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Originating Department: Distribution Engineering



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1. Introduction

This is a general specification that covers the minimum requirements for the three-phase pad-mounted distribution transformers 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

Samples shall be furnished as requested by LUMA Energy. Vendors that have supplied this material to LUMA on previous orders, will not have to furnish samples at bid opening. 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.

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. Containers shall be marked outside with LUMA Energy purchase order and item number.
- 4.2. Transformers shall be marked on the cover with the point of delivery (district) and purchase order number using a label.
- 4.3. Labels and tags shall be waterproof.

5. Equal or Approved Equal to

ABB, Howard Industries, MEGA-TRAN, and Cooper Power Systems.



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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. Each unit shall be banded to a two-way entry, disposable pallet of the manufacturer's own design. The pallet shall be of such dimensions as to provide a minimum of one inch (1") clearance at the transformers widest outside measurements, on all four sides. It shall provide a minimum of two and a half inches (2 1/2") of fork under clearance.

The transformer shall be banded to the pallet, using non-metallic banding, to prevent rust and shifting of the unit during transit, while allowing the unit to be handed by sling or fork truck without removing the banding.

LUMA shall allow the use of metallic banding ONLY if such banding is protecting in the places in which the band is in direct contact with the transformer tank.

The banding method to be used shall be submitted by the awarded bidder for LUMA's approval.

7. Number Per Package (Logistics)

One (1) per package or as required by LUMA Energy.

8. Acceptance Criteria

8.1. All characteristics, definitions, and terminology, except as specifically covered in this specification, shall be in accordance with the latest revision of the following ANSI Standards.

C57.12.00 IEEE Standard General Requirements for Liquid- Immersed Distribution, Power and Regulating Transformers.

C57.12.21 American National Standard Requirements for Pad-Mounted, Compartmental-Type, Self-Cooled, Single-Phase Distribution Transformers With High-Voltage Bushings: High Voltage (34 500 GrdY/19 920 V and Below) and Low Voltage (240/120 V, 167 kVA and Smaller)

C57.12.28 Pad-Mounted Equipment-Enclosure Integrity



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- C57.12.29 Pad-Mounted Equipment-Enclosure Integrity for Coastal Environments
- C57.12.70 IEEE Standard for Standard Terminal Marking and Connections for Distribution and Power Transformers
- C57.12.90 IEEE Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers and IEEE Guide for Short-Circuit Testing of Distribution and Power Transformers.
- C57.12.91 Guide for Loading Mineral-Oil-Immersed Overhead and Pad-Mounted Transformers Rated 500 KVA and Less with 65°C or 55°C Average Winding Rise.

Also, it shall comply (but shall not be limited to) with the latest revision of applicable codes, standards, and other regulations such as ASTM, NEMA, NEC, EQB-PUERTO RICO, EPA, DOT, AWS, etc.

- 8.2. The routine and design tests shall be made in accordance with ANSI C57.12.00. The routine test samples performed on the units shall be submitted at Bid Opening. The design test samples will be submitted only when the supplier require approval for the equipment. The bidder shall submit a written certification stating that all tests shall be performed according to the latest codes, standards, and regulations in order to provide a product of quality.
- 8.3. Routine tests that shall be performed on EACH UNIT are the following:
 - a. Temperature at which the tests are performed.
 - b. Voltage ratio
 - c. Polarity
 - d. Phase relationship
 - e. Core losses (no-load losses)
 - f. Exciting current
 - g. Winding losses (load losses)
 - h. Tank leaks
 - i. Impedance
 - j. Applied potential



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- k. Induced potential
 - l. Impulse tests
- 8.4. Typical design tests data include the following:
- i. Insulation resistance
 - ii. Power factor
 - iii. Temperature rise
 - iv. Over excitation
 - v. Radio interference
 - vi. Oil tests
 - vii. Noise tests as per NEMA Standard TR 1, latest revision
 - viii. Tank pressure withstand
 - ix. Temperature at which the tests were performed
- 8.5. Any exceptions to the tests mentioned in 8.2 shall be specified at Bid Opening.
- 8.6. The tests mentioned at 8.2 shall be performed on the fully assembled unit at manufacturer's location. **TESTS SHALL BE PERFORMED IN THE UNITS WITH ALL ITS ACCESSORIES AND/OR PARTS INSTALLED.**
- 8.7. The table with the parameters of resistance (%R), reactance (%X), and impedance (%Z) is attached in order for the bidders to include the specific values for each transformer (Annex 1).
- 8.8. A report of the tests performed on 8.2 shall be provided for each transformer according to the requirements of the purchases.
- 9. Description**
- 9.1. 65° C average winding rise oil immersed distribution transformer. The transformer shall consist of tank, core, bushings, insulating oil, tap changer, etc.
 - 9.2. 60 Hertz
 - 9.3. Transformers shall be supplied with a high power factor and low core and winding losses.



