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## Specification No. E-051

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Revision No. 0  
Date: 07/12/2018

PREPARED BY ENGINEERING DEPARTMENT

### TRANSMISSION & DISTRIBUTION SPECIFICATION

Specification No. E-051

For

**THREE-POLE, GROUP-OPERATED, AIR DISCONNECT SWITCH**

**SUBSTATION**

**VERTICAL-BREAK OUTDOOR TYPE**

**34.5 KV 2000 AMPS**

**34.5 KV 3000 AMPS**

**115 KV 1200 AMPS**

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### THREE-POLE, GROUP-OPERATED, AIR DISCONNECT SWITCH VERTICAL-BREAK, SUBSTATION OUTDOOR TYPE

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### 1.0 SCOPE

1.1 This specification covers GPA requirements for 34.5 kV and 115 kV outdoor, three-pole, group-operated, vertical-break, manual or motor operated air disconnect switch. The switch shall be equipped with current-interrupting enhancement to provide a full load-break capability up to 3000 Amperes for 34.5 kV and 1200 Amperes for 115 kV. It shall interrupt line charged currents up to 100A.

The switch shall include arcing horns, insulators, manual or motor operated operators, and other accessories.

1.2 The switch is intended for use in tropical weather conditions with a corrosive sea air atmosphere, with sustained wind strength of 170 MPH and subject to seismic zone 4 condition.

### 2.0 APPLICABLE PUBLICATIONS

The equipment specified herein shall be designed, manufactured, assembled and tested in accordance with the latest revisions of ANSI C37.30, ANSI 37.32, ANSI 37.33, and ANSI 37.34.

### 3.0 DEVIATIONS AND NON-CONFORMANCE REQUIREMENTS

3.1 Deviations from this specification or changes in the material or design after the purchase order has been placed must be approved by the GPA Engineering Department and acknowledged by a Purchase Order Amendment issued by GPA.

3.2 Units received with deviations or non-conformances that are not acknowledged per Section 3.1 are subject to rejection. The Supplier of rejected units is responsible for any corrective action including but not limited to materials, labor and transportation necessary to dispose of or make the units conform to the specification.

3.3 Notification of defective units discovered before or after installation that are believed to be inherent to manufacturing problems or workmanship shall be made and forwarded to the Supplier. The description of the item, documentation of the problem and the described information, disposition and/or follow-up (as appropriate) that GPA expects from the Supplier will be specified. The Supplier's

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response shall be made within thirty (30) days unless an extension is acknowledged and approved in writing by the GPA Manager of Engineering.

### 4.0 SUBMITTALS

- 4.1 Shop drawings indicating details of construction and the outline of all connectors shall be submitted to GPA Engineering for review and approval.

Information required includes:

1. Catalogs and cut sheets.
  2. Single-pole assembly:
    - a. Dimensions from bottom of base to terminal pads at each end.
    - b. Dimensions from bottom of base to tip of blade in open position.
    - c. Overall length of base and mounting hole locations.
    - d. Terminal pad holes relative to base mounting holes.
  3. 3-pole arrangement with material list and mounting dimensions.
  4. Detail drawings of the operating mechanism.
  5. Show weight of complete single-pole assembly.
  6. Show weight of complete 3-pole switch assembly, including operating mechanism.
  7. Detail drawings of interrupting attachments.
  8. Bill of material.
  9. Complete installation instructions.
  10. Operation, Maintenance, and Installation Manuals
  11. Nameplate
- 4.2 GPA shall be allowed two (2) weeks to review and approve drawings provided in Section 4.1 without affecting the shipping date. Delays in delivery due to drawings that are disapproved during this review period are the responsibility of the Supplier.
- 4.3 Drawings returned to the Supplier as approved shall be considered authorization to proceed with the work. The approval of GPA shall in no way abrogate the requirements of this specification.
- 4.4 Instruction books shall be furnished which shall contain the description of components, parts and accessories, detailed installation instructions, complete instructions covering operation and maintenance of equipment, complete replacement parts list.

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4.5 At least one complete set of drawings and instruction books per switch shall be provided at the time of delivery.

4.6 An AutoCAD file and a complete set of final certified reproducible drawings shall be provided to GPA for record and filing. This includes instruction books, schematic diagram, and wiring diagrams.

**5.0 CERTIFIED TEST REPORTS**

Certified tests shall be conducted in accordance with applicable standards. The Supplier shall furnish two (2) copies of certified test reports for all tests covered by this specification to the GPA Manager of Engineering within two (2) weeks of delivery.

**6.0 RATINGS**

The switch rating requirements are as follows:

Item	Rating
A. Nominal Voltage	115 kV
B. Maximum Voltage	121 kV
C. Continuous Current Rating, Motor Operated	1,200 A
Manual Operated	1,200 A
D. Momentary Current Rating	100 kA
E. BIL	550 kV
F. Switch Phase Spacing	120 inches
G. Post Insulator	NEMA TR 287

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Item	Rating
A. Nominal Voltage	34.5 kV
B. Maximum Voltage	38 kV
C. Continuous Current Rating, Manual Operated	3,000A or 2000A per GPA requisition
D. Momentary Current Rating	100 kA
E. BIL	200 kV
F. Switch Phase Spacing	48 inches
G. Post Insulator	NEMA TR 231

Motor operator dc motor shall be rated for operation at 125 volts dc. Each disconnect switch shall be designed and constructed for operation on a 3-phase, 60 hertz, solidly grounded system, at an ambient temperature range from +40 °C to -30 °C at an altitude below 3,300 feet.

