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**38 kV Transmission Line GOAB Switch & MOD**

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**Equipment Specification**

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**Version History**

| Version | Date            | Description                                                                                                                            |
|---------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------|
| 00      | August 26, 2022 | General revision for final approval.                                                                                                   |
| 01      | May 1, 2023     | Line and tap connector changes for 1000 kcmil Bare CU Conductor.                                                                       |
| 02      | Jul 13, 2023    | Manufacturer and catalog numbers removal.                                                                                              |
| 03      | Oct 2, 2023     | Change to new specification format and add section proposal information and section 12 Warehouse and Asset Suit Identification Number. |
|         |                 |                                                                                                                                        |



**1. General**

- 1.1. This specification describes the minimum requirements for the design, manufacturing, testing, and delivery of a pole-mounted Gang Operated Air Break (GOAB) Switch to be used in LUMA Energy 38 kV transmission lines in Puerto Rico.
- 1.2. Further information will be provided by LUMA Energy at the time of order placement and will provide information on site conditions, quantity, and other requirements.

**2. Specific Name**

- 2.1. 38kV Transmission Line GOAB Switch.

**3. Basic Use**

- 3.1. To be used as a line disconnect switch or line sectionalizer configuration on 38 kV overhead, pole mounted, transmission lines.

**4. Special Requirements**

- 4.1. Samples shall be furnished if requested by LUMA.
- 4.2. LUMA may require One (1) unit properly labeled for testing and analysis.
- 4.3. Descriptive and technical literature, installation instructions and outline drawings showing physical dimensions and switch mounting shall be supplied if requested by LUMA.
- 4.4. They shall be required to show evidence of LUMA's approval of the equipment if requested.

**5. Marking and Packaging**

- 5.1. Containers shall be marked outside with LUMA's purchase order number and code number.
- 5.2. Vendors shall prepare material and equipment for shipment in such a way that facilitate handling and protect it from damage.
- 5.3. Switches and accessories shall be adequately packaged and crated for outdoor storage for a period of at least one (1) year.
- 5.4. All material shall be packaged and marked in such a way that the receiving warehouse can readily identify and send in one (1) complete unit (one set of switches) to field location without opening crates to sort items and/or parts.

**6. Compatible with:**

- 6.1. For compatible manufacturer and model see Table 1.
- 6.2. 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.

**7. Quantity per package:**

- 7.1. As requested by LUMA.



**8. Acceptance Criteria**

- 8.1. Each disconnect switch shall be designed and built following the latest applicable ANSI/IEEE, NEMA and ASTM standards and the herein included requirements.
- 8.2. The following standards shall form part of this specification unless otherwise stated:
  - 8.2.1. ANSI C84.1 Electric Power Systems and Equipment - Voltage Ratings (60 Hz)
  - 8.2.2. IEEE C37.30.1 Requirements for AC High-Voltage Air Switches Rated Above 1000V.
  - 8.2.3. ASTM A123/A123M Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

**9. Description**

- 9.1. The 38kV Transmission Line Gang Operated Air Break (GOAB) Switch shall have the following minimum ratings:

| Normal Operating Voltage | Nominal Rated Voltage | Maximum Rated Voltage | Rated Full Wave Impulse Withstand Voltage (BIL) | Rated Continuous Current | Short Circuit Current                        | Momentary Short Circuit Current Withstand |
|--------------------------|-----------------------|-----------------------|-------------------------------------------------|--------------------------|----------------------------------------------|-------------------------------------------|
| 38 kV rms                | 46 kV rms             | 48.3 kV rms           | 250 kV peak                                     | 1200 A rms               | 44 kA rms symmetrical for 3 seconds at 60 Hz | 70 kA peak for 10 cycles at 60 Hz         |

- 9.2. The GOAB switch shall be of the Side Break type and shall be suitable for direct mounting on wood poles, round metal, or concrete flat surface poles in a vertical phase-over-phase fashion so that the blades lie in a plane through the pole axis. The make and brake action shall take place between contacts mounted on a fixed insulator and a blade mounted on a rotating insulator.
- 9.3. The GOAB holes for mounting shall be spaced to 24 inches center to center and suitable for 5/8 inches through bolts.
- 9.4. The support insulators shall be one piece polymer, ANSI sky blending gray station post.
- 9.5. The GOAB shall be equipped with quick break arcing horns.
- 9.6. The GOAB shall be able to be installed on the following configurations: One Way Line Tap, One Way In-Line, Two Way, and Three Way.
- 9.7. The current shall be carried by a rigid hard drawn copper blade with silver tip plate or with tip of cast beryllium soldered with silver.



