

**Transmission & Distribution
Material & Installation Specification**

SF6 Switch

I. General

DESCRIPTION

- A. The switch shall consist of manually operated load interrupting, SF6 insulated, 630A linear puffer switches configured as 5-way unit. The switches shall be designated G&W SVRAM style completely sealed, submersible, dead front devices.

QUALITY ASSURANCE

- A. Manufacturer qualifications: The chosen manufacturer shall have at least 10 years' experience in manufacturing SF6 insulated medium voltage switchgear. The manufacturer of the switches shall be completely and solely responsible for the performance of the load break switch and fault interrupter as well as the complete integrated assembly as rated.
- B. The manufacturer shall furnish certification of ratings of the load break switch, fault interrupter and the integrated switch assembly upon request.
- C. The switch shall comply with requirements of the latest revisions of applicable industry standards, including:
IEEE C37.72, IEEE C37.74, IEEE 386
- D. The switch manufacturer shall be ISO 9001:2008 and ISO 14001:2004 certified.

DELIVERY, STORAGE, AND HANDLING

- A. Load break switches shall be shipped FOB, preassembled at the factory. No field assembly shall be required.
- B. The contractor, if applicable, shall handle, transfer, and move the switches in accordance with manufacturer's recommendations.

II. Product

SWITCH CONFIGURATION

- A. Each switch shall be equipped with five (5) 3-phase load break switched ways, as indicated on the plans.
- B. Switches shall be designed for front access to operators and top access to cables. The bushings placement shall be staggered to allow elbow installation without interference.

SWITCH CONSTRUCTION

A. General

Switch contacts and cable entrance terminations shall be contained in a single welded mild steel tank with entrances internally connected by copper conductors. Construction shall be a dead front design. Switches shall be shipped factory filled with SF6 gas conforming to ASTM D-2472. Switch tanks shall be painted ASA70 light gray using a corrosion-resistant epoxy paint.

B. Load Break Switch

Each switching way is to be equipped with an internally mounted operating mechanism capable of providing quick-make, quick-break operation in either switching direction. The mechanism must be capable of delivering sufficient torque and shall be provided with latches for each position to assure load interrupting, fault closing and momentary ratings. All switch positions are to be clearly identified, padlockable and adaptable to keylock schemes. The operating mechanism shall be actuated from outside the switch tank with an operating handle. The operating shaft shall be made of stainless steel for maximum corrosion resistance. A double "O" ring type operating shaft seal shall be used for a leak resistant, long life seal. Switch contacts shall be a tulip-bayonet design and made of plated, high-conductivity copper alloy with arcing tips of copper/tungsten alloy to assure permanent low resistance and to avoid sticking during operations. The contacts shall be designed such that arcing does not occur in the area of main current interchange and contact pressure will increase with increased current flow. The stationary contacts shall be supported independent of the cable entrance bushings, eliminating possible misalignment. The contact nozzle shall have a converging/diverging geometry which improves the flow of SF6 into the arc zone. Contact travel shall be a minimum of 3

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inches and have sufficient open contact separation to assure efficient arc extinction and to withstand field DC testing levels and maintain BIL levels. Switch contacts shall be clearly visible in the open position through viewing windows. Auxiliary blades used for load interruption are not acceptable.

DESIGN RATINGS

A. Switch Ratings - the switch shall be rated below:

SELECTION OF RATINGS	IEEE/IEC
Maximum Design Voltage, kV	15.5
Impulse Level (BIL) Voltage, kV	110
Continuous Current, Amperes	630
Load break Current, Amperes	630
One Minute Withstand (dry), AC kV	35
Production Test Rating	34
15 Minute Withstand, DC kV	53
Momentary Current, kA, ASYM	40
Fault-Close Current, kA, ASYM	40
One Second Current, kA, SYM	25
Mechanical Endurance, Operations	2000
Open Gap withstand, kV	200
Operations load interrupting at 600A	1200
10 operation overload interrupting capability; amps	3000

CABLE ENTRANCES

- A. Load Break Switches
 Cable entrances shall be tested to IEEE 386 and be, as indicated on the switch drawing:
- All 600 amp G&W Quik-Change disconnectable apparatus bushing.

FACTORY PRODUCTION TESTS

- A. Each switch shall undergo the following production testing. Test reports must be available upon request.
- Each switch shall be factory filled with SF6 gas. The gas shall be checked for moisture content.
 - Each switch shall undergo an SF6 leak check to verify the integrity of the tank, seals, and gaskets.
 - A mechanical operation check of each switching mechanism.
 - AC hi-pot tested one minute phase-to-phase, phase-to-ground and across the open contacts.
 - Circuit resistance shall be checked.

