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Pole Mounted Capacitor Bank for Continuous (Fixed) Operation

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Reviewer Miguel J. Rios López, PE General Engineer, Distribution Standards & Materials	Signature 	Date Sep 1, 2023
Reviewer Rafael Torres Martínez, PE Supervisor, Distribution Standards & Materials	Signature 	Date Sep 1, 2023
Approver Ricardo Castro Gómez, PE Manager, Distribution Standards & Materials	Signature 	Date Sep 1, 2023

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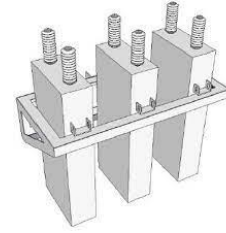
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Sep. 20, 2022	Initial Release
Feb. 16, 2023	Table of Compliance (TOC) added and general format modifications.
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Warehouse Catalog #	Version	Date
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032-83462	3	09/01/2023
032-83463	3	09/01/2023
032-83466	3	09/01/2023
032-83467	3	09/01/2023
032-83468	3	09/01/2023
032-83469	3	09/01/2023
032-83470	3	09/01/2023
032-83471	3	09/01/2023
032-83472	3	09/01/2023
032-83473	3	09/01/2023
032-83474	3	09/01/2023
032-83475	3	09/01/2023
032-83476	3	09/01/2023
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1. Introduction

This is a general specification that covers the minimum requirements for pole mounted capacitor bank with capacitor units for continuous (fixed) operation 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 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 and electrical drawings, prior to approval. Vendors that have supplied this equipment/material to LUMA on previous orders will not have to furnish samples at bid opening. If any equipment/material or design changes were made to an approved product, it must be re-submitted to the material specification engineer for approval before shipping.
- 2.2. 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 a product that is refused or rejected.
- 2.3. Documentation from any regulating agency pertaining to disposal requirements (other than landfill) for any component of the capacitor, now and in the future, shall be submitted to the material specification engineer for further review.
- 2.4. All capacitor units supplied, as part of this specification to make up the capacitor bank, shall conform to the requirements specified in LUMA equipment specification document No. 4350.181.
- 2.5. Upon inspection of incoming equipment/material, the purchaser reserves the right to refuse product shipments and to determine the acceptability or rejection of the product received. The supplier shall be liable for all costs incurred for a product that is refused/rejected.
- 2.6. 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.

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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. 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 Energy. Evidence of LUMA Energy's approval of the equipment/material shall be supplied by the vendor if requested by LUMA Energy.

4. Markings

- 4.1. Wooden crates or packages must be clearly marked on the outside with LUMA Energy's purchase order, warehouse item number, and supplier's part number.
- 4.2. Packaging labels and tags shall be waterproof.

5. Compatible with

- 5.1. For compatible manufacturer and model 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. All individual capacitor units shall be shipped with a shorting connection between the bushings.

7. Number Per Package (Logistics)

Standard package: One (1) capacitor bank per wooden crate or as requested by LUMA Energy.

8. Acceptance Criteria

- 8.1. Test required: certified by external laboratories.
- 8.2. 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.

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- 8.3. Latest applicable codes, standards, and other regulations:
- a. IEEE 18-2012: Standard for shunt power capacitors.
 - b. IEC 60871-1: Shunt capacitors for a.c. power systems having a rated voltage above 1000V.

9. Description

- 9.1. The pole mounted capacitor bank described in this specification is intended to be used for a grounded-wye connection, and continuous (fixed) operation, but the frame must have the mounting provision to incorporate arresters and all the necessary capacitor switching equipment like capacitor switches, control power transformer, and control junction box.
- 9.2. Each capacitor bank frame must contain three (3) double bushing capacitors connected to each other in a grounded-wye pattern and grounded through the frame. Effective electrical bonding of the rack to mounting hooks or frame must be provided.
- 9.3. The pole mounted capacitor banks will be connected to the electrical distribution system having the following characteristics:
- a. System Voltages of 4.16kV to 15.0kV LL (2.4/4.16kV, 4.16/7.2kV, 4.8/8.32kV, & 7.62/13.2kV)
 - b. System Frequency: 60 Hz
 - c. System Connection: Grounded wye (4-wire)
 - d. Fault Current (minimum): 10,000 amps
- 9.4. The capacitor bank assemblies and units shall be constructed with minimum BIL Rating as per Section 12: Table 1.
- 9.5. The capacitor bank (including equipment and accessories) must be designed to withstand outdoor operation in a humid tropical zone with altitude ranging from 15 to 3,000 ft above sea level, under ambient temperature between 10° C and 40° C and subject to be installed close to seashore with a heavy corrosive environment.
- 9.6. The pole mounted capacitor bank (including any additional equipment/accessories) should be designed and constructed to withstand sustained hurricane-force wind velocities according to LUMA Energy's requirement.
- 9.7. The equipment reliability must meet an expected life of twenty-five (25) years with survival rate of at least ninety (90%) percent.
- 9.8. The capacitor bank assembly must come completely pre-assembled from factory with all high voltage wiring accessories and terminal bushings provided with wildlife protection.