- 9.8. No braided conductor shall be used in the current path.
- 9.9. Bearings shall be maintenance free for the life of the switch.
- 9.10. Non-ferrous construction shall be used from switch lever to switch contacts.
- 9.11. The line connectors and cable tap terminals shall be tin plated copper suitable for 1000 kcmil Bare CU, 61 strands, Diameter: 1.152 in., conductor. Grounding strap terminals or cable from No. 2 to 4/0 shall be provided.
- 9.12. The switch shall be supplied with at least 50 ft. total length of operating pipes or rods, including from the fist switch control rod clamp to the operating handle. The operating rods are 8 to 10 ft. long each, threaded at both ends, with coupling fittings. Spacing guides every 8 to 10 ft. up to the pole. Operating rods shall consist of hot-dip galvanized tubes not less than 1 in. diameter. Should include not less than 4 (four) holders to brace the pole. The GOAB switch shall be able to be installed at least on a 70 ft. steel pole, 60 ft. above ground level.
- 9.13. The switch shall have a hot-dip galvanized steel or 6061-T6 aluminum frame, in accordance with applicable ANSI/IEEE standards and galvanizing as per ASTM A153. All bolts, cap screws, socket set screw lock washers or equivalent, etc. That are normally supplied with the equipment, but which cannot be factory assembled shall be hot dip galvanized and enclosed in a plastic container attached to the switch.
- 9.14. **Manual Operating Mechanism**
  - 9.14.1. The manual operating mechanism shall be reciprocating swing, as shown on the Drawings.
  - 9.14.2. The manual operating mechanism holes for mounting shall be spaced to 12 inches center to center and suitable for 5/8 inches through bolts.
  - 9.14.3. The operating mechanism shall include outboard bearings, horizontal and vertical operating pipes, pipe guides, pipe coupling, ground strap, grounding clamp and operating handle. The operating mechanism shall include provision for padlocking with a ½ in round shackle padlock in the CLOSED or OPEN positions, with CLOSED and OPEN indicators.
  - 9.14.4. Manual operating mechanisms shall include barrel-type auxiliary switches for remote status indication. The auxiliary switches shall be mounted on the vertical operating pipe. The auxiliary switches shall be heavy-duty, industrial grade, long life type switches and shall be "Form-C" contacts.
  - 9.14.5. The operator platform, 914.4 mm (36 in) x 609.6 mm (24 in) shall be provided by LUMA or a third party.
- 9.15. **Motor Operating Mechanism**
  - 9.15.1. Motor operators shall be reciprocating drive mechanisms for the local and remote operation of GOAB disconnect switches, with an electro-mechanical (non-hydraulic) drivetrain of maintenance-free design, and with all major components housed within a single enclosure. Operators shall be automation-ready with contacts for remote indication of switch and motor operator status. The motor operators shall have the ability to add condition monitoring features at order placement or as a retrofit in the field.



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9.15.2. Motor operators shall have the following minimum ratings:

| Rated Output Stall Torque | Rated Control and Motor Voltage | Auxiliary Voltage for Heaters and Light | Operating Speed                                                                                                |
|---------------------------|---------------------------------|-----------------------------------------|----------------------------------------------------------------------------------------------------------------|
| 5,000 lb.                 | 120/240 VAC or 24-125 VDC       | 120 VAC, 60 Hz                          | Operating stroke must be a 14½ in. nominal and fully operate the switch open or closed within 0.5-0.7 seconds. |

9.15.3. Stroke limits, once set, shall not require re-setting after manual operation or motor running maintenance.

9.15.4. Operator linkage must toggle over center at both limits of the stroke to:

9.15.4.1. Place control rod compression on a mechanical stop in the closed position

9.15.4.2. Prevent accidental movement from the open position.

9.15.5. Switch position status must be indicated locally on the control panel and transmitted via SCADA remotely when in either local/manual or remote/motor operating mode.

