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AC POWER CABLE, GENERAL PURPOSE, MULTICONDUCTOR, 600 VOLT, 60 HERTZ, PROCUREMENT OF, SPECIFICATION FOR

INSTALLATION OPERATIONS DIRECTORATE

National Aeronautics and
Space Administration

John F. Kennedy Space Center

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Approved:

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ABBREVIATIONS AND ACRYONYMS

ac	alternating current
ASTM	American Society for Testing and Materials
ICEA	Insulated Power Cable Engineers Association
IL	Illinois
KSC	John F. Kennedy Space Center
MA	Massachusetts
NASA	National Aeronautics and Space Administration
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
PA	Pennsylvania
SPEC	specification
UL	Underwriters Laboratory Inc.
VA	Virginia
°C	degree Celsius

AC POWER CABLE, GENERAL PURPOSE MULTICONDUCTOR, 600-VOLT, 60-HERTZ, PROCUREMENT OF, SPECIFICATION FOR

1. SCOPE

This specification provides data for the procurement of multiconductor, 600-volt, alternating current (ac), 60-hertz power cable. The cables included in this specification employ soft annealed copper conductors, either coated or uncoated, insulated with rubber, thermoplastic, or polychloroprene (neoprene).

1.1 Classification. - Cable included in this specification shall be of the types listed in table 1. A specification sheet for each type listed below is included in appendix A.

Table 1. Wire Types

UL Type	Description	Maximum Temperature Degree Celsius (°C)
SO	Hard service cord	60
STO	Hard service cord	60
W	Portable cable, heavy duty	75
G	Portable cable, heavy duty	75
USE	Moisture- and heat-resistant	75

2. APPLICABLE DOCUMENTS

The following documents form a part of this document to the extent specified herein. When this document is used for procurement, including solicitation, or is added to an existing contract, the specific revision levels, amendments, and approval dates of said documents shall be specified in an attachment to the Solicitation/Statement of Work/Contract.

2.1 Non-Governmental.

American Society for Testing and Materials (ASTM)

ASTM B3	Standard Specification for Soft or Annealed Copper Wire

ASTM B33	Standard Specification for Tinned Soft or Annealed Copper Wire for Electrical Purposes

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

National Electrical Manufacturers Association (NEMA)

NEMA WC-3/ICEA S-19-81	Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

(Applications for copies should be addressed to National Electrical Manufacturers Association, 1300 N. 17th Street, Suite 1847, Rosslyn, VA 22209.)

National Fire Protection Association (NFPA)

NFPA 70	National Electrical Code

(Application for copies should be addressed to the National Fire Protection Association, One Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.)

Underwriters Laboratory Inc. (UL)

UL-44	UL Standard for Safety Rubber-Insulated Wires and Cables
UL-854	UL Standard for Safety Service-Entrance Cables

(Application for copies should be addressed to Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062.)

3. REQUIREMENTS

3.1 Material.

3.1.1 Individual Conductors. - All conductors used in cables listed in this specification shall be of soft annealed copper in accordance with ASTM B3, either coated conforming to ASTM B33 or uncoated as detailed in the individual specification sheets in appendix A.

ASTM B33	Standard Specification for Tinned Soft or Annealed Copper Wire for Electrical Purposes

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AC POWER CABLE, GENERAL PURPOSE MULTICONDUCTOR, 600-VOLT, 60-HERTZ, PROCUREMENT OF, SPECIFICATION FOR

1. SCOPE

This specification provides data for the procurement of multiconductor, 600-volt, alternating current (ac), 60-hertz power cable. The cables included in this specification employ soft annealed copper conductors, either coated or uncoated, insulated with rubber, thermoplastic, or polychloroprene (neoprene).

1.1 Classification. - Cable included in this specification shall be of the types listed in table 1. A specification sheet for each type listed below is included in appendix A.

Table 1. Wire Types

UL Type	Description	Maximum Temperature Degree Celsius (°C)
SO	Hard service cord	60
STO	Hard service cord	60
W	Portable cable, heavy duty	75
G	Portable cable, heavy duty	75
USE	Moisture- and heat-resistant	75

2. APPLICABLE DOCUMENTS

The following documents form a part of this document to the extent specified herein. When this document is used for procurement, including solicitation, or is added to an existing contract, the specific revision levels, amendments, and approval dates of said documents shall be specified in an attachment to the Solicitation/Statement of Work/Contract.

2.1 Non-Governmental.

American Society for Testing and Materials (ASTM)

ASTM B3	Standard Specification for Soft or Annealed Copper Wire

3.1.1.1 Stranding. - Conductors used in multiconductor cables shall be stranded. Stranding shall be Class B, Part 2, NEMA WC-3/ICEA S-19-81.

