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Dead Front Switching Unit

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Document No.: 4350.231

Item No.: 038-83414

Asset Suite: 83414

Originating Department: Distribution Engineering



Dead Front Switching Unit

1. Introduction

This is a general specification that covers the minimum requirements for pad-mounted dead front switching unit interrupters 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 and electrical drawings, prior to approval. Vendors that have supplied this material to 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, it must be re-submitted 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. In case of any changes or updates to the supplier's procedures, quality routines, and/or inspection layout the supplier shall be responsible for all costs incurred for product that is 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 rejected.
- 2.4. Any changes or updates to the supplier's approved designs, procedures, quality routines and/or inspection layout shall be communicated to LUMA Energy's material specification engineer in writing.



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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.

4. Markings

- 4.1. Containers shall be marked outside with LUMA Energy's purchase order and item number, manufacturer's details such as model name and number, lot number, and the warehouse ID number where it will be received at.
- 4.2. Packaging labels and tags shall be waterproof.

5. Equal or Approved Equal to

- 5.1. S&C: Manual PME Pad-Mounted Gear, Air-Insulated: 65152R1-A10E3F12L71M1-S426
 - a. Interrupting Switches: S&C Mini-Rupter Switch
 - b. Load Break Power Fuses: S&C (SMU-20) to be used on PME-9 Model.
 - c. Power Fuses Mountings and End Fittings: S&C (SME-20), cat. # 3093 to be used on PME-9 Model. See document 4350.214, item 010-83385.
- 5.2. Enclosure paint:
 - a. S&C Ultradur II Outdoor Finish Paint (green color).

6. Packaging

- 6.1. The pad-mounted switching unit shall be shipped on a pallet and comply with ANSI/IEEE Standard C37.20.3.
- 6.2. 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.
- 6.3. Warning label shall be placed on the equipment for special handling and storage requirements.
- 6.4. Any additional materials shall be packed in weatherproof boxes and identified with weatherproof labels.



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- 6.5. All materials, elements, parts, and hardware crates shall be shipped on flatbed trailers and stored in such a way so that they can be unloaded by finger lifts. Deliveries in containers or closed platforms where finger lifts cannot be used will not be accepted.
- 6.6. A copy of each detailed packing list must be sent to LUMA Energy's personnel in charge of the requisition, prior to the delivery.

7. Number Per Package (Logistics)

Standard package: One unit per pallet or as requested by LUMA.

8. Acceptance Criteria

- 8.1. Test required: certified by external qualified laboratories.
- 8.2. Latest applicable codes, standards, and other regulations: IEEE, NEMA, ANSI, ASTM, NEC, and OSHA standards and the herein included requirements. The following standards shall form a part of this specification unless otherwise stated:
 - a. ASTM (A480) for flat-rolled stainless and heat-resisting steel plate, sheet, and strip.
 - b. ANSI/IEEE (37.20.3) for metal-enclosed interrupter switchgear (1 kV-38 kV).
 - c. ANSI/IEEE (C57.12-28) for pad-mounted equipment, enclosure Integrity.
 - d. ANSI/IEEE (386) for separable insulated connector systems in power distribution systems rated 2.5 kV through 35 kV.
 - e. NEMA Class A20 for insulators.
 - f. ANSI Z535 for safety signs and colors.

9. Description

- 9.1. The pad-mounted dead front switching unit is used for tapping off branches from the main distribution feeder in a 60 Hz electrical system. Hereafter, the pad-mounted dead front switching unit will be called "the unit".
- 9.2. The unit shall consist of a single self-supporting enclosure, containing a main bus, interrupter switches, power fuses, insulators, grounding bus, and all necessary accessories for sectionalizing a distribution feeder.
- 9.3. The manufacturer of the unit is responsible for the functional integration of all these parts and accessories and shall guarantee the performance of this integration including the performance of the interrupter switches and power fuses, although other companies, approved by LUMA, have supplied these parts.