9.15.6. The operator enclosure shall be of welded NEMA 4X construction of 14-gauge, stainless steel with ANSI 71 gray powder-coating 3 mils minimum thickness. Single point lifting is to be provided on a powder coated welded stainless-steel enclosure with stainless steel hardware and safety handle.

9.15.7. It shall not be necessary to disengage the control rod to perform manual operation of the switch.

9.15.8. The manual handle shall require the use of an interlocking device which, when removed for use with the manual handle, shall break the electrical circuit to the motor (user safety point)

## 10. Inspection

10.1. 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 shall not prevent subsequent rejection if such material is found to be defective later.

## 11. Proposal Information

11.1 Submitted proposals must include:

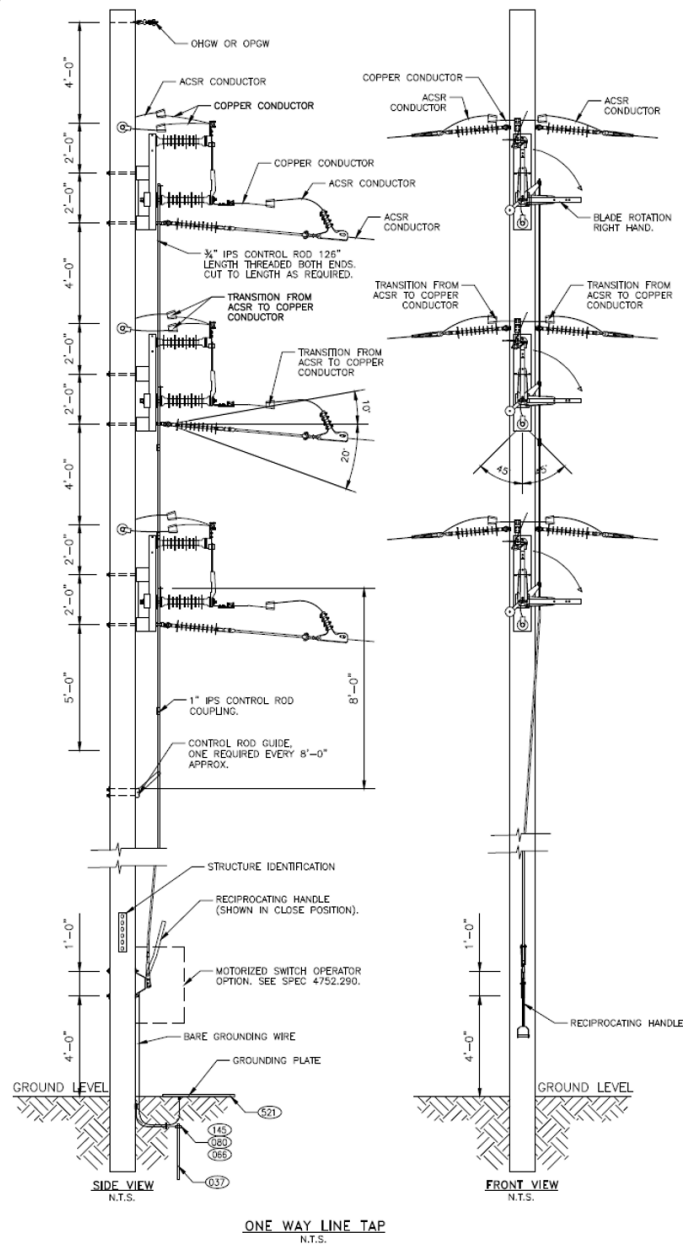
11.1.1 Technical information and drawings.

