



Document Title:  
**THHN/THWN-2 Copper Cable**

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**Related/Referenced Documents**

N/A

**Version History**

Version	Date	Revision Comments
1	Feb. 22, 2022	Items 040-00774 to 006-01070 converted from PREPA to LUMA format.
2	Apr. 13, 2022	Section 3 and 7 edited.
3	Jun. 07, 2022	Document History format changed.
4	Sep. 20, 2022	Cover Page added and the last two codes created.
5	Jan. 24, 2023	Table of Compliance added
6	Apr. 20, 2023	Document Version added on Cover Page, Title and Insulation Characteristic changed, Item 006-84642 created. Models on Table 2 changed.
7	Sep. 09, 2024	General format modifications, TOC updated, Section 4 modified, and sections order rearranged.



## Item Version History

Warehouse Catalog #	Asset Suite #	Version	Date
040-00774	58516	10	9/9/2024
040-00931	54271	10	9/9/2024
040-00899	54270	9	9/9/2024
040-00873	54269	10	9/9/2024
040-00857	54268	10	9/9/2024
040-00816	54267	10	9/9/2024
040-00790	54266	10	9/9/2024
040-01293	54273	5	9/9/2024
006-01070	56897	10	9/9/2024
006-83458	83458	4	9/9/2024
006-83459	83459	4	9/9/2024
006-84642	84642	2	9/9/2024



## 1. Introduction

This is a general specification that covers the minimum requirements for THHN/THWN-2 copper cable to be used in the underground 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 equipment/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 equipment/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 manufactured 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. If there are any changes or updates to the supplier's procedures, quality routines, and/or inspection layout, the supplier shall be liable for all costs incurred for products that are refused/rejected.
- 2.3. Upon inspection of incoming equipment/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 products that are refused/rejected.

### 3. Literature

- 3.1. Descriptive and technical literature must be supplied by the vendor at time of bidding. This literature must include, but is not limited to details of material, drawings, documented testing, and instructions for use and installation. **The literature must be an official document from and certified by the manufacturer.** Failure to submit documents on time and duly certified by the manufacturer will cause bidder disqualification.
- 3.2. If required by LUMA, final drawings and documentation shall be submitted by the vendor before the manufacturing and shipping process for approval.

### 4. Compatible with

- 4.1. For compatible suppliers/manufacturers and models see Table 2.
- 4.2. These models are examples of the equipment/material described in this document and do not represent a preference. LUMA will evaluate equally any model not listed here during any acquisition event.

### 5. Markings

- 5.1. 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.
- 5.2. Package(s) to be delivered at warehouse shall be clearly marked with manufacturer and item information (part number, serial number, quantity, etc.).
- 5.3. Packaging labels and tags shall be waterproof.

### 6. Packaging

- 6.1. All equipment/material 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. Cable shall be shipped in a non-returnable reel/spool, containing 500 ft. (152.4 m) continuous. Cable won't be accepted by sections.
- 6.3. Each end of the cable shall be firmly and properly secured to reel/spool.
- 6.4. Reels/spools shall be protected against damage in ordinary handling and shipping.
- 6.5. The manufacturer shall protect cable ends from water entrance or damage by means of an adequate seal.

### 7. Number Per Package (Logistics)

500 ft (152.4 m) per reel/spool or as requested by LUMA.

### 8. Acceptance Criteria

- 8.1. Test required: certified by external laboratories.

- 8.2. Product shall be manufactured in accordance with the latest issue below (section 8.3). When conflicts occur between purchaser’s specifications and the latest issue below, the purchaser’s specification shall prevail.
- 8.3. Latest applicable codes, standards, and other regulations:
- a. ASTM B3: For soft or annealed copper wire for electrical purposes.
  - b. ASTM B8: For concentric-lay-stranded copper conductors, hard, medium-hard, or soft.
  - c. NEMA WC-70/ICEA S-95-658: Applies to materials, constructions, and testing of 2000 volts and less thermoplastic, crosslinked polyethylene, and crosslinked rubber insulated wires.
  - d. UL 83: Specifies the requirements for 600 V single-conductor, thermoplastic-insulated wires and cables.

## 9. Description

- 9.1. This cable is used as general-purpose wire for lighting and power circuits at 600V or less, through conduits and cable trays for services, feeders, and branch circuits as specified in the National Electrical Code (NEC).
- 9.2. Shall be suitable for dry and wet locations at temperatures not to exceed 90°C.
- 9.3. Shall be stranded as per ASTM B8 and annealed soft copper conductor as per ASTM B3, rated at 600 V.
- 9.4. Shall be THWN-2 or THHN/THWN-2 as per UL standard 83 and shall comply with NEMA WC-70/ICEA S-95-658. THWN will be accepted as well. **THHN alone will not be accepted.**
- 9.5. The insulation shall be premium grade flame retardant polyvinyl chloride (PVC), with a tough polyamide nylon overlay jacket or UL listed equivalent.
- 9.6. Shall be gasoline and oil resistant II as well as water resistant.
- 9.7. Table 1: Characteristics by cable sizes and colors

