Details of 27% nickel coated (NHC/NHA) conductor.

Size Designation	Conductor Area (Circular Mils)		K-value	Stranding (No. of Strands X AWG of Strands)	Allowable No. of Missing Strands (Max)	Nominal Dia. of Individual Strands (Inch) 1/	Minimum Diameter of Stranded Conductor (Inch)	Maximum Diameter of Stranded Conductor (Inch)	Max Resistance of Conductor (Ohms/1000 Ft at 20°C)		Elongation (%, Min)	
	Nominal (All) 1/	Minimum							(NHC)	(NHA)	(NHC)	(NHA)
22	754	694	1.87	19x34	0	0.0063	0.0290	0.0330	23.7	25.6	10	6
20	1,216	1,127	1.34	19x32	0	0.0080	0.0365	0.0415	14.6	15.3	10	6
18	1,900	1,770	1.34	19x30	0	0.0100	0.0455	0.0520	9.14	9.59	10	6
16	2,426	2,261	1.19	19x29	0	0.0113	0.0520	0.0610	6.85	7.30	10	6
14	3,831	3,570	1.38	19x27	0	0.0142	0.0650	0.0740	4.32		10	
12	6,038	5,672	1.67	19x25	0	0.0179	0.0820	0.0940	2.78		10	
10	9,880	8,716	1.35	49x27	0	0.0142	0.123	0.129	1.68		10	
8	16,983	16,645	2.29	133x29	0	0.0113	0.158	0.179	0.936		10	
6	26,818	26,284	2.31	133x27	0	0.0142	0.198	0.218	0.591		10	
4	42,615	41,767	2.55	133x25	0	0.0179	0.250	0.272	0.375		10	
2	66,500	64,981	3.21	665x30	2	0.0100	0.320	0.345	0.241		10	
1	81,700	79,878	2.89	817x30	2	0.0100	0.355	0.384	0.196		10	
01	104,500	102,126	3.24	1,045x30	3	0.0100	0.395	0.432	0.153		10	
02	133,000	130,059	3.15	1,330x30	3	0.0100	0.440	0.490	0.120		10	
03	166,500	162,795	3.09	1,665x30	4	0.0100	0.500	0.548	0.096		10	
04	210,900	206,213	3.32	2,109x30	5	0.0100	0.565	0.615	0.077		10	

1/ Nominal values are for information only. Nominal values are not requirements.

TABLE II-E. Details of ultra-high strength copper alloy conductors. 1/

Size Designation	Conductor Area (Circular Mils)		K-value	Stranding (No. of strands X AWG of strands)	Allowable no. of Missing Strands (Max)	Nominal Dia of individual Strands (Inch) 2/	Diameter of Stranded Conductor		Maximum Resistance (Ohms/1000 ft) at 20°C	Min Break strength (lbs)	Elongation (% min)
	Nominal 2/	Minimum					Min (Inch)	Max (Inch)			
26	304	275	1.34	19x38	0	0.0040	0.0175	0.0204	56.4	21.5	6

1/ Applies to silver and nickel coated conductors.

2/ Nominal values are for information only. Nominal values are not requirements.

TABLE II-F. Details of Type KPH, KPS, KNH and KNS extension conductors.

Size Designation	Conductor Area (Circular Mils)		Stranding (No. of strands X AWG of strands)	Allowable no. of Missing Strands (Max)	Nominal Dia of individual Strands (Inch) 1/	1/ General Purpose Conductor Diameter		Resistance (OHMS Per 1,000 FT @ 20°C)			
								KP (H or S)		KN (H or S)	
	Nominal	Minimum				Min (Inch)	Max (Inch)	Min.	Max.	Min.	Max.
22	754	694	19 x 34	0	0.063	.029	.033	546.7	604.3	228.2	252.3
20	1,216	1,127	19 x 32	0	0.0080	.037	.041	339.2	375.0	141.5	156.5
18	1,900	1,770	19 x 30	0	0.100	.046	.051	217.0	240.0	90.5	100.2
16	2,426	2,261	19 x 29	0	0.113	.052	.058	169.7	187.7	70.6	78.2
14	3,831	3,570	19 x 27	0	0.142	.065	.073	107.6	119.0	44.9	49.7

1/ No small diameter thermocouple conductors exist at this time.

TABLE III-A. Details of annealed copper conductors (soft metric conversion).