## 12. Table 1: Warehouse and Asset Suit Identification Number

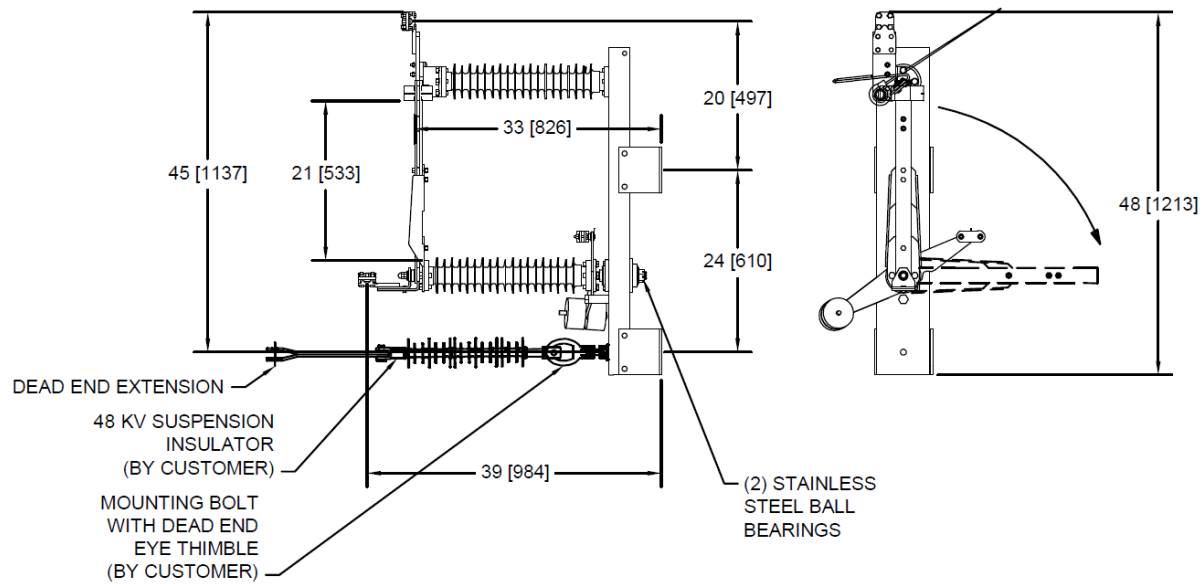
| Item | Description                        | Compatible Manufacturer & Model            | LUMA Warehouse No. |
|------|------------------------------------|--------------------------------------------|--------------------|
| 1    | 38kV Transmission Line GOAB Switch | Line BOSS Tap Switch,<br>LBS 48-69 kV      | 032-02801          |
| 2    | 38kV Transmission Line GOAB MOD    | MSO Motorized Switch<br>Operator, MSOTA4CM | 032-83123          |

## 13. Drawing

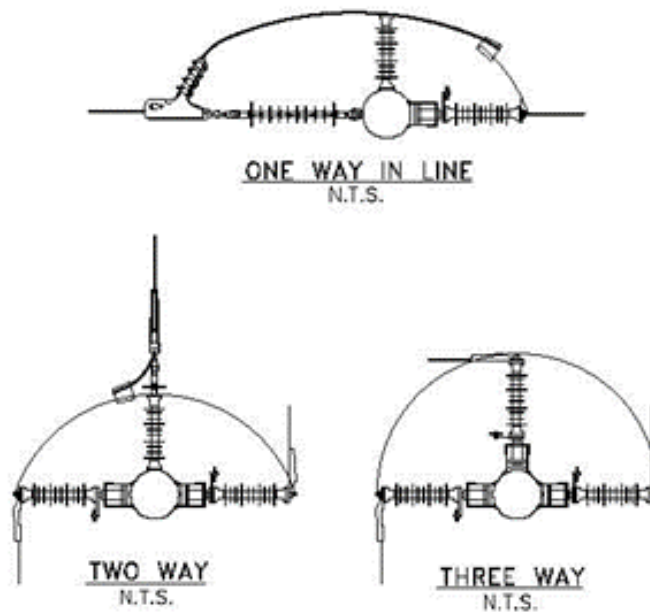
Typical Pole Assembly:



Typical Dimensions:



Alternative GOAB Typical Configurations:



— End of Specification —











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Final Audit Report

2023-10-02


|                 |                                                 |
|-----------------|-------------------------------------------------|
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