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- 9.4. The unit, including its enclosure, main bus, grounding bus, interrupter switches, power fuses, insulators, and accessories, shall be designed, rated, manufactured, and tested in accordance with the latest applicable IEEE, NEMA, ANSI, ASTM, NEC, and OSHA standards.
- 9.5. The unit shall be designed and constructed in accordance with the attached LUMA standards URD-11-B or latest revision.
- 9.6. The unit shall be assembled and tested for satisfactory operation in factory.
- 9.7. The manufacturer shall guarantee the unit against corrosion for at least five years. This guarantee is additional to LUMA's standard warranty terms.
- 9.8. General design and construction:
 - a. For the connection to the main distribution feeder (source), the unit shall have two (2) compartments with one (1) three-pole gang interrupter switch for three-phase (3 \emptyset) operation (see URD-11-B) with load break function to avoid external arc or flame per compartment.
 - b. All interrupter switches mechanism shall be stainless-steel, at least type 304 or any other rust resistant material.
 - c. The switch operating mechanisms shall be located at each side of the unit and shall be enclosed and locked to avoid operation by others without permission. Shall include indicator for open/close position.
 - d. For the load, the unit shall have two (2) compartments with three (3) load break power fuses for the branches from the main distribution feeder.
 - e. The interrupter switches and power fuses shall be connected to the main bus.
 - f. The source compartments shall be provided with three (3) 600 A bushings with parking brackets per compartment (see URD 11-B, Page 2). All of them shall be factory installed. The bushings shall be suitable to accept any connector complying with IEEE 386 and the material shall be Ethylene Propylene Diene Monomer (EPDM) or similar.
 - g. The load compartments shall be provided with three (3) 200 A bushings wells with parking brackets per compartment (see URD 11-B, Page 3). All of them shall be factory installed. The bushings shall be suitable to accept any connector complying with IEEE 386 and the material shall be Ethylene Propylene Diene Monomer (EPDM) or similar.
 - h. Each fuse holder shall be easy to operate, making the de-energized and isolated fuse accessible for easy replacement.



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- i. Electrical Requirements:
 - 1. Nominal Voltage (RMS): 15 kV
 - 2. Basic Insulating Level (BIL): 95.0 kV
 - 3. Main Bus Rated Current (RMS): 600 A
 - 4. Three-Pole Interrupter Switches Rated Current: 600 A (RMS)
 - a. Three-Time Duty Cycle Fault Closing: 25,000 A Symmetrical (RMS)
 - b. Three-Time Duty Cycle Fault Closing, Peak: 65,000 A
 - c. One (1) second Short Circuit Current: 25,000 A Symmetrical (RMS)
 - d. Short Circuit Current, Peak: 65,000 A
 - 5. Fuses Continuous Current: 200 A (RMS)
 - a. One (1) second Short Circuit Current: 14,000 A Symmetrical (RMS)
 - b. Short Circuit Current, Peak: 36,400 A
- j. Physical Requirements:
 - 1. Shall be dead-front so no exposed energized components in either the switch or fuse compartment shall be allowed.
 - 2. The medium voltage compartment shall be completely encased to avoid air path keeping moisture and particles out.
 - 3. The bottom of the medium voltage compartment shall be covered with a rust resistant steel floor to avoid foliage and wildlife entry.
 - 4. The circuit configuration shall be two inlets (source) with 3Ø switch interrupters each and two outlets (load) with three fuses each (see URD 11-B). For S&C model shall be PME-9.
 - 5. The unit dimensions shall be 45.5" height X 75" wide X 66.75" deep (115.6 X 190.5 X 169.5) cm as indicated in URD 11-B (pages 3 & 4).
 - 6. Interrupter Switches:
 - a. The interrupter switches and power fuses mounting insulators shall be made of porcelain or cycloaliphatic epoxy resin (CYPOXY).
 - b. The insulators shall conform with the following:
 - 1. Non-tracking properties.