Size Designation	Conductor Area (mm²)		K-value	Stranding (No. of Strands X AWG of Strands)	Allowable No. of Missing Strands (max)	Nominal Dia. of Individual Strands (mm) 1/	Diameter of Stranded Conductor					Max Resistance of Conductor (Ohms/Km at 20°C) Soft or Annealed Copper			Elongation (% Min)
							Min (mm)	Max (mm)							
								3m Dia		Gen'l Purpose					
	Nominal 1/ (All)	Minimum						(SCC)	(NCC/ TCC)	(SCC)	(NCC/ TCC)	Silver Coated (SCC)	Nickel Coated (NCC)	Tin Coated (TCC)	
30	0.0568	0.0517	.77	7x38	0	0.102	0.267	0.315	0.340	0.315	0.340	330.4	363.2	353.6	6
28	0.0887	0.0816	1.05	7X36	0	0.127	0.343	0.391	0.417	0.391	0.417	209.3	223.8	225.1	6
26	0.1340	0.1393	1.34	19X38	0	0.102	0.445	0.493	0.518	0.518	0.544	126.0	138.5	133.5	6
24	0.2407	0.2199	1.18	19X36	0	0.127	0.572	0.620	0.620	0.645	0.671	79.7	85.0	86.0	6
22	0.3821	0.3517	1.67	19X34	0	0.160	0.724	0.772	0.798	0.823	0.848	49.5	52.5	53.1	10
20	0.6162	0.5711	1.34	19X32	0	0.203	0.927	0.975	1.00	1.03	1.05	30.2	32.1	32.4	10
18	0.9627	0.8969	1.34	19X30	0	0.254	1.16	1.23	1.25	1.28	1.31	19.0	20.0	20.4	10
16	1.229	1.146	1.19	19X29	0	0.287	1.31	1.38	1.41	1.46	1.48	14.8	15.8	15.8	10
14	1.941	1.809	1.38	19X27	0	0.361	1.64	1.74	1.76	1.84	1.88	9.45	9.84	10.0	10
12*	3.085	2.874	1.67	19X25	0	0.455	2.07	2.17	2.19	2.30	2.35	5.97	6.20	6.30	10
12*	2.978	2.773	1.26	37X28	0	0.320	2.13	2.22	2.27	2.27	2.30	6.23	6.50	6.63	10
10	4.740	4.416	1.35	37X26	0	0.404	2.69	2.79	2.84	2.84	2.90	3.90	4.07	4.13	10
8	8.605	8.434	2.29	133X29	0	0.287	4.01	4.22	4.29	4.29	4.39	2.16	2.28	2.30	10
6	13.59	13.32	2.31	133X27	0	0.361	5.03	5.28	5.38	5.41	5.51	1.37	1.43	1.46	10
4	21.59	21.16	2.33	133X25	0	0.455	6.35	6.68	6.81	6.88	6.96	0.866	0.903	0.919	10
2	33.70	32.92	3.21	665X30	2	0.254	8.13			8.64	8.64	0.551	0.581	0.600	10
1	41.40	40.47	2.89	817X30	2	0.254	9.14			9.65	9.65	0.456	0.472	0.489	10
01	52.95	51.75	3.24	1,045X30	3	0.254	10.0			10.8	10.8	0.354	0.371	0.381	10
02	67.39	65.90	3.15	1,330X30	3	0.254	11.2			12.1	12.1	0.279	0.292	0.299	10
03	84.37	82.49	3.09	1,665X30	4	0.254	12.7			13.7	13.7	0.223	0.233	0.233	10
04	106.86	104.49	3.33	2,109X30	5	0.254	14.4			15.4	15.4	0.177	0.184	0.184	10

1/ Nominal values are for information only. Nominal values are not requirements.

* - For size 12, 37x28 is the preferred construction. 19x25 is inactive for new design.

THIS SOFT METRIC CONVERSION TABLE III-A PROVIDES A CROSS-REFERENCE TO TABLE II-A. FOR INFORMATION ONLY

TABLE III-B. Details of aluminum conductors (soft metric conversion).