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9.4. Painting

- a. Tank and covers shall be protected against environmental conditions and corrosion by means of an adequate process of painting. Tank and cover shall be painted green as per ANSI C57.12.28.

The paint shall have a great retention of brightness and color in surfaces like aluminum and ferrous and non-ferrous materials. It shall be resistant, during long terms, to ultraviolet rays, humidity, corrosion due to acids, salts, organic solvents, gases, and others. It shall comply with federal regulations on temperature and environment.

- b. Paint shall be suitable for tropical climate conditions as per ANSI C57.12.28 and ANSI.57.12.29.
- c. In order to be evaluated, technical and descriptive literature shall be supplied at Bid Opening. This literature shall include, but shall not be limited to, the process, type of paint and description, material safety data sheet, etc.

9.5. Nameplate

- i. Shall be mounted on one of the mounting brackets in such a manner that there are no sharp edges exposed. The material (aluminum or copper) used in each winding, date of manufacture, total weight, serial number, among all the other information as per ANSI requirements (see 9.5.b.), shall be shown on the nameplate.
- ii. Nameplate A, as per ANSI C57.12.00.5.12, shall be used for transformers covered in this specification.
- iii. The information on the nameplate shall be engraved or stamped. Any of the two processes shall ensure legibility for the life of the transformer.
- iv. Nameplate shall be made of corrosion resistant material.
- v. The nameplates shall include the true date of manufacture-month and year (example 08-22). No codes will be acceptable.



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- vi. The name plate shall include the approximate total weight in pounds shall be shown on the nameplate to include:
 - 1. Transformer
 - 2. Transformer plus Switch
 - vii. A sample of the nameplate as requested in this section shall be submitted by the awarded bidder.
- 9.6. Welding
- a. Welds to be used shall be in accordance with the material that will be welded and as per American Welding Society (AWS) 1.1 or latest revision.
 - b. All welds at the exterior of the tank shall be continuous. It shall include the welding, **ON ALL SIDES**, of lifting lugs, mounting brackets, grounding provisions, etc., in order to prevent accumulation of humidity. Therefore spot, tack, or skip welds are not acceptable for attaching hinges, brackets, grounding busses, mounting studs, etc.
- 9.7. Core and Coil
- a. Cores:
 - 1. Shall be made from high quality grain-oriented silicon steel with flat, rolled, and low loss permeability laminations.
 - 2. Core shall be made free of buckles and wave surface defects.
 - b. Winding:
 - 1. Shall be non-telescoping with high and lower tension windings assembly forming and integral unit.
 - 2. Winding Polarization Index shall be 2.0 or more as per ANSI C57.125-2015.
 - c. Sound Levels: The design and assembly of the transformer shall be such that noise from the energized unit and its accessories shall not exceed 56 dB, according to NEMA TR-1
 - d. Core and winding losses shall be less than or equal to the losses listed in Section 20.0 of this specification.



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e. The Bidder shall specify the material of the primary and secondary windings at Bid Opening.

9.8. Transformer losses and bidding procedure

a. Bidder shall submit the no load losses at 20°C, load losses at 85°C full load and load losses at 55°C at 50% of load to calculate the efficiency and life cycle cost (Annex 2).

b. Bidder shall specify winding material of the primary and secondary at Bid Opening.

c. All losses information will be used to evaluate the Life Cycle Cost (LCC) of each bidder according to the following formula,

$$LCC = (UC) + (\$8.95) * NLL + (\$4.73) * LL, \text{ where}$$

UC = unit cost (\$)

NLL = No load losses (W) at 20°C

LL = Load losses (W) at 85°C full load

d. Shall be complying with Part II of the Department of Energy (DOE) 10 CFR PART 431 minimum requirements.