3.1.2 Insulation. - The various insulations used on individual conductors in this specification shall be as specified in appendix A.

3.1.2.1 Working Voltage. - The working voltage of the completed cable shall be 600 volts, 60 hertz.

3.1.2.2 Covering. - Those cables requiring additional protection over the insulating material are identified in appendix A.

3.2 Color Coding. - Colors used to identify individual conductors in multiconductor cables shall be in accordance with Part 5 of NEMA WC-3/ICEA S-19-81.

3.3 Cabling.

3.3.1 Assembly. - Individual insulated conductors shall be cabled with a left-hand lay.

3.3.2 Fillers. - When necessary, the interstices shall be filled to give the completed cable a circular cross section.

3.3.3 Jacketing. - Jacketing used on individual cables in this specification are detailed in appendix A.

3.4 Surface Marking. - Cables listed in this specification shall be marked in accordance with the provisions of NEMA WC-3/ICEA S-19-81.

4. QUALITY ASSURANCE PROVISIONS

The supplier is responsible for the performance of all inspection and test requirements. Unless otherwise specified, sampling, inspection, and tests shall be in accordance with the specifications for insulation, conductor, and covering referenced in appendix A. The National Electrical Code or the Underwriters Laboratories Inc. stamp or label shall be proof of sufficient factory and/or laboratory tests.

5. PREPARATION FOR DELIVERY

5.1 Packaging. - Cable and wire shall be packaged in accordance with the manufacturers standard practice, providing it ensures protection for the product during shipment and safe delivery to its destination.

6. NOTES

6.1 Intended Use. - This specification is intended to be used for the procurement of general-purpose multiconductor 600-volt, 60-hertz ac power cable for use in facilities, systems, and equipment at the John F. Kennedy Space Center (KSC), NASA.

6.2 Ordering Data. - Procurement documents shall specify the following information:

a. Title, number, and date of this specification and appendix A cable specification sheet

b. Length of cable required and number of lengths

c. Number of conductors

d. Conductor size

NOTICE. The Government drawings, specifications, and/or data are prepared for the official use by, or on the behalf of, the United States Government. The Government neither warrants these Government drawings, specifications, or other data, nor assumes any responsibility or obligation, for their use for purposes other than the Government project for which they were prepared and/or provided by the Government, or an activity directly related thereto. The fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded, by implication or otherwise, as licensing in any manner the holder or any other person or corporation, nor conveying the right or permission, to manufacture, use, or sell any patented invention that may relate thereto.

Custodian:

NASA - John F. Kennedy Space Center

Preparing Activity:

John F. Kennedy Space Center
Electrical Engineering Division
Engineering Development Directorate

6. NOTES

6.1 Intended Use. - This specification is intended to be used for the procurement of general-purpose multiconductor 600-volt, 60-hertz ac power cable for use in facilities, systems, and equipment at the John F. Kennedy Space Center (KSC), NASA.

6.2 Ordering Data. - Procurement documents shall specify the following information:

a. Title, number, and date of this specification and appendix A cable specification sheet

b. Length of cable required and number of lengths

c. Number of conductors

d. Conductor size

NOTICE. The Government drawings, specifications, and/or data are prepared for the official use by, or on the behalf of, the United States Government. The Government neither warrants these Government drawings, specifications, or other data, nor assumes any responsibility or obligation, for their use for purposes other than the Government project for which they were prepared and/or provided by the Government, or an activity directly related thereto. The fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded, by implication or otherwise, as licensing in any manner the holder or any other person or corporation, nor conveying the right or permission, to manufacture, use, or sell any patented invention that may relate thereto.

Custodian:

NASA - John F. Kennedy Space Center

Preparing Activity:

John F. Kennedy Space Center
Electrical Engineering Division
Engineering Development Directorate

3.1.1.1 Stranding. - Conductors used in multiconductor cables shall be stranded. Stranding shall be Class B, Part 2, NEMA WC-3/ICEA S-19-81.

3.1.2 Insulation. - The various insulations used on individual conductors in this specification shall be as specified in appendix A.

3.1.2.1 Working Voltage. - The working voltage of the completed cable shall be 600 volts, 60 hertz.

3.1.2.2 Covering. - Those cables requiring additional protection over the insulating material are identified in appendix A.

3.2 Color Coding. - Colors used to identify individual conductors in multiconductor cables shall be in accordance with Part 5 of NEMA WC-3/ICEA S-19-81.

3.3 Cabling.

3.3.1 Assembly. - Individual insulated conductors shall be cabled with a left-hand lay.

3.3.2 Fillers. - When necessary, the interstices shall be filled to give the completed cable a circular cross section.

3.3.3 Jacketing. - Jacketing used on individual cables in this specification are detailed in appendix A.

3.4 Surface Marking. - Cables listed in this specification shall be marked in accordance with the provisions of NEMA WC-3/ICEA S-19-81.

