



Equipment Specification

Document No.: 4350.049

Originating Department: Distribution Engineering



Copper Control Cable (#16 & 10 AWG), Distribution System

1. Introduction

This is a general specification that covers the minimum requirements for a control cable (see table 1 for sizes), to be used in the distribution system in Puerto Rico. Further information will be provided by LUMA Energy at the time of order placement and will provide information on site specific conditions, quantity, and other requirements. This document includes the general electrical and mechanical characteristics of the material.

2. Special Requirements

- 2.1. Samples shall be furnished as requested by LUMA Energy. All documented testing required by applicable specifications and standards shall be submitted with product samples, including mechanical drawings, prior to approval. Vendors that have supplied this material to PREPA/LUMA on previous orders, will not have to furnish samples at bid opening. With the exception if any material or design changes were made to an approved product, vendor must re-submit sample to the Material Specification engineer for approval before shipping. The material will be received at the LUMA's general warehouse (011) at Palo Seco, Puerto Rico. Shipping will include transportation and unloading at the indicated warehouse.
- 2.2. Product shall be manufacture in accordance with the latest issue ASTM, NEMA, IEEE and ANSI specification. When conflicts occur between Purchaser's specifications and the ASTM, NEMA, IEEE, or ANSI specifications, the Purchaser's specification shall prevail. The product shall be furnished as described here in this specification or as amended by the purchase order. Any changes or updates to the Supplier's procedures, quality routines, and/or inspection layout shall be liable for all costs incurred for product that is refused/rejected.
- 2.3. Upon inspection of incoming material, the purchaser reserves the right to refuse product shipments and to determine the acceptability or rejection of product received. The Supplier shall be liable for all costs incurred for product that is refused/rejected.
- 2.4. Vendor shall submit two (2) quotes: one for conductor on steel reel and another for conductor on wood reel. See detail of reels in section 6.



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3. Quantity/Literature

Descriptive and technical literature must be supplied by vendor at time of bidding. This literature may include, but is not limited to details of material, drawings, documented testing, and instructions for use and installation. Failure to submit documents on time will cause bidder disqualification. For products described in this specification as requiring qualification, awards will be made only for such products that, prior to the time for opening of bids, had been tested and/or approved by LUMA. Evidence of PREPA's and/or LUMA Energy's approval of the equipment or material shall be supplied by vendor if requested by LUMA Energy.

4. Markings

- 4.1. Cable shall be marked with manufacturer's name, size, type of conductor, insulation type, rated voltage, classification, manufacturing date, customer (LUMA), and amount of remaining cable in the reel every three feet (3 ft).
- 4.2. Cable reels shall be marked outside with LUMA Energy's purchase order, item number, description of wire & specification date, code name, net length & size, gross & tare weights, and manufacturer's name & lot/production number.
- 4.3. Packaging labels and tags shall be waterproof.

5. Equal or Approved Equal to

- 5.1. American Wire Group (for model see section 12 table 1).
- 5.2. Southwire.

6. Packaging

- 6.1. All material and equipment shall be packaged and marked in such a way as to facilitate handling and protection from damage and that the receiving warehouse can readily identify it and send it, in one complete unit, to a field location without opening crates or boxes to sort items and/or parts.
- 6.2. Shall be shipped continuous in a non-returnable new reel (refer to section 12 table 1 for package quantity by conductor type). Conductor won't be accepted by sections.
- 6.3. Reels shall be made of treated wood conforming with AWPA (U1 & T1-17), with a retention of 0.3 lbs/cu ft (4.81 kg/cu m) of pentachlorophenol or chromated-copper-arsenate (CCA).
- 6.4. Treatment material shall comply with AWPA P9.



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- 6.5. Reels made of steel with a finishing consisting of a high-pressure hot phosphate wash and bonding agent, zinc chromate-iron oxide primer and final enamel coat to provide the necessary extra durability shall be accepted.
- 6.6. Reels shall have a minimum arbor hole diameter of 2.5 in (6.35 cm).
- 6.7. Each end of the cable shall be firmly and properly secured to reel.
- 6.8. Reels shall be protected against damage in ordinary handling and shipping.
 - a. Manufacturer shall protect the upper layers with pieces of wood along the transverse section of reel for conductor protection with NEMA level 2 wrapping of protective material.
 - b. Manufacturer shall protect conductor ends from water entrance or damage by means of an adequate seal.
- 6.9. Other types of reels will be evaluated by Luma Energy.

7. Number Per Package (Logistics)

Standard package: one thousand feet (304.8 m) per reel or as requested by LUMA.

8. Acceptance Criteria

- 8.1. Test required: certified by external laboratories.
- 8.2. Latest applicable codes, standards, and other regulations: ANSI/ASTM (B3), AWPA (P9, U1, T1), ICEA (1-E2 (K-2), S-73-532, S-95-658), UL (1277, 1581).

9. Description

- 9.1. These cables are used in industrial power or control circuits.
- 9.2. The control cable shall be rated at 600 V, PVC/nylon insulated single copper conductors, same size each, THHN or THWN.
 - a. Each individual conductor shall be bare annealed copper in compliance with ASTM B3 covered with a polyvinyl chloride (PVC) insulation over which a nylon (polyamide) or UL listed equal jacket is applied.
 - b. The overall jacket must consist of a heat, moisture, and sunlight resistant PVC with not less than 0.06" (1.52 mm) of thickness. All required markings as specified in section 4.1. shall be included.
 - c. Cable color code must meet the ICEA 1-E2 (K-2) standard.



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- d. Cable must be able for direct burial, cable trays, raceways, and outdoor locations use.
- e. Must be flame retardant with temperatures of 90 °C (194 °F) for wet or dry locations.

9.3. For size, number of conductors, overall diameter, and strands see table 1.

10. Inspection

The acceptance of any material or equipment shall in no way relieve the vendor from his responsibility to meet all the requirements of this specification, and it would not prevent subsequent rejection if such materials were found later to be defective.

11. Warranty

The conductor shall be designed and manufactured to provide a minimum life expectancy of 40 years. Replacement costs associated with premature conductor failure due to inadequate design of faulty manufacturing is to be the responsibility of the Supplier. The manufacturer shall guarantee that each part of the finished conductor has been manufactured in accordance with requirements of the referenced specifications and standards and that the finished conductor complies with the same requirements. The supplier/manufacturer shall agree to replace any length of conductor for two years after date of delivery if defective material or workmanship is found during installation or if the conductor fails from normal use during its first year of service. In either case, the supplier/manufacture shall be given a reasonable opportunity to inspect such defect or failure. A technical report detailing the cause(s) of the defect and the corrective measures implemented to prevent recurrence shall be provided upon request of the purchaser.

12. Table 1: Warehouse and Asset Suite Identification Number

Item	Warehouse Catalog #	Asset Suite #	Number of conductors	Strands Each	Overall Approximate Diameter	Suggested Manufacturer & Model
Cable 16 AWG	006-01591	59360	25	26	0.717" (18.21 mm)	Southwire (581517) AWG (16-TC1-25)
Cable 10 AWG	006-01583	59359	4	7	0.505" (12.83 mm)	AWG (10-TC1-4)

— End of Specification —



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Document History

Version	2
Date	02/24/2022
Author	Miguel J. Rios
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Approver Manager	Ricardo Castro

Handwritten signatures in blue ink over horizontal lines. The first signature is above the Author line, the second is above the Reviewer line, and the third is above the Approver Manager line.