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2. Adequate leakage distance for the rating herein specified.
 3. Adequate strength for the short circuit rating herein specified.
 4. Shall comply with NEMA class A-20.
 - c. Each 3 \emptyset switch shall have an arc chute per phase. Shall have copper blades with silver-plated copper jaw and silver-plated copper contact on both sides. As mentioned on section 9.8.a. each gang shall consist of three switches that shall be operated at the same time with a handle. Each switch shall have provision for lock in open and close position. The entire switch assembly shall be supported on a one-piece frame. The complete operating mechanism must be stainless-steel 304 grade as mentioned on section 9.8.b or any other rust resistant material.
 7. The unit main bus must be made in copper and must be designed and constructed to comply with the current rating specified in section 9.8.i. of this document.
 8. The unit shall have grounding rods suitable for the main feeder and branches neutral conductors' connection.
- 9.9. Enclosure's design and construction:
- a. Shall be self-supporting tamper proof and suitable for a concrete pad installation.
 - b. The enclosure and its doors shall be made from 11-gauge type 304 stainless-steel, and with non-magnetic properties, as per ASTM A-480.
 - c. Shall include mounting provision for fault indicators in each source compartment of the unit with a viewing window on each door of such compartments. The window shall be made to avoid water inlet.
 - d. All the structural joints and butt joints shall be welded, and the external seams shall be smooth.
 - e. Each door shall have a minimum of two type 304 stainless-steel, heavy-duty, pin-type hinges.
 - f. The enclosure doors shall have hasps made of 11-gauge type 304 stainless-steel suitable for a 7/16" (1.11 cm) shackle.
 - g. A protective trunk or hood is required to be attached to the padlock carrier of the doors to prevent outsiders from picking the padlock and gaining access to the interior of the unit. It must be of the same material and gauge used for the construction of the equipment and the edges must be smooth with no sharp at all.



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- h. The enclosure doors shall provide wide opening to allow unrestricted access for the separable insulated connectors and fuses operation.
- i. The door opening shall have a 90° flange, facing outward, that shall provide strength and rigidity as well as deep over-lapping between the doors and guard against water entry.
- j. Each door or the one used to secure both doors shall be provided with a type 304 stainless-steel or any other rust resistant material mechanism compatible with the padlocking provision to avoid vandalism.
- k. Each door of the fuse compartment side shall have storage provision for spare fuse assemblies and end fittings.
- l. The enclosure top shall be rain-tight, designed for no water accumulation, and undercoated with an insulating “no drip” compound.
- m. The manufacturer shall smooth and clean any weld made on the enclosure before painting the unit.
- n. The paint applied on the enclosure shall be exclusively for metal surfaces.
- o. This paint shall be barium free, including the primer used.
- p. The color of the paint shall be green as per latest ANSI/IEEE C57.12.28 (section 5.2.4).
- q. The paint shall be high adhesive, corrosion resistant, severe weathering resistant, abrasion resistant, shall repel moisture, and shall be environmentally friendly (no VOC containing chemicals).
- r. The compartments inside the enclosure shall be segregated with 11-gauge type 304 stainless steel barriers to be isolated from each other.
- s. Wide-view, unbreakable windows shall be installed in the source compartments, inside the unit to let the worker verify the switch position and check for visible break.
- t. In the load compartment, viewing windows shall be installed to let the worker verify blown fuse indicators.
- u. The enclosure shall have two visible identifications, an exterior label, and an interior plaque, containing the following information:
 - 1. Manufacturer’s name, address, and telephone number.
 - 2. Date of manufacture.
 - 3. Serial & Model number.



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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

- 11.1. Replacement costs associated with enclosure or parts failure due to inadequate design, faulty manufacturing, or packaging are to be responsibility of the supplier.
- 11.2. In reply to purchaser's request for quotation, supplier shall include the terms and conditions of the warranty period and coverage.
- 11.3. The supplier shall warrant the product against failure while operating under normal conditions.

12. Proposal Information

- 12.1. Submitted proposals must include:
 - a. Technical information
 - b. Table of Compliance completed by the bidder with reference. (See Appendix 1)

— End of Specification —



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Appendix



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Appendix 1: Table of Compliance

Line	Criteria	Description	Pass/Fail (P / F)	Comments
1	Specification	The Proponent complies with the corresponding specification document 4350.231, including the URD 11-B.		
2	Industry Standards	The Proponent complies with the industry standards established in the specification document. (ASTM, ANSI/IEEE & NEMA)		
3	Material	<ul style="list-style-type: none">• Cabinet: 11-Gage Stainless Steel 304• Bushings: EPDM or similar• Insulators: Porcelain or CYPOXY• Main Bus & Grounding Rods: Copper• Switch Blades: Copper		
4	Product Requirement	<ul style="list-style-type: none">• Assembled and tested in factory• Self-supporting enclosure• Dead Front• 600A Bushings in the source side.• 200A Bushings well in the load side.• Parking Brackets for all Bushings.• GFCI mounting provision with viewing windows in the source compartments.• Welded structural joints and butt joints• Smooth external seams.• Protective trunk attached to the padlock carrier of each door.• Green Barium free Paint		
5	Interrupter Switches	<ul style="list-style-type: none">• Two (2) sets of one (1) three-pole gang as per URD 11-B.		