4. QUALITY ASSURANCE PROVISIONS

The supplier is responsible for the performance of all inspection and test requirements. Unless otherwise specified, sampling, inspection, and tests shall be in accordance with the specifications for insulation, conductor, and covering referenced in appendix A. The National Electrical Code or the Underwriters Laboratories Inc. stamp or label shall be proof of sufficient factory and/or laboratory tests.

5. PREPARATION FOR DELIVERY

5.1 Packaging. - Cable and wire shall be packaged in accordance with the manufacturers standard practice, providing it ensures protection for the product during shipment and safe delivery to its destination.

APPENDIX A

SPECIFICATION SHEETS FOR ELECTRICAL CABLES

SPECIFICATION SHEET FOR ELECTRICAL CABLE, TYPE SO

This specification sheet provides specific requirements for electrical cable, type SO, 600 volt, 60 hertz, ac; forms a part of John F. Kennedy Space Center Specification KSC-SPEC-E-0019B; and is mandatory for use by KSC and associated contractors.

General Description

Insulation: Rubber, color coded, per NEMA WC-3/ICEA S-19-81

Installation: Portable equipment, pendants, motor leads, etc.

Operating Temperature: 60 °C maximum

Use: Extra hard use - damp locations

Conductor: Uncoated, stranded, per NEMA WC-3/ICEA S-19-81

Covering: Polychloroprene (neoprene), per NEMA WC-3/ICEA S-19-81

SPECIFICATION SHEET FOR ELECTRICAL CABLE, TYPE STO

This specification sheet provides specific requirements for electrical cable, type STO, 600 volt, 60 hertz, ac; forms a part of John F. Kennedy Space Center Specification KSC-SPEC-E-0019B; and is mandatory for use by KSC and associated contractors.

General Description

Insulation: Oil-resistant thermoplastic, color coded, per NEMA WC-3/ICEA S-19-81

Installation: Portable equipment, pendants

Operating Temperature: 60 °C maximum

Use: Extra hard use - damp locations

Conductor: Uncoated, stranded, per NEMA WC-3/ICEA S-19-81

Covering: Oil-resistant thermoplastic, per NEMA WC-3/ICEA S-19-81

SPECIFICATION SHEET FOR ELECTRICAL CABLE, TYPE W

This specification sheet provides specific requirements for electrical cable, type W, 600 volt, 60 hertz, ac; forms a part of John F. Kennedy Space Center Specification KSC-SPEC-E-0019B; and is mandatory for use by KSC and associated contractors.

General Description

Insulation: Heat-resistant rubber, color coded, per NEMA WC-3/ICEA S-19-81

Installation: Portable, oil resistant

Operating Temperature: 75 °C maximum

Use: Heavy duty portable power cable

Conductor: Tinned, stranded, per NEMA WC-3/ICEA S-19-81

Covering: Per NEMA WC-3/ICEA S-19-81

SPECIFICATION SHEET FOR ELECTRICAL CABLE, TYPE G

This specification sheet provides specific requirements for electrical cable, type G, 600 volt, 60 hertz, ac; forms a part of John F. Kennedy Space Center Specification KSC-SPEC-E-0019B; and is mandatory for use by KSC and associated contractors.

General Description

Insulation: Heat-resistant rubber, color coded, per NEMA WC-3/ICEA S-19-81

Installation: Portable, oil resistant

Operating Temperature: 75 °C maximum

Use: Heavy duty portable grounded power cable

Conductor: Tinned, stranded, per NEMA WC-3/ICEA S-19-81

Grounding Conductor: Tinned, stranded - one per power conductor, per NEMA WC-3/ICEA S-19-81

Covering: Per NEMA WC-3/ICEA S-19-81

SPECIFICATION SHEET FOR ELECTRICAL CABLE, TYPE USE

This specification sheet provides specific requirements for electrical cable, type USE, 600 volt, 60 hertz, ac; forms a part of John F. Kennedy Space Center Specification KSC-SPEC-E-0019B; and is mandatory for use by KSC and associated contractors.

General Description

Insulation: Moisture- and heat-resistant rubber (RHW), Underwriters Laboratories (UL 44 and UL 854)

Installation: Conduit, duct, raceway, direct burial

Operating Temperature: 75 °C maximum

Use: General Purpose

Conductor: Tinned, stranded, per NEMA WC-3/ICEA S-19-81

Covering: Moisture-resistant polychloroprene (neoprene), per NEMA WC-3/ICEA S-19-81