1. The efficiency shall be no less than that required for their KVA rating in the table below defined at 50% of load with no load losses at 20°C and load losses at 55°C

Energy Conservation Standards for Liquid-Immersed Distribution Transformers Three-Phase	
KVA	Efficiency (%)
15	98.65
30	98.83
45	98.92
75	99.03
112.5	99.11
150	99.16
225	99.23
300	99.27
500	99.35
750	99.40
1000	99.43
1500	99.48
2000	99.51
2500	99.53



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9.9. Tap Changer

- a. Shall be of the no load rotating type with an externally operated handle designed for de-energized operation.
- b. Shall be located under oil level with five (5) taps, including nominal voltage, each of two and a half percent (2.5%) of rated primary voltage.

TAP RANGE
TWO 2½% TAPS ABOVE AND BELOW RATED PRIMARY VOLTAGE

- c. Tap Changer shall have stops at each position to set desired voltage.
- d. A label shall be placed below the tap changer indicating that the transformer must be de-energized prior to the operation of the tap changer. A sample of this label shall be submitted if requested by LUMA.
- e. Tap changer shall be located in place not exposed to possible damage due to the handling of the transformer.

9.10. Insulating Oil

- a. Each transformer shall be furnished with its tank filled with oil with a Polychlorinated Biphenyl (PCB) concentration of less than 1 PPM (NO PCB). The nameplate shall indicate this compliance.

Also, for transformers that are sold in the island through distributors, a label shall be affixed to the transformer in a visible place indicating that the unit is a NO PCB transformer.

In the case of transformers sold to LUMA, the NO PCB compliance shall be included in the same label of the property number (Our Number). Refer to the Section 9.13.a.4 for more information on thermal transfer polyester labels for more details. A sample of this label shall be submitted if requested by LUMA.

The label shall have the same duration of the transformer under normal operating conditions.



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- b. The insulating oil shall comply with ANSI/ASTM D3487 and LUMA requirements. In addition, the oil shall have the following:
 - 1. 30 KV minimum breakdown voltage
 - 2. Neutralization number of 0.25
 - 3. Viscosity of:
 - a. 81.25 centistokes at 25°C as per ASTM D445-86
 - b. 15.00 centistokes at 100°C as per ASTM D445-86
 - c. The awarded bidder shall submit:
 - 1. A certificate stating that, at all moments, the transformers supplied to LUMA shall have a concentration of less than 1 PPM of PCB.
 - 2. Safety Data Sheet (SDS) of the oil.
- 9.11. Pressure Relief Valve
- a. The body of the pressure relief valve shall be an internal fault detector type equal or approved equal to IFD Corporation and in accordance with ANSI C57.12.21.
 - b. The relief valve shall allow the pressure inside the tank to be released but no air admitted when the unit is cool or lightly loaded.
- 9.12. Insulation
- a. Shall be made with, at least, Class 105 insulation system as per ANSI C57.12.80.
 - b. The insulation power factor shall be as per ANSI C57.12.90 (60 Hz).
 - c. Technical information on the insulation shall be submitted by the awarded supplier.
- 9.13. Additional Labels
- a. The transformer shall have the following labels:
 - 1. A label in Spanish indicating “Peligro - Alto Voltaje”. This is a descriptive information. The information regarding this label shall be as specified by the regulatory agencies (ANSI, IEEE, etc.)



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This label shall be placed on the upper left corner of the transformer's right door besides the NO-PCB label described in section 9.10. It shall be of the same size as the NO-PCB label.

2. A label indicating the KVA rating of the transformer. This label shall be placed, whenever possible, on the upper right corner of the transformer's left door leaving approximately six (6) inches of height between the upper part of the door and the KVA label to place the Property Number assigned by LUMA Energy.

This label shall have a minimum dimension of three (3) inches width by three (3) inches height and a maximum dimension of four (4) inches width by four (4) inches height.

Each number for any of the labels' dimensions mentioned above shall have a width of a minimum of 0.75 inches and a maximum of one (1) inch. The height shall be two (2) inches.

3. Whenever stainless steel transformers are specified in the purchase order, a label with the words "STAINLESS STEEL", made from the same material as the KVA rating label, shall be used. This label shall be placed directly under the KVA rating label. This label shall have the same width of the KVA rating label.
4. A label with LUMA's property number (see Section 10.8).