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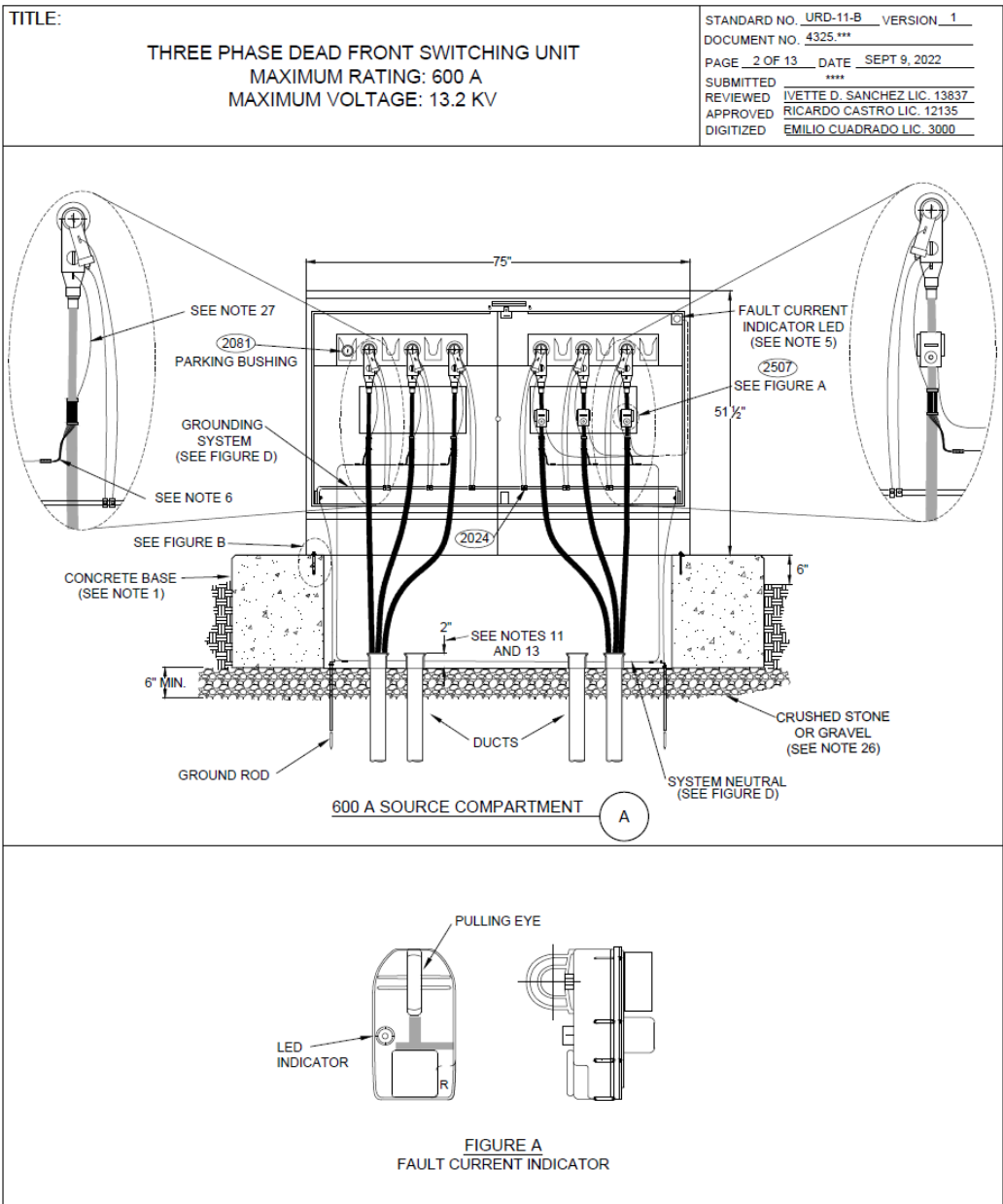
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URD 11-B (Source Side View)