STANDARD COMPONENT

- A. The following shall be included as standard:
- 1/4" 304L dual certified stainless steel tank
 - Fixed operating handle for each way
 - Temperature compensating pressure gauge and fill valve
 - 1/2-13 nuts to provide sufficient grounding provisions for all cable entrances
 - Stainless steel three line diagram and corrosion-resistant nameplates.
 - Switch operating handles with padlock provision.
 - One (1) viewing window per way to view open contact position
 - Provision to mount future low pressure alarm

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OPTIONS AS DEFINED BY ENGINEER

- A. The following options shall be supplied:
1. Quick disconnect fitting to remove the pressure gauge without loss of SF6 gas
 2. Low pressure warning device to provide a dry contact if SF6 pressure within the tank falls below 5psig (applicable where ambient temperatures stay above 32°F)
 3. SF6 density switch to provide a dry contact if SF6 density falls too low (applicable where ambient temperatures may fall below 32°F)
 4. 4/0 brass ground lug
 5. Provisions to mount a key interlock after installation
 6. Keylock installed at the factory, to lock in open position
 7. Auxiliary switches to mount (2) Form C contacts for remote switch position indication of the load break switch
 8. Junction box for wiring SF6 alarms, or remote switch position contacts (specify NEMA 4X for dry applications or NEMA 6P for wet/damp applications)
 9. Operation counters
 10. Refill kit consisting of regulator, hose and SF6 bottle

LABELING

- A. Hazard Alerting Signs
Each unit of switchgear shall be provided with a "Danger--Hazardous Voltage--Failure to Follow These Instructions Will Likely Cause Shock, Burns, or Death" sign. The text shall further indicate that operating personnel must know and obey the employer's work rules, know the hazards involved, and use proper protective equipment and tools to work on this equipment.
- B. Nameplates, Ratings Labels, and Connection Diagrams
Each unit of switchgear shall be provided with a nameplate indicating the manufacturer's name, catalog number, model number, date of manufacture, and serial number. Each unit of switchgear shall be provided with a ratings label indicating the following: voltage rating; main bus continuous rating; short-circuit rating; fault interrupter ratings including interrupting and duty-cycle fault-closing; and load break switch ratings including duty-cycle fault-closing and short-time.

III. Installation

Installation shall include all receiving, hauling, loading and unloading, rigging, rollers, anchoring leveling and mounting of accessories as required for a complete and operational switchgear. Installation shall also include are insulated caps for unused bushings, grounding and topping off, when needed, with SF6 gas to safe operation levels.

