1.0 GENERAL
1.01 The automated distribution switch shall conform to the following specification.

1.02 The switch shall be an outdoor, three-pole device incorporating single-gap, SF6-gas-filled, group-operated interrupters driven by a single stored-energy operating mechanism located on the switch assembly base.

1.03 The switch shall be configured (select appropriate description):
   (a) upright
   (b) upright—extra mounting-pole clearance
   (c) upright compact (alley arm)
   (d) tiered outboard

1.04 The switch manufacturer shall have a minimum of 10 years of experience in the production of distribution automation switches and have at least 5000 units installed and in operation.

1.05 The switch manufacturer shall supply all internal wiring for the switching system. The switch manufacturer shall supply detailed wiring diagrams, interconnection drawings, and remote terminal unit point data drawings (as required).

1.06 The switch shall perform as intended at temperatures from –40°C to +40°C and it shall maintain full dielectric strength and interrupting capability at a gas pressure of 0 PSI.

1.07 Testing
   The following design tests shall have been performed on the switch, and certified test reports shall be provided upon request:
   
   **Interrupting:** IEEE 1247
   **Dielectric:** ANSI C37.34
   **Radio Influence Voltage:** ANSI C37.34 and ANSI C37.32
   **Temperature Rise:** IEEE 1247
   **Short-Time:** ANSI C37.34 and IEC 265-1
   **Fault Closing:** IEEE 1247 and IEC 265-1
   **Mechanical Endurance:** IEEE 1247

1.08 Each interrupter shall be tested to –40°C to ensure a leak rate of less than $10^{-6}$ cubic centimeters per second, before shipment from the factory.
2.0 LOADBREAK SWITCH

2.01 The switch shall use an integrated stored-energy operating mechanism, with the drive train enclosed inside the switch base.

2.02 The interrupters and the stored-energy operating mechanism shall be maintenance-free.

2.03 For switches in all upright mounting configurations:
A color-coded interrupter position indicator (green for “open,” red for “closed”) shall be furnished on the _____________________ (specify left side, right side, or left and right sides) of the switch base.

For switches in the tiered-outboard mounting configuration:
A color-coded interrupter position indicator (green for “open,” red for “closed”) shall be furnished on the bottom of the switch base.

or optionally, when required by the user

For switches in all upright mounting configurations:
A reversed-color-coded interrupter position indicator (green for “closed,” red for “open”) shall be furnished on the _____________________ (specify left side, right side, or left and right sides) of the switch base.

or optionally

For switches in all upright mounting configurations:
An international symbol interrupter position indicator shall be furnished on the _____________________ (specify left side, right side, or left and right sides) of the switch base for switches in the upright, upright extra mounting-pole clearance and compact mounting configurations. Specify bottom of the switch, for tiered-outboard mounting configurations.

2.04 The switch shall not use any pressure gauges, to minimize entry points into the interrupters as well as opportunities for leakage. Each interrupter shall be tested in the manner indicated in Section 1.08.

2.05 The switch shall be furnished with permanent lifting means to facilitate installation.

2.06 The switch shall be furnished with tin-plated terminal pads.

2.07 The loading from the jumpers shall not exceed 90 pounds in-line and 30 pounds perpendicular to the terminal pads, per IEEE Standard C37.32-1996 Section 8.8.2.2.

2.08 The switch shall be furnished with provisions for mounting three surge arresters on one side of the switch.

or optionally

The switch shall be furnished with provisions for mounting three surge arresters on both sides of the switch.
2.09 60-Hz Ratings (Specify as appropriate)
Load-Current Interrupting: 900 Amperes
Momentary: 25,000 Amperes, Asymmetrical
Duty-Cycle Fault-Closing: 20,000 Amperes, RMS Asymmetrical, Five-Time

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2.10 50-Hz Ratings (Specify as appropriate)
Load-Current Interrupting: 900 Amperes
Momentary: 25,000 Amperes, Asymmetrical
Duty-Cycle Fault-Closing: 20,000 Amperes, RMS Asymmetrical, Five-Time

<table>
<thead>
<tr>
<th>kV</th>
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2.11 The switch shall have been tested and rated for at least 3000 mechanical close-open operations.

2.12 The switch shall have been tested and rated for at least 500 close-open, loop-current switching operations at 900 amperes.

2.13 Switches in the upright mounting configurations, when furnished with the optional visible-break disconnect specified in Section 4.01, shall be capable of continuously carrying and interrupting up to 900 amperes at ambient temperatures up to 40°C with a minimum wind velocity of two feet per second.
3.0 OPERATING MECHANISM
3.01 The integral stored-energy operating mechanism shall be capable of electrically opening and closing the switch, or manually opening and closing the switch by means of a standard or extendible hookstick. No vertical operating shaft shall be required.

3.02 The optional visible-break disconnect specified in Section 4.01, when furnished, shall be mechanically interlocked with the operating mechanism such that the disconnect is blocked from opening until the interrupters are opened.

3.03 The operating mechanism shall be mechanically interlocked with the optional visible-break disconnect specified in Section 4.01, when furnished, such that manual and electrical operation of the interrupters is blocked when the disconnect is open.