DISTRIBUTION ENGINEERING
UNDERGROUND DISTRIBUTION STANDARDS





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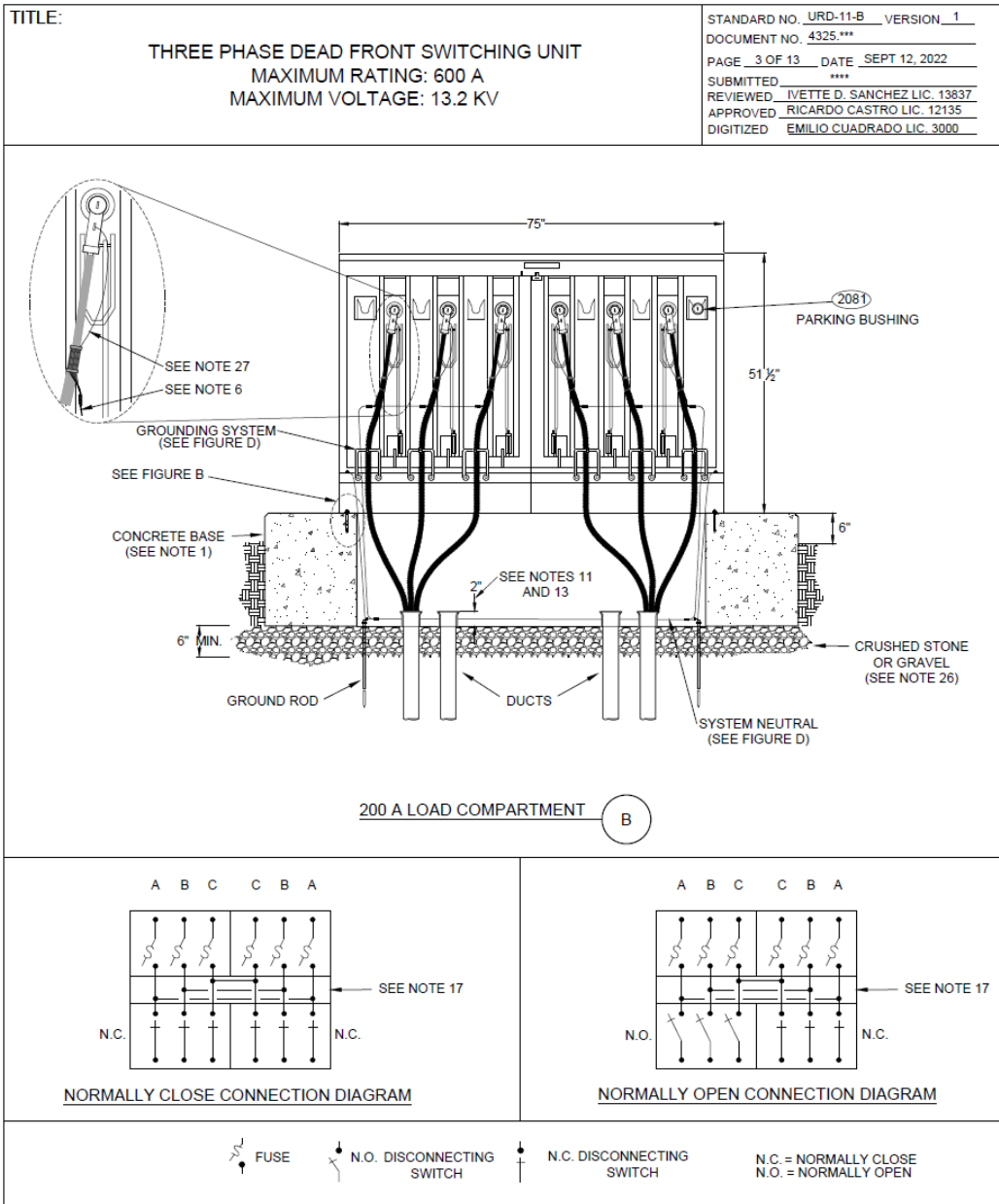
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URD 11-B (Load Side View)