This label shall be made with thermal transfer polyester labels specification. The label shall be affixed on the outside upper right corner of the transformer's left door (as seen with the door closed). LUMA will provide the sequence of numbers to be used as property numbers. The thermal transfer polyester label shall have the following characteristics:

A. Substrate specifications:

- i. Material: Polyester
- ii. Shall resist abrasion, acids, chemicals, corrosives, solvent, moisture, and humidity, cold, and tearing
- iii. Temperature range: 0°C to 50°C (32°F to 122°F)



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- B. Adhesive specifications:
 - i. Adhesive type shall be acrylic.
 - ii. Shall be compatible with dirt, high-energy and low-energy plastics, painted metal, polyethylene, metals and untreated metals, and irregular surfaces.
- C. Color: The numbers will be black over a white base to assure a legibility from about 35 ft.
- D. The label shall last a minimum of 20 years installed on the transformer under normal operating conditions.
- 5. A second label with LUMA's property number (OUR NUMBER) shall be placed inside the upper left corner of the transformer's right door (as seen with the door closed).

This label shall be with thermal transfer polyester labels (See Section 9.13.a.4) with the exception that the dimensions shall be four (4) inches width and three and a half (3.5) inches height.

- b. The following table summarizes the dimensions of the labels required:

SECTION	LABEL DESCRIPTION	WIDTH (IN.)		HEIGHT (IN.)	
		MIN.	MAX.	MIN.	MAX.
9.9.d.	TAP CHANGER	INDUSTRY STANDARD			
9.10.a.	NO-PCB				
9.13.a.1.	"PELIGRO – ALTO VOLTAJE"				
9.13.a.2.	KVA RATING	3	4	3	4
9.13.a.3.	STAINLESS STEEL	3	4	2	
9.13.a.4.	PROPERTY NUMBER (Outside Transformer)	12		3.5	
9.13.a.5.	PROPERTY NUMBER (Inside Transformer)	4		3.5	
FOR DETAILS ON THIS LABEL REFERS TO THE SECTIONS MENTIONED.					



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9.14. KVA Rating

- a. The transformer shall be designed in accordance with this specification and shall have one of the following KVA ratings:

KVA RATINGS	
150	300

The kVA Ratings are continuous and shall be based on 65°C average winding temperature rise or 80°C hot spot conductor temperature rise.

LUMA reserves the right to specify units with different capacities in KVA.

9.15. Voltages Ratings and Basic Insulation Level (BIL)

- i. The primary voltage and the basic insulation level (BIL) shall be in accordance with the following:

PRIMARY VOLTAGE (V)	BIL (KV)
13200 Delta	95

- ii. The secondary voltage rating and basic insulation level (BIL) shall be in accordance with the following:

SECONDARY VOLTAGE	BIL (KV)
208Y/120	30

- b. Transformers shall be Delta-Wye connected.
c. Refer to ANSI C57.12.26 for further information.

9.16. Tank

- a. The entire unit (tank, sill, lifting lugs and cover) shall be made of Stainless Steel 304 gauge 14. The exterior surfaces of the transformer and compartment shall be designed to restrict or prevent unauthorized entry into the cable terminating compartment. Locking provisions shall be an approved design between the vendor and LUMA.
- b. Tank characteristics:
1. Suitable for outdoor use.



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- 2. Rectangular shape, tamperproof, weatherproof and with no openings to prevent that foreign object can be inserted or thrown inside.
- 3. Suitable for mounting on flat surfaces. Refer to underground standard URD - 35 for information on the mounting base requirements.

Dimension	Maximum
Width	65 inches
Depth	64 inches

- 4. Fitted with lifting lugs and ground provisions permanently affixed. Grounding facilities shall consist of a tin-plated copper connector suitable for 2/0 AWG conductor welded to the tank.
- 5. Grounding pads/bus for both the HV & LV sides and below the LV X2 bushing with removable ground strap. Each pad/bus shall be supplied with an approved connector.
- 6. A compartment shall be affixed to one side of the transformer, with primary bushing on the left side of the compartment and secondary bushings on the right. Full-length barriers between the primary and secondary compartment sections shall be provided. The barriers shall be made of metal or any other rigid material. The depth of this compartment shall be at least 30 inches (76.2 cm).
- 7. Doors shall be designed to prevent inadvertent dislodgment from the hinge. A solid top is preferable for increased rigidity.
- 8. Construction of the unit shall be such that it can be lifted skidded or slip into place on the mounting pad without disturbing the entrance cables.
- 9. Suitable means for padlocking the compartment door shall be provided. Aluminum handles and latches are no acceptable.
- 10. Constructed and coating shall meet all requirements in ANSI C57.12.28 and C57.12.29.
- 11. Paint shall be pad mount green as per ANSI C57.12.28.