3.04 The operating mechanism shall include:
   (a) Low-resistance contacts for indication of open/close position.
   (b) Maintenance-free wiping contacts to prevent operational difficulties arising from frost or corrosion.
   (c) Self-lubricating, maintenance-free bearings.

3.05 The operating mechanism shall be capable of operating electrically at a minimum operating voltage of 16 Vdc.

3.06 The operating mechanism shall require no more than two pulls of 60 pounds maximum to operate manually when the mechanism is fully charged.

3.07 Stored energy in the operating mechanism shall not be released upon large impact load to the switch or pole.

3.08 The operating mechanism shall be tested in the manner described in Section 1.07.

Specify the optional features in Sections 4.01 through 4.06 as required:

4.0 OPTIONAL FEATURES
4.01 For switches in the upright, upright extra pole-mounting clearance, and upright compact mounting configurations:
   The switch shall be furnished with a visible-break disconnect comprised of three interlocked, single-phase, hookstick-operated blades.

4.02 The switch shall be furnished with a ___________ (specify 25-foot, 35-foot, 45-foot, 75-foot, or 100-foot) long shielded control cable in liquid-tight flexible metal conduit, for connection to the optional control unit.

4.03 Sensors shall be furnished on one side of the switch for three-phase monitoring of line current. Sensing shall be accurate to within ±3% across the tested temperature range of –40°C to +40°C.

   or

Sensors shall be furnished on both sides of the switch for three-phase monitoring of line current and voltage. Sensing shall be accurate to within ±3% across the tested temperature range of –40°C to +40°C. Voltage sensors shall have isolated secondaries to protect the inputs of the RTU or IED from potentially damaging voltage surges.

   or

The switch shall be furnished with stationary support insulators and mounting provisions for _______________ (specify type) sensors.
4.04 For switches in the upright, upright extra pole-mounting clearance, and upright compact mounting configurations:

The switch shall be furnished with a pole band and J-bolts.

or

The switch shall be furnished with provisions for dead-ending, including a pole band with J-bolts, dead-ending angles, and a set of extension links.

4.05 The switch shall be furnished with wildlife covers to minimize animal-intrusion-related faults.

4.06 For switch in the upright or tiered-outboard configurations: The switch can be furnished with optional integral dead-ending brackets capable of supporting 2000-pound tension per conductor in instances where conductors are attached to one side of the switch, or 8000-pound tension per conductor in instances where conductors are attached to both sides of the switch.

or

For switch in the upright—extra mounting-pole clearance configuration: The switch can be furnished with optional integral dead-ending brackets capable of supporting 1500-pound tension per conductor in instances where conductors are attached to one side of the switch, or 8000-pound tension per conductor in instances where conductors are attached to both sides of the switch.

Specify one of the following optional features as required:

5.0 SELF-POWERED COMMUNICATION AND CONTROL UNIT

5.01 The manufacturer shall furnish a custom-engineered communication and control unit, including a/an __________________ (specify type) remote terminal unit and a/an __________________ (specify type) communication device.

5.02 Control power shall be provided by the optional three-phase current/voltage sensors located on the front side of the switch, specified in Section 4.03.

or

Control power shall be provided by the optional three-phase current/voltage sensors located on the front and the pole-saddle sides of the switch, specified in Section 4.03. A transfer scheme shall be furnished to ensure continuous control power as long as one side of the switch is energized.

5.03 A temperature-compensated constant voltage battery charger and rechargeable, sealed-lead, starved-electrolyte battery packs shall be provided in the communication and control unit.

5.04 Controls for local electrical opening and closing of the switch and for selecting local or remote operation shall be provided in the communication and control unit.

5.05 Color-coded interrupter position indicating lamps (green for “open,” red for “closed”) shall be furnished in the communication and control unit.

or optionally

Reversed-color-coded interrupter position indicating lamps (green for “closed,” red for “open”) shall be furnished in the communication and control unit.

5.06 An operation counter shall be provided in the communication and control unit.
5.07 The communication and control unit and all standard components shall be rated for an ambient temperature range of –40°C to +70°C.

5.08 The communication and control unit enclosure shall be of 316L stainless steel with gasketed front, designed to the NEMA 4X standard. Appropriate venting shall be provided to prevent gas and moisture buildup. Vents shall be louversed, screened, and filtered to prevent entry of insects and to minimize entry of dust and wind-driven rain into the enclosure.

or

5.0 EXTERNALLY POWERED COMMUNICATION AND CONTROL UNIT

5.01 The manufacturer shall furnish a custom-engineered communication and control unit, including a/an ___________________ (specify type) remote terminal unit and a/an ___________________ communication device.

5.02 Control power shall be provided by an external 120-Vac power source.

5.03 A high-output, temperature-compensated constant-voltage battery charger with unique battery management system, and rechargeable, sealed-lead, starved-electrolyte batteries shall be provided in the communication and control unit.

5.04 Controls for local electrical opening and closing of the switch and for selecting local or remote operation shall be provided in the communication and control unit.

5.05 Color-coded interrupter position indicating lamps (green for “open,” red for “closed”) shall be furnished in the communication and control unit.

or optionally

Reversed-color-coded interrupter position indicating lamps (green for “closed,” red for “open”) shall be furnished in the communication and control unit.