DISTRIBUTION ENGINEERING
UNDERGROUND DISTRIBUTION STANDARDS





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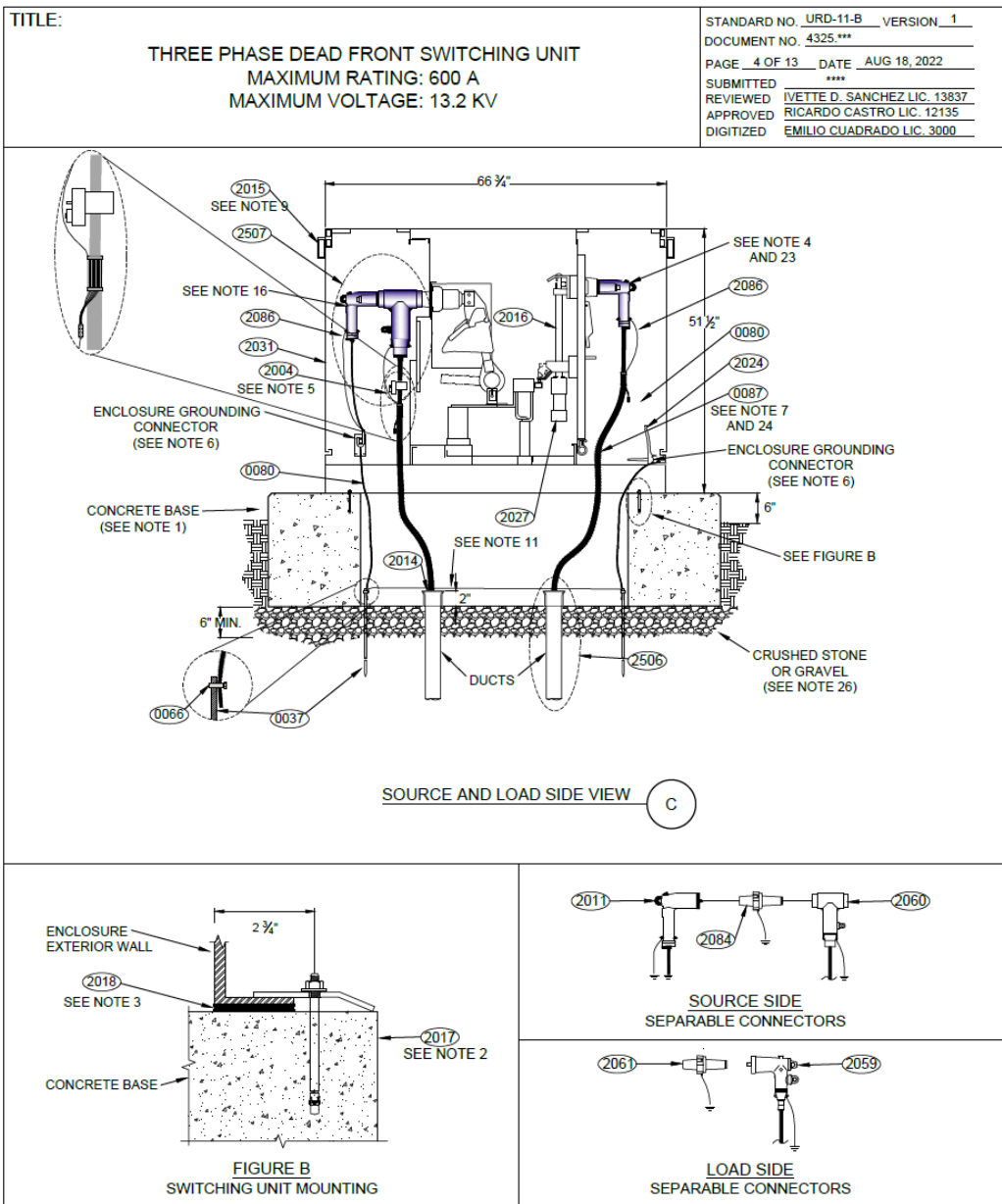
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URD 11-B (Interior Source & Load View)



DISTRIBUTION ENGINEERING
UNDERGROUND DISTRIBUTION STANDARDS













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Final Audit Report

2023-01-04

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