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12. Shall have an internal mark, which indicates the proper oil level as per Section 6.2.3 of ANSI C57.12.20.
 13. No wood materials shall be used inside the tank.
 14. Pressure relief valve with bottom above the 140°C oil level.
 15. Oil level plug/cap located at the 25°C oil level.
 16. An oil draining plug shall be provided near the center of the tank. This plug shall be located in an area clear of grounding pads, bushings, etc. to allow access for removal.
 17. Only transformers without cooling fins and radiators shall be accepted by PREPA. The drawings included with this specification described the dimensions of the transformer without cooling fins and radiators.
 18. Handle for the no load-tap changer.
 19. Handle for the voltage selector switch on multi-ratio transformers.
 20. Provision for a 5/8" diameter hole on the secondary (LV) side of the compartment for the installation of a fault detector. It shall be sealed with a tamper proof plug.
 21. An appropriate sidewall mounted bayonet fuse holder assembly, with flapper valve and drip cup, in series with an isolation link, shall be installed according to the transformer size and primary voltage connections
 22. All external hardware such as transformer's corners, lifting lugs, padlock provisions, and jacking facilities, among others, shall be provided in such a manner that there are no sharp edges exposed.
- 9.17. Cover
- a. Cover shall be of the vertical lift hinge type with the same characteristics of the tank.
 - b. Coated with a 10kV dielectric finish.
 - c. Shall be made of the same material as tank.



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9.18. High Voltage Bushings and Terminals

- a. The transformer shall be supplied with three (3) loadbreak bushings inserts and three (3) loadbreak feed thru insert, all rated 200 AMP, for full three phase duty in accordance with figure 6 of ANSI C57.12.26 for loop feed configurations.
- b. The transformer shall be provided in high voltage side with removable bushing inserts and bushing wells. Wells shall be externally clamp and removable to allow field replacement of bushings without opening the tank.
- c. The bushing wells shall be oriented so that the elbows can be operated with a hot stick.
- d. Primary bushing wells shall have a dust cover in place for shipment.
- e. The internal risers to externally clamped bushing wells shall allow replacement of the bushing wells from the exterior of the tank.
- f. Stainless steel alloy ground pads shall be welded to the tank. The ground pads shall be located on the primary and secondary sides. The primary ground pad shall be located in the lower right hand corner of the tank.

9.19. Low Voltage Bushings and Terminals

- a. The low voltage line and neutral bushings shall be an epoxy design and must be bolted on and externally clamped. The neutral bushing shall be bolted to the tank through a stainless steel neutral ground pad.
- b. Bushings shall be provided with 4-hole spade type terminals in accordance with NEMA CC 1 standard. Each hole shall be 1/2" diameter.
- c. Number of secondary bushings shall be as specified in ANSI C57.
- d. Stainless steel alloy ground pads shall be welded to the tank. The ground pads shall be located on the primary and secondary sides. The secondary ground pad shall be located in the lower right hand corner of the tank.
- e. Secondary bushings shall have adequate strength to support the cables and prevent oil leaks.



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9.20. Secondary Circuit Breaker

- a. An adjustable-trip circuit breaker shall be furnished with the transformers for the secondary voltage connection. This breaker shall be located inside the connection compartment.
- b. The breaker shall be mounted to brackets attached to the walls of the transformer. It shall include bus risers from the secondary bushings to the line side of the breaker.
- c. The minimum breaker description shall be as follow:

DESCRIPTION	TRANSFORMER SIZE IN KVA	
	150	300
Ampere Rating	600 A	1200 A
Quantity of Poles	3	3
Rated Operational Voltage	600 V	600 V

- d. The breaker shall have an interruptive capacity of 125% of the nominal load current of the transformer.
- e. For commercial loads application, the breaker shall be of the adjustable-trip type for a variety of currents, based on the breaker ampere rating.
- f. Each output terminal of the breaker shall have a maximum of four points of connection, suitable for 500 kcmil copper cable. For 150 KVA transformers, two 500 kcmil copper cable shall be installed between the transformer terminals and the output breaker; for 300 kVA transformers, four 500 kcmil copper cable shall be installed. The insulation shall have to be approved by LUMA Energy.