Item	Size (AWG) - Color	Strands	Insulation Thickness	Jacket Thickness	Approx. Overall Diameter	Net Weight Lbs./MFT
1	12 - green	19	15 mils (0.38 mm)	4 mils (0.10 mm)	128 mils (3.25 mm)	24 (10.89 kg)
2	12 - white	19	15 mils (0.38 mm)	4 mils (0.10 mm)	128 mils (3.25 mm)	24 (10.89 kg)
3	12 - black	19	15 mils (0.38 mm)	4 mils (0.10 mm)	128 mils (3.25 mm)	24 (10.89 kg)
4	12 - red	19	15 mils (0.38 mm)	4 mils (0.10 mm)	128 mils (3.25 mm)	24 (10.89 kg)
5	12 - orange	19	15 mils (0.38 mm)	4 mils (0.10 mm)	128 mils (3.25 mm)	24 (10.89 kg)
6	12 - blue	19	15 mils (0.38 mm)	4 mils (0.10 mm)	128 mils (3.25 mm)	24 (10.89 kg)
7	12 - yellow	19	15 mils (0.38 mm)	4 mils (0.10 mm)	128 mils (3.25 mm)	24 (10.89 kg)
8	12 - brown	19	15 mils (0.38 mm)	4 mils (0.10 mm)	128 mils (3.25 mm)	24 (10.89 kg)
9	10 - black	1	20 mils (0.51 mm)	4 mils (0.10 mm)	150 mils (3.81 mm)	37 (16.78 kg)
10	10 - white	19	20 mils (0.51 mm)	4 mils (0.10 mm)	161 mils (4.09 mm)	40 (18.14 kg)
11	10 - green	19	20 mils (0.51 mm)	4 mils (0.10 mm)	161 mils (4.09 mm)	40 (18.14 kg)
12	10 - black	19	20 mils (0.51 mm)	4 mils (0.10 mm)	161 mils (4.09 mm)	40 (18.14 kg)

## 10. Inspection

The acceptance of any equipment/material 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 equipment/materials were found later to be defective.

## 11. Warranty

The cable shall be designed and manufactured to provide a minimum life expectancy of 40 years. The supplier/manufacturer shall guarantee that each part of the finished cable has been manufactured in accordance with the requirements of the referenced specifications and standards. The supplier/manufacturer shall agree to replace any length of conductor for two years after the date of delivery if defective material or workmanship is found during installation or if the cable fails from normal use during its first year of service free of cost for the purchaser. 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. Proposal Information

12.1. Submitted proposals must include:

- a. Technical information, tests, and drawings.
- b. Table of Compliance completed by the bidder with reference (see Appendix 1).

## 13. Table 2: Warehouse and Asset Suite Identification Number

	Item	Warehouse #	Asset Suite #	Southwire Model	Viakon Model
1	12 - green	040-00774	58516	22968201	SLM366
2	12 - white	040-00931	54271	22965801	SLM370
3	12 - black	040-00899	54270	22964101	SLM371
4	12 - red	040-00873	54269	22966601	SLM369
5	12 - orange	040-00857	54268	22970801	SLM373
6	12 - blue	040-00816	54267	22967401	SLM372
7	12 - yellow	040-00790	54266	22969001	SLM367
8	12 - brown	040-01293	54273	22971601	SLLT91
9	10 - black (solid)	006-01070	56897	11595601	SLL429
10	10 - white	006-83458	83458	22974001	SLZS95
11	10 - green	006-83459	83459	22977301	SLZS98
12	10 - black	006-84642	84642	22973201	SLZS94

— End of Specification —



## Appendix

## Appendix 1: Table of Compliance

Line	Criteria	Description	Pass/Fail (P / F)	Comments
1	Specification	Complies with the document 4350.056.		
2	Industry Standards	Industry standards: ASTM (B3, B8), NEMA WC-70/ICEA S-95-658) & UL 83.		
3	Material	Conductor: Copper		
		Insulation: Polyvinyl Chloride (PVC)		
		Jacket: Polyamide Nylon		
4	Product Requirement	Stranded Annealed Soft Copper Conductor		
		600V Insulation, THWN-2 or THHN/THWN-2		
		Gasoline and Oil Resistant II		
		Water Resistant		
		90°C for dry and wet locations.		
5	Insulation Thickness	15 mils for 12 AWG cable		
		20 mils for 10 AWG cable		
6	Jacket Thickness	4 mils for 12 and 10 AWG cable		
7	Strands	19		
		1 for 006-01070		

**NOTE: This table is only a checklist for reference. The compliance shall be with the complete document. Marking a PASS in the table won't be accepted as a compliance without the technical information required to certify it.**











# 4350.056 Copper Cable THHN-THWN-2 (9-9-24)

Final Audit Report

2024-09-09

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