5.06 An operation counter shall be provided in the communication and control unit.

5.07 The communication and control unit and all standard components shall be rated for an ambient temperature range of –40°C to +70°C.

5.08 The communication and control unit enclosure shall be of 316L stainless steel with gasketed front, designed to the NEMA 4X standard. Appropriate venting shall be provided to prevent gas and moisture buildup. Vents shall be louversed, screened, and filtered to prevent entry of insects and to minimize entry of dust and wind-driven rain into the enclosure.

or

5.0 5801 AUTOMATIC SWITCH CONTROL

5.01 The manufacturer shall furnish a fully integrated automatic switch control, providing sophisticated remote terminal unit functionality. It shall include a/an ___________________ (specify type) communication device. The control shall be upgradeable to the manufacturer’s proprietary automatic restoration system, which uses peer-to-peer communication and distributed intelligence to make operating decisions. No central processing or SCADA shall be required, though fully supported.
5.02 Control power shall be provided by an external 120-Vac power source.

or optionally

Control power shall be provided by the optional three-phase current/voltage sensors located on the front and the pole-saddle sides of the switch, specified in Section 4.03. A transfer scheme shall be furnished to ensure continuous control power as long as one side of the switch is energized.

5.03 A high-output, temperature-compensated, constant-voltage battery charger with unique battery management system, and rechargeable, sealed-lead, starved-electrolyte batteries shall be provided in the automatic switch control.

5.04 Controls for local electrical opening and closing of the switch and for selecting local or remote operation shall be provided in the automatic switch control.

5.05 Color-coded interrupter position indicating lamps (green for “open,” red for “closed”) shall be furnished in the automatic switch control.

or optionally

Reversed-color-coded interrupter position indicating lamps (green for “closed,” red for “open”) shall be furnished in the automatic switch control.

5.06 Diagnostic indicating lamps shall be furnished in the automatic switch control.

5.07 Local communication access shall be provided via a DB9 connector.

5.08 The automatic switch control and all standard components shall be rated for an ambient temperature range of –40°C to +70°C.

5.09 The automatic switch control enclosure shall be of non-corrosive aluminum. Appropriate venting shall be provided to prevent gas and moisture buildup. Vents shall be louvered, screened, and filtered to prevent entry of insects and to minimize entry of dust and wind-driven rain into the enclosure.

Specify the optional features in Sections 5.10 through 5.12 as required:

5.10 The full version of the manufacturer’s proprietary automatic restoration system software shall be furnished.

5.11 A pager alert and supervisory system shall be furnished, providing authorized individuals with notification of status changes to the manufacturer’s proprietary automatic restoration system.

5.12 Graphical user interface software shall be furnished, providing full on-line access to the configuration, real-time, and historical data of the automated distribution switch and other distribution automation equipment.

or
5.0 5802 AUTOMATIC SWITCH CONTROL

5.01 The manufacturer shall furnish a fully integrated automatic switch control for remote supervisory or source-transfer application, providing sophisticated remote terminal unit functionality. It shall include a/an___________________ (specify type) communication device. The control shall be upgradeable to the manufacturer's proprietary automatic restoration system, which uses peer-to-peer communication and distributed intelligence to make operating decisions. No central processing or SCADA shall be required, though fully supported.

5.02 Control power shall be provided by the optional three-phase current/voltage sensors located on the front and the pole-saddle sides of the switch, specified in Section 4.03. A transfer scheme shall be furnished to ensure continuous control power as long as one side of the switch is energized.

5.03 A high-output, temperature-compensated, constant-voltage battery charger with unique battery management system, and rechargeable, sealed-lead, starved-electrolyte batteries shall be provided in the automatic switch control.

5.04 Controls for local electrical opening and closing of the switch and for selecting local or remote operation shall be provided in the automatic switch control.

5.05 Color-coded interrupter position indicating lamps (green for “open,” red for “closed”) shall be furnished in the automatic switch control.

or optionally

Reversed-color-coded interrupter position indicating lamps (green for “closed,” red for “open”) shall be furnished in the automatic switch control.

5.06 Diagnostic indicating lamps shall be furnished in the automatic switch control.

5.07 Local communication access shall be provided via a DB9 connector.

5.08 The automatic switch control and all standard components shall be rated for an ambient temperature range of –40°C to +70°C.

5.09 The automatic switch control enclosure shall be of non-corrosive aluminum. Appropriate venting shall be provided to prevent gas and moisture buildup. Vents shall be louvered, screened, and filtered to prevent entry of insects and to minimize entry of dust and wind-driven rain into the enclosure.

Specify the optional features in Sections 5.10 through 5.12 as required:

5.10 The full version of the manufacturer’s proprietary automatic restoration system software shall be furnished.

5.11 A pager alert and supervisory system shall be furnished, providing authorized individuals with notification of status changes to the manufacturer’s proprietary automatic restoration system.

5.12 Graphical user interface software shall be furnished, providing full on-line access to the configuration, real-time, and historical data of the automated distribution switch and other distribution automation equipment.