**7.0 DESIGN AND CONSTRUCTION**

7.1 Switches:

1. Furnish vertical-break configuration, group-operated air disconnect switches equipped with current-interrupting enhancement, which provide full-load break capability (with arcing horns) designed for vertical or horizontal mounting.
2. Do not use cast iron for switches.
3. Do not use nonferrous switch parts above the top insulator caps.
4. Use copper, copper alloy, or aluminum alloy for current carrying parts.
5. Furnish a means of adjustment for correction of misalignment in insulators, bases, and operating linkage without removing switch from structure.

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6. Provide counter-balanced main switch blades to prevent them from falling closed or open, from any position, in the event of failure in any link of the operating mechanism.
7. Furnish a complete base properly designed for mounting on steel structures. Switch bases shall be steel channel, hot-dip galvanized after fabrication.
8. Space switches at 4 feet phase spacing for 34.5 kV and 10 feet phase spacing for 115 kV. Provide base mounting for four 5/8 inch mounting bolts spaced on a 9 3/4 x 11 inch pattern per switch.
9. Furnish self-aligning contacts, of high-pressure type of an approved design.
10. Provide self-wiping contacts replaceable in the field without removing the switch from the structure.
11. Furnish flexible leads of suitable ampacity and of noncorrosive material with a clamped and sweated connection for grounding.
12. A lock out/tag out bracket.
13. A grounding lug to accommodate No. 4 to No. 2/O AWG ground wire.

### 7.2 Insulators:

Furnish station post type, ANSI Color No. 70, Light Gray insulators and with a 5 inch bolt circle assembled by the insulator manufacturer.

### 7.3 Nameplate

The switch shall be provided with a permanent nameplate showing all of the required information, including the manufacturer's name, month and year of manufacture, and the maximum voltage and current ratings.

## 8.0 OPERATIONS

### 8.1 Manual Operating Mechanism:

1. Manual operators shall be heavy-duty geared crank type with gearbox for switches rated 69 kV and above. The hub of the operator handle shall be

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located approximately 3 ft. above the structure base plate, unless otherwise indicated in the drawings. Manual operators shall not require an operating force greater than 50 lbs.

2. Provide corrosion-free manual operating mechanism, swing-handle type, with provisions for padlocking in open and closed positions.
3. Provide bracket supports for attaching bearings, operator shaft, and similar items to the steel structures shown on Drawing.
4. Provide a position indicator close to the operating mechanism which clearly shows the position of the switch to be either OPEN or CLOSED.
5. Provide a braided, tinned copper wire grounding strap with a clamp for attaching to the vertical operating shaft and two 9/16-inch holes at the opposite end for attaching to the substation grounding system.
6. Provide a nameplate, including the manufacturer's name, switch type and designation number, serial number, current rating, nominal voltage rating, and BIL voltage rating.
7. Provide sealed, permanently lubricated bearings at each directional offset of the operating linkage.

### 8.2 Motor Operating Mechanism:

1. Each motor operator shall be complete with a dc motor rated as indicated at the end of the Ratings Specification Data Sheet. Each operator shall have provisions for manual operation without removal or disassembly of the motor operator. The motor operator shall be located such that the hub of the manual operator handle is located approximately 3 feet above the structure base plate, unless otherwise indicated on the drawings. Manual operators shall not require an operating force greater than 50 lb.
2. Motor operators shall have sealed bearings with permanent lubrication.
3. Each operator shall be provided with an auxiliary switch including contacts. Auxiliary switch contacts shall be field convertible.
4. The following accessories shall be furnished for each motor operator:
  - One space heater rated 240 volts ac, single-phase; with thermostat (Applied voltage will be 120 volts ac)
  - One reversing contactor to permit the use of momentarily closed external contacts as initiating devices

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- Position indicating target
  - Local push-button control
  - Local-remote selector switch
  - Switch operations counter
5. Each motor operator shall be mounted in a noncorrosion type stainless steel enclosure suitable for protecting the operator during 170 mph wind with driving rain. Painted enclosures are not acceptable.
  6. Provisions shall be supplied in the motor operator control circuit for the Owner's external interlock contacts.
  7. Motor operator with heavy-duty geared crank type manual operating mechanism and field adjustable auxiliary switch contacts in addition to those required for motor operator control:
    - Minimum number "a" type 16
    - Minimum number "b" type 16

### 9.0 QUALITY CONTROL

The Supplier shall have a quality control program to ensure compliance with the requirements of this specification. The program shall be documented and available for GPA's review if requested.

Documentation of the quality control program shall indicate where in the production and manufacturing process the quality checks are taken, describe the purpose of the checks, and describe the nature of the check, i.e. if check is visual only or if electrical or mechanical testing is used.

### 10.0 PACKING AND SHIPPING

- 10.1 The switch shall be placed and crated with suitable material to prevent damage and injury during shipment and handling operations.
- 10.2 The switch shall be securely blocked to prevent shifting during transit.

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- 10.3 The Supplier shall have adequate work and inspection instructions for handling, interim storage, preservation, packaging, and shipping to protect the quality of the switch and prevent damage, loss, deterioration and substitution of products.

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