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- 9.9. All capacitor banks shall be designed with consideration given to the environmental impact of use and disposal of the item.
- 9.10. The capacitor bank frame must have the following features:
- a. The frame must be made of stainless steel or aluminum for protection against corrosion.
 - b. All mounting hardware for mounting capacitor units, and accessories shall be made of stainless steel.
 - c. The frame must accommodate three (3) single phase capacitor units.
 - d. The frame must be designed to support all necessary equipment for continuous (fixed) or controlled (switched) capacitor rack installation.
 - e. Each capacitor bank frame must have a stainless-steel nameplate with the following information:
 1. Manufacturer's Name
 2. Manufacture Year
 3. Voltage and KVAR Bank rating
 4. Basic Insulation Level (BIL)
 - f. The frame must include a ground connector that accommodates #10 AWG solid to #2 AWG stranded wire.
 - g. The capacitor bank frame shall be fitted with 4 lifting eyes which will provide level lifting when all equipment/accessories are mounted.
 - h. The frame pole-mounting bracket must have mounting holes or a combination of mounting holes and slots of 13/16" (20.64 mm) diameter that comply with the following spacing: 8" (20.23 cm), and 12" (30.48 cm), or 24" (60.96 cm). A spacing of 18" (45.72 cm) shall be accepted as an alternate option.
- 9.11. Capacitor Units:
- a. Each capacitor bank must contain three 409 stainless-steel double bushing heavy-duty capacitors connected to each other in a grounded-wye pattern and grounded through the frame.
 - b. All capacitor units supplied, as part of this specification to make up the capacitor bank, shall conform to the requirements specified in LUMA equipment specification document 4350.181: Capacitor Unit Single Phase & Double Bushings.

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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. Proposal Information

11.1. Submitted proposals must include:

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

12. Table 1: Warehouse and Asset Suite Identification Number

Pole Mounted Capacitor Banks for Continuous (Fixed) Operation							
Capacitor Bank Ratings and Suggested Manufacturer Model							
Warehouse Catalog #	Asset Suite #	Voltage (kV) L - G	Unit kVAR	Bank kVAR	BIL	Compatible Manufacturer	Compatible Model
032-83461	83461	2.4	50	150	95	Cooper Power System.	0CAB22J31010018
032-83462	83462	2.4	100	300	95		0CBB22J31010018
032-83463	83463	2.4	150	450	95		0CCB22J31010018
032-83466	83466	2.4	200	600	95		0CDB22J31010018
032-83467	83467	4.16	50	150	95	Cooper Power System.	0CAB24J31010018
032-83468	83468	4.16	100	300	95		0CBB24J31010018
032-83469	83469	4.16	150	450	95		0CCB24J31010018
032-83470	83470	4.16	200	600	95		0CDB24J31010018
032-83471	83471	4.8	50	150	95	Cooper Power System.	0CAB25J31010018
032-83472	83472	4.8	100	300	95		0CBB25J31010018
032-83473	83473	4.8	150	450	95		0CCB25J31010018
032-83474	83474	4.8	200	600	95		0CDB25J31010018
032-83475	83475	7.62	50	150	95	Cooper Power System.	0CAB28J31010018
032-83476	83476	7.62	100	300	95		0CBB28J31010018
032-83477	83477	7.62	150	450	95		0CCB28J31010018
032-83478	83478	7.62	200	600	95		0CDB28J31010018
032-83479	83479	7.62	300	900	95		0CEB28J31010018
032-83480	83480	7.62	400	1,200	95		0CFB28J31010018

— End of Specification —

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Continuous (Fixed) Operation**

Appendix

Pole Mounted Capacitor Bank for Continuous (Fixed) Operation

Appendix 1: Table of Compliance

Line	Criteria	Description	Pass/Fail (P / F)	Comments
1	Specification	The Proponent complies with the corresponding specification document (4350.175 and 4350.181).		
2	Industry Standards	The Proponent complies with the industry standards established in the specification document (ANSI, NEMA, ASTM, IEEE 18-2012, IEC 60871-1).		
3	Type	Pole Mounted Single-Phase Heavy-Duty Fixed Capacitors Bank		
4	Product Requirements	Three capacitors per bank connected to each other in a grounded-wye pattern and grounded through the frame.		
		Factory assembled including all necessary hardware, wiring, and wildlife protection.		
5	Material	Tank: Stainless-Steel 409		
		Bushings: Light Gray Porcelain		
		Bushing Terminal: Nickel Plated		
		Rack: Stainless-Steel or Aluminum		
6	Product Requirement (Capacitor Units)	Two Bushings ea. with parallel groove connectors for #8 to 2 AWG.		
		Electrical Characteristics as per Sections 9.19, 9.20, and 9.21 of document 4350.181.		
		Tank Rupture Curves defined through 10kA.		
		Discharge Resistors to 50V within 5 minutes.		
		Dielectric Fluid: Non-PCB		
		Mounting brackets with industry-standard 15.62" mounting center.		
		Nameplate as per Section 9.13. of document 4350.181.		
7	Product Requirement (Pole-Mounted Rack)	Frame must accommodate three (3) single phase capacitor units.		
		Mounting provision for Switches, CPT, Arresters, and Junction Box.		
		Ground connector for #10 AWG solid to #2 AWG stranded wire.		
		Fitted with 4 lifting eyes.		
		Pole Mounting Bracket with hole pattern of 8" and 12" apart (18" shall be accepted as alternate).		
		Holes diameter: 13/16"		











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Final Audit Report

2023-09-01

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