Size Designation	Cross-Sectional Area (mm2)		Stranding (No. of Strands X AWG of Strands)	Allowable No. of Missing Strands (max)	Nominal Dia. of Individual Strands (mm) 1/	Diameter of Stranded Conductor		Maximum Resistance (Ohms/Km @ 20°C)	Tensile Strength (N/mm2)	Elongation (%, Min)
	Nominal 1/	Minimum				Min (mm)	Max (mm)			
8	8.39	7.98	41x24	0	0.0511	3.81	4.06	3.586	158-241	1
6	14.33	13.62	70x24	0	0.0511	5.11	5.36	2.103	158-241	1
4	21.90	20.82	107x24	0	0.0511	6.30	6.65	1.401	158-241	1
2	34.39	32.31	168x24	2	0.0511	8.00	8.38	0.879	158-241	1
1	44.83	42.24	219x24	2	0.0511	8.97	9.35	0.702	158-241	1
01	53.02	49.83	259x24	3	0.0511	10.2	10.6	0.554	158-241	1
02	68.37	64.43	334x24	3	0.0511	11.5	12.1	0.436	158-241	1
03	87.41	82.34	427x24	4	0.0511	13.0	13.6	0.358	158-241	1
04	107.07	100.83	523x24	4	0.0511	14.3	14.9	0.279	158-241	1

1/ Nominal values are for information only. Nominal values are not requirements.

THIS SOFT METRIC CONVERSION TABLE III-B PROVIDES A CROSS-REFERENCE TO TABLE II-B.
FOR INFORMATION ONLY

TABLE III-C. Details of high strength copper alloy conductors (soft metric conversion).

Size Designation	Cross-Sectional Area (mm2)		K-value	Stranding (No. of Strands X AWG of Strands)	Allowable No. of Missing Strands (max)	Nominal Dia. of Individual Strands (mm) 1/	Diameter of Stranded Conductor					Max Resistance of Conductor (Ohm/Km @ 20°C)		Min Breaking Strength (Kg) (SCA/NCA)	Elongation (%, Min)
							Min (mm)	Max (mm)							
								Sm Dia		Gen'l Purpose					
	Nominal (AD) 1/	Minimum						(SCA)	(NCA)	(SCA)	(NCA)	Silver Coated (SCA)	Nickel Coated (NCA)		
30	0.0561	.0517	.77	7x38	0	0.102	0.267	0.315	0.340	0.315	0.340	333.2	425.2	2.3	6
28	0.0887	.0816	1.05	7x36	0	0.127	0.343	0.391	0.417	0.391	0.417	244.1	259.2	3.7	6
26	0.1340	.1393	1.34	19x38	0	0.102	0.445	0.518	0.518	0.518	0.544	147.0	162.1	6.4	6
24	0.2407	.2199	1.11	19x36	0	0.127	0.572	0.620	0.645	0.645	0.671	93.2	91.8	10.2	6
22	0.3821	.3517	1.87	19x34	0	0.160	0.724	0.791	0.791	0.823	0.845	57.4	61.0	18.2	6
20	0.6162	.5711	1.34	19x32	0	0.203	0.927	1.03	1.00	1.03	1.05	35.1	37.4	26.4	6
18	0.9627	.8969	1.34	19x30	0	0.254	1.16	1.19	1.19	1.28	1.31	21.1	23.2	41.0	6
16	1.229	1.146	1.19	19x29	0	0.287	1.31	1.35	1.35	1.46	1.48	16.1	16.9	52.3	6

1/ Nominal values are for information only. Nominal values are not requirements.

THIS SOFT METRIC CONVERSION TABLE III-C PROVIDES A CROSS-REFERENCE TO TABLE II-C. FOR INFORMATION ONLY

TABLE III-D. Details of 27 percent nickel coated (NHC/NHA) conductor (soft metric conversion).