9.21. Loop Feed

The transformer shall be equipped for loop feed connection on the high voltage compartment which shall include incoming and outgoing load-break 200A bushing inserts.

9.22. Protection

- a. The transformer shall be provided with three (3) current dual sensing bayonet type fuses in series with internal fault sensing isolation links. The fuses shall be already installed in the fuse holder.
- b. Bayonet fuse oil drip shields mounted on fuse holder.



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c. Surge Arresters:

- 1. The transformer shall be provided with three (3) MOV elbow arresters rated as follows:

Description	Unit
Class	15 KV
MCOV	8.4 KV
Duty Cycle Rating	10 KV rms

- 2. The transformer shall be provided with three (3) MOV parking stand arresters rated as follow:

Description	Unit
Class	15 KV
MCOV	8.4 KV

- 3. Transformer shall be supplied with six (6) provisions for grounding arresters, one (1) for each primary bushing. The grounding provisions shall be installed immediately under each primary bushings using the same array in which the bushings are mounted.

9.23. Design:

The design parameters and weights allowed in this equipment are:

DISTRIBUTION TRANSFORMERS DESIGN PARAMETERS		
KVA	Max. Values %Z	MAXIMUM WEIGHT (POUNDS)
150	4	4,200
300	4	

9.24. Accessories

Transformers shall be provided with the following accessories:

- a. Temperature Gage
- b. Liquid Level Gage
- c. One inch (1") stainless steel fill valve
- d. Drain Valve
- e. Dial Type Thermometer



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10. Warehouse and Asset Suite Information

KVA Rating (kVA)	Primary Voltage (kV)	Secondary Voltage (V)	Warehouse Number	Asset Suite Number
150	13.2	120/208	012-09832	59265
300	13.2	120/208	012-09360	59258

11. 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.

12. Warranty

- 12.1. The Supplier shall guarantee for a period of twenty (24) months after delivery or twelve (12) months from installation that the equipment supplied are free from defects in material and workmanship.
- 12.2. If, during the warranty period the unit or its components are proved to be defective, the Supplier shall replace or repair such unit at no cost to the Buyer.
- 12.3. The guarantee period mentioned in 12.1 shall begin at the moment in which the project is energized by LUMA Energy. The Supplier shall be responsible to comply with this guarantee clause. Any expenses by LUMA due to the malfunction of the equipment during the guarantee period shall be invoiced to the contractor, project owner, or person in charge of the project.

— End of Specification —



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Appendices



ANNEX 1

TABLE OF COMPLIANCE FOR IMPEDANCE PARAMETERS OF
DISTRIBUTION TRANSFORMERS

ITEM	% R	% X	% Z	WEIGHT
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

ANNEX 2

REQUIRED INFORMATION FOR REQUEST FOR QUOTATION OR
BIDDING OF DISTRIBUTION TRANSFORMERS

ITEM	PRIMARY VOLTAGE	SECONDARY VOLTAGE	CAPACITY KVA	NO LOAD LOSSES @ 20°C W	LOAD LOSSES @ 85°C W	LOAD LOSSES @ 55°C W
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
NOTAS: 1. NO PROPONENT WILL BE EVALUATED WITHOUT THE INFORMATION REQUIRED IN THIS FORM. 2. LOSSES AT 55°C MUST BE AT 50% OF TOTAL LOAD. 3. THIS INFORMATION WILL BE USED TO DETERMINED THE WINNING PROPONENT BASED ON THE LIFE CYCLE COST ANALYSIS.				PERSON CERTIFYING THE INFORMATION NAME IN PRINT SIGNATURE		PROPONENT'S NAME











4350.216 Three Phase Distribution Transformer Padmounted (11-01-2022)

Final Audit Report

2022-11-01

Created:	2022-11-01
By:	Rodolfo Flores (rodolfo.floresortiz@lumapr.com)
Status:	Signed
Transaction ID:	CBJCHBCAABAAEuMEwpX1fYyQz3JwM6pTm9RL0KN9gFx

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