



Document Title:
Copper Cable, XHHW-2, XLPE, 600 V

Document Type: Specification	Engineering Type Material Specification	Document No.: 4350.054
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Department
Distribution

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04

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Shared document with: Transmission & Distribution

**Select the Departments impacted by the document*

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N/A

Related/Referenced Documents

N/A

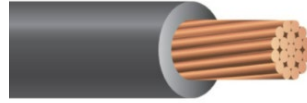
Version History

Version	Date	Revision Comments
1	Nov. 17, 2021	PREPA to LUMA Format for Items 006-00833, 006-00809, and 006-01575.
2	Mar. 11, 2022	New Items included: 006-82622, 006-82623, and 006-00809.
3	Nov. 15, 2023	General format modifications. Table of Compliance (TOC) added. Document changed as shared between T&D for Items 006-00833 and 006-00809.
4	Dec. 14, 2023	Adding requirement to include "Property of PREPA" and SFM as part of the jacket markings.



Item Version History

Warehouse Catalog #	Asset Suite #	Version	Date
006-00833	56892	8	12/14/2023
006-82622	82622	3	12/14/2023
006-82623	82623	3	12/14/2023
006-82753	82753	3	12/14/2023
006-00809	56891	10	12/14/2023
006-01575	59358	3	12/14/2023



1. Introduction

This is a general specification that covers the minimum requirements for a copper cable, XHHW-2, XLPE, to be used in the distribution and transmission 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 equipment/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.
- 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.

3. Literature

Descriptive and technical literature must be supplied by the 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. Evidence of PREPA's and/or LUMA Energy's approval of the equipment/material shall be supplied by the vendor if requested by LUMA Energy.

4. Markings

- 4.1. 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.
- 4.2. Packaging labels and tags shall be waterproof.

5. Compatible with

- 5.1. For compatible suppliers/manufacturers and models see Table 1.
- 5.2. 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.

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. Shall be shipped in a non-returnable new reel containing 1,000 ft (304.8 m) of continuous cable. Cable won't be accepted by sections less than 1,000 ft in the same reel.
- 6.3. Treated wood reels shall be made 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.
- 6.5. Steel reels shall consist of a high-pressure hot phosphate wash and bonding agent finish, zinc chromate-iron oxide primer, and a final enamel coat to provide the necessary extra durability.
- 6.6. Reels shall have a minimum arbor hole diameter of 2.5" (6.35 cm).
- 6.7. The upper layers shall be protected with pieces of wood along the transverse section of the reel for cable protection with NEMA level 2 wrapping of protective material and the cable ends shall be protected from water entrance or any damage by means of an adequate seal.
- 6.8. Cable ends shall be firmly and properly secured.

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, B8), AWPA (P9, U1, T1), NEMA WC 70/ICEA (S-95-658), UL (44, 1581).
- 8.3. NEMA Standard Publication No. WC 26: Binational Wire and Cable Packaging Standard.

9. Description

- 9.1. These cables are used as neutral in 15 kV underground systems and are suitable for wet and dry locations at temperatures not to exceed 90°C.
- 9.2. Shall be high-heat, gasoline, oil, and moisture resistant.
- 9.3. The cable shall be a concentric lay-stranded copper conductor as per ASTM B8 and annealed as per ASTM B3.
- 9.4. The insulation shall be XHHW-2 with 90°C (194°F) weatherproof black cross-linked polyethylene (XLPE) (see section 12 table 1 for approximate insulation thickness) in accordance with ICEA publication no. S-95-658, UL 44, and UL 1581. Shall be rated at 600V.
- 9.5. The outside cable jacket markings shall include "Property of PREPA", sequential footage marks (SFM), and all required markings as per the applicable standards and regulations. The supplier shall provide an example of the final legend at bid opening.

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/material 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. Table 1: Warehouse and Asset Suite Identification Number

Item	Warehouse Catalog #	Asset Suite #	Ampacity at 75°C	Strands	Approximate Overall Diameter	Approximate Insulation Thickness	Weight/ 1000 ft	Compatible Model
* 2 AWG	006-00833	56892	115	7	0.390" (9.9 mm)	45 mils	236 lbs (107.0 kg)	AWG (XHHW-C2)
								Southwire (112987)
1/0 AWG	006-82622	82622	150	19	0.490" (1.2 cm)	55 mils	363 lbs (164.6 kg)	AWG (XHHW-C1/0)
								Southwire (113001)
2/0 AWG	006-82623	82623	175	19	0.535" (13.6 mm)	55 mils	452 lbs (205.0 kg)	AWG (XHHW-C2/0)
								Southwire (113019)
3/0 AWG	006-82753	82753	200	19	0.590" (15.0 mm)	55 mils	562 lbs (254.9 kg)	AWG (XHHW-C3/0)
								Southwire (113027)
* 4/0 AWG	006-00809	56891	230	19	0.645" (16.4 mm)	55 mils	702 lbs (318.4 kg)	AWG (XHHW-C4/0)
								Southwire (113035)
500 MCM	006-01575	59358	380	37	0.955" (24.3 mm)	65 mils	1643 lbs (745.2 kg)	AWG (XHHW-C500)
								Southwire (113084)

* The items 006-00833 and 006-00809 are also used in the 38kV transmission system.

— End of Specification —



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600 V

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Department: Distribution

Appendix

Appendix 1: Table of Compliance

Line	Criteria	Description	Pass/Fail (P / F)	Comments
1	Specification	The Proponent complies with the corresponding specification document 4350.054.		
2	Industry Standards	The Proponent complies with the industry standards established in this document. (ANSI/ASTM, AWWA, NEMA, ICEA, and UL).		
3	Type	XHHW-2		
4	Material	Conductor: Copper		
		Insulation: XLPE		
5	Product Requirement	Rated Voltage: 600V		
		Concentric Lay Stranded & Annealed.		
		High-heat, gasoline, oil, and moisture resistant.		
		For wet and dry locations at temperatures not to exceed 90°C.		
		Jacket markings including "Property of PREPA", SFM, and all required as per the applicable standards and regulations.		
6	Size	As per Table 1		
7	Strands	As per Table 1		
8	Overall Diameter	As per Table 1		
9	Insulation Thickness	As per Table 1		
10	Ampacity	As per Table 1		











4350.054 Copper Cable 600V-Neutral XHHW-2 (12-14-23)

Final Audit Report

2023-12-14


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