Size Designation	Cross-Sectional Area (mm2)		K-value	Stranding (No. of Strands X AWG of Strands)	Allowable No. of Missing Strands (Max)	Nominal Dia. of Individual Strands (mm) 1/	Diameter of Stranded Conductor		Max Resistance of Conductor (Ohms/Km at 20°C)		Elongation (%, Min)	
	Nominal (All) 1/	Minimum					Min (mm)	Max (mm)	(NHC)	(NHA)	(NHC)	(NHA)
22	0.3821	0.3517	1.87	19x34	0	0.160	0.737	0.838	77.8	84.0	10	6
20	0.6162	0.5711	1.34	19x32	0	0.203	0.927	1.05	47.9	50.1	10	6
18	0.9627	0.8969	1.34	19x30	0	0.254	1.16	1.32	30.0	31.5	10	6
16	1.229	1.146	1.19	19x29	0	0.287	1.32	1.55	22.5	24.0	10	6
14	1.941	1.809	1.38	19x27	0	0.361	1.65	1.88	14.2		10	
12	3.085	2.874	1.67	19x25	0	0.455	2.08	2.39	9.12		10	
10	5.006	4.416	1.35	49x27	0	0.361	3.12	3.28	5.51		10	
8	8.605	8.434	2.29	133x29	0	0.287	4.01	4.55	3.07		10	
6	13.59	13.32	2.31	133x27	0	0.361	5.03	5.54	1.94		10	
4	21.59	21.16	2.55	133x25	0	0.455	6.35	6.91	1.23		10	
2	33.70	32.92	3.21	665x30	2	0.254	8.13	8.76	0.791		10	
1	41.40	40.47	2.89	817x30	2	0.254	9.02	9.75	0.643		10	
01	52.95	51.75	3.24	1,045x30	3	0.254	10.0	11.0	0.502		10	
02	67.39	65.90	3.15	1,330x30	3	0.254	11.2	12.4	0.394		10	
03	84.37	82.49	3.09	1,665x30	4	0.254	12.7	13.9	0.315		10	
04	106.86	104.49	3.32	2,109x30	5	0.254	14.4	15.6	0.253		10	

1/ Nominal values are for information only. Nominal values are not requirements.

THIS SOFT METRIC CONVERSION TABLE III-D PROVIDES A CROSS-REFERENCE TO TABLE II-D. FOR INFORMATION ONLY

TABLE III-E. Details of ultra-high strength copper alloy conductors (soft metric conversion). 1/

Size Designation	Conductor Area (mm2)		K-value	Stranding (No. of strands X AWG of strands)	Allowable no. of Missing Strands (Max)	Nominal Dia of Individual Strands (mm) 2/	Diameter of Stranded Conductor		Maximum Resistance (Ohms/km) at 20°C	Min Break strength (kgs)	Elongation (% min)
	Nominal 2/	Minimum					Min (mm)	Max (mm)			
26	0.1540	0.1393	1.34	19x38	0	0.102	0.445	0.518	0.185	95.6	6

1/ Applies to silver and nickel coated conductors.

2/ Nominal values are for information only. Nominal values are not requirements.

THIS SOFT METRIC CONVERSION TABLE III-E PROVIDES A CROSS-REFERENCE TO TABLE II-E. FOR INFORMATION ONLY

TABLE III-F. Details of type KPH, KPS, KNH and KNS extension conductors (soft metric conversion).

Size Designation	Conductor Area (mm2)		Stranding (No. of strands X AWG of strands)	Allowable no. of Missing Strands (Max)	Nominal Dia of individual Strands (mm) 1/	1/ General Purpose Conductor Diameter		Resistance (OHMS/KM @ 20°C)			
								KP (H or S)		KN (H or S)	
	Nominal	Minimum				Min. (mm)	Max. (mm)	Min.	Max.	Min.	Max.
22	.3821	.3517	19 x 34	0	.160	.737	.838	1794.1	1983.2	748.8	828.0
20	.6162	.5711	19 x 32	0	.203	.940	1.04	1113.1	1230.7	464.3	513.6
18	.9627	.8969	19 x 30	0	.254	1.17	1.30	712.1	787.7	296.9	328.9
16	1.229	1.146	19 x 29	0	.287	1.32	1.47	566.9	616.0	231.6	256.7
14	1.941	1.809	19 x 27	0	.361	1.65	1.85	353.1	390.6	147.3	163.2

1/ No small diameter thermocouple conductors exist at this time.

THIS SOFT METRIC CONVERSION TABLE III-F PROVIDES A CROSS-REFERENCE TO TABLE II-F.
FOR INFORMATION ONLY

Custodians:
Navy - AS
Army - CR
AF - 85

Review Activities:
Army - AR, SC
Navy - SH

Preparing activity:
Navy - AS
(Project 6145-1180)

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

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4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. 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) AUTOVON (If applicable)	7. DATE SUBMITTED (YYMMDD)

8. PREPARING ACTIVITY

a. NAME	b. TELEPHONE (Include Area Code) (1) Commercial	(2) AUTOVON
COMMANDING OFFICER, NAVAL AIR WARFARE CENTER AIRCRAFT DIVISION LAKEHURST, SYSTEMS REQUIREMENTS DEPARTMENT	(908) 323-7488	624-7488
c. ADDRESS (Include Zip Code) CODE SR3, HIGHWAY 547, LAKEHURST, NJ 08733-5100	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	

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