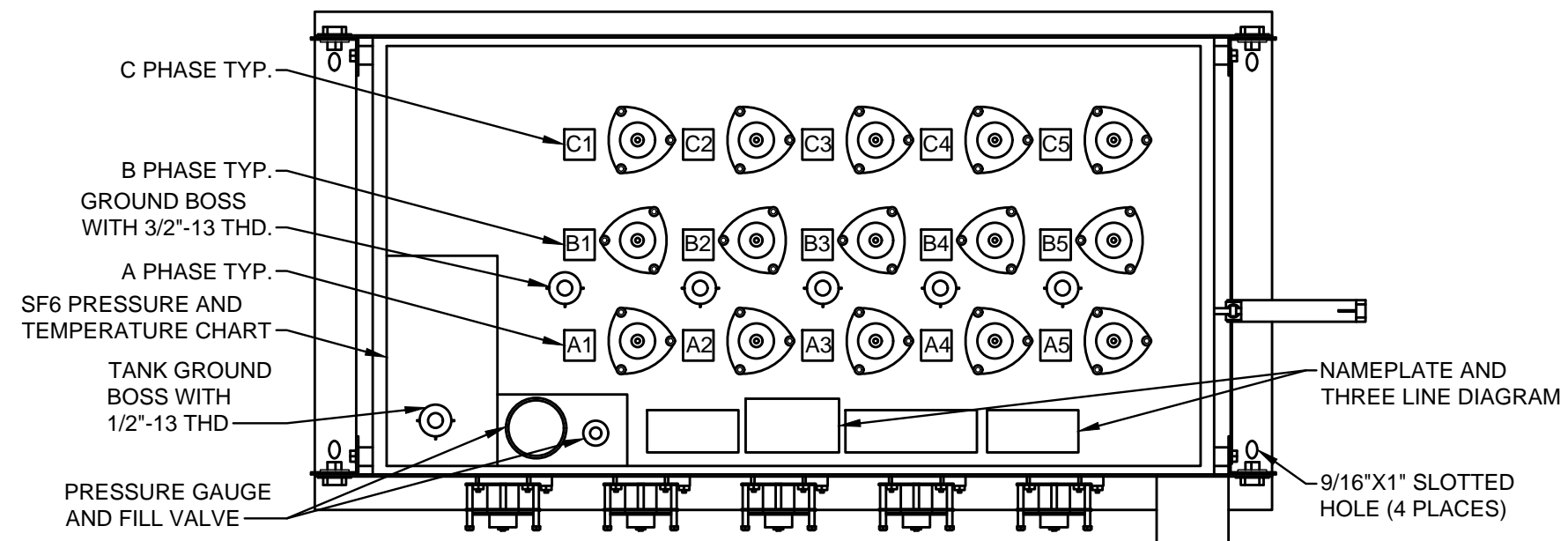
IV. Method of measurement

Shall be for each completed and operational switch as specified herein.

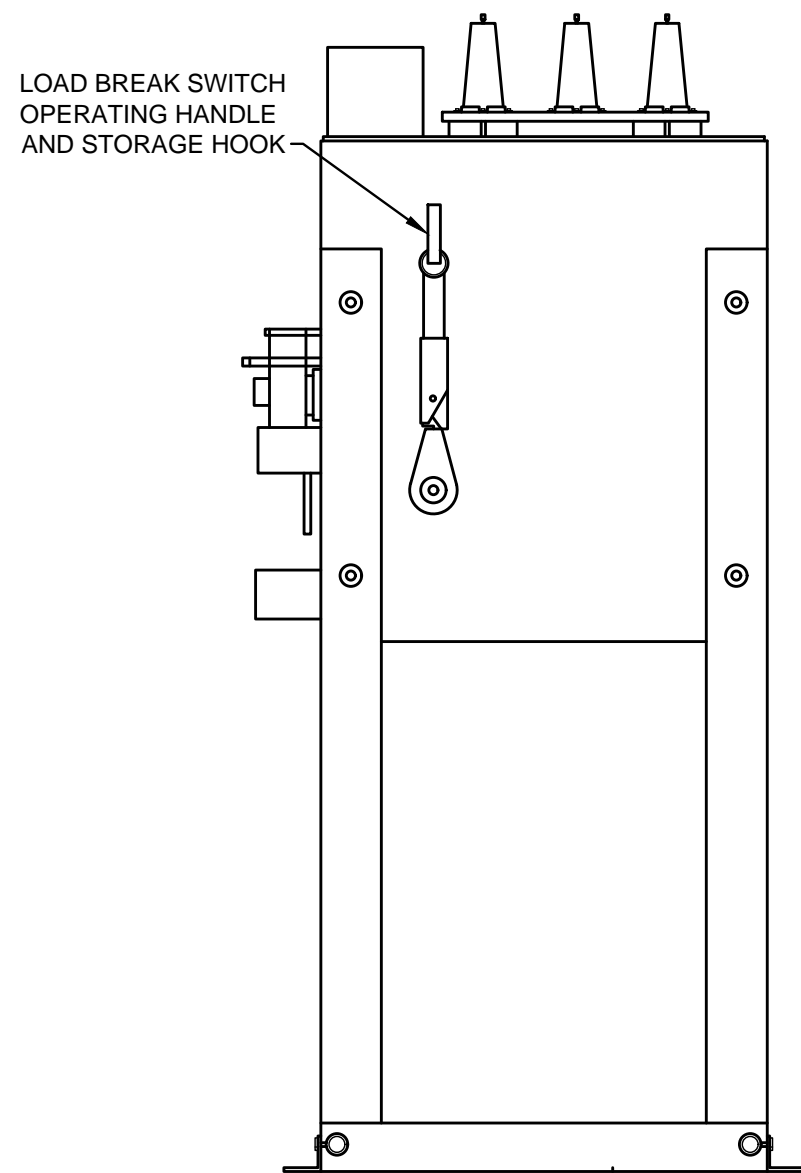
V. Basis of payment

Items	Unit	Description
TDMIS-1405	Each	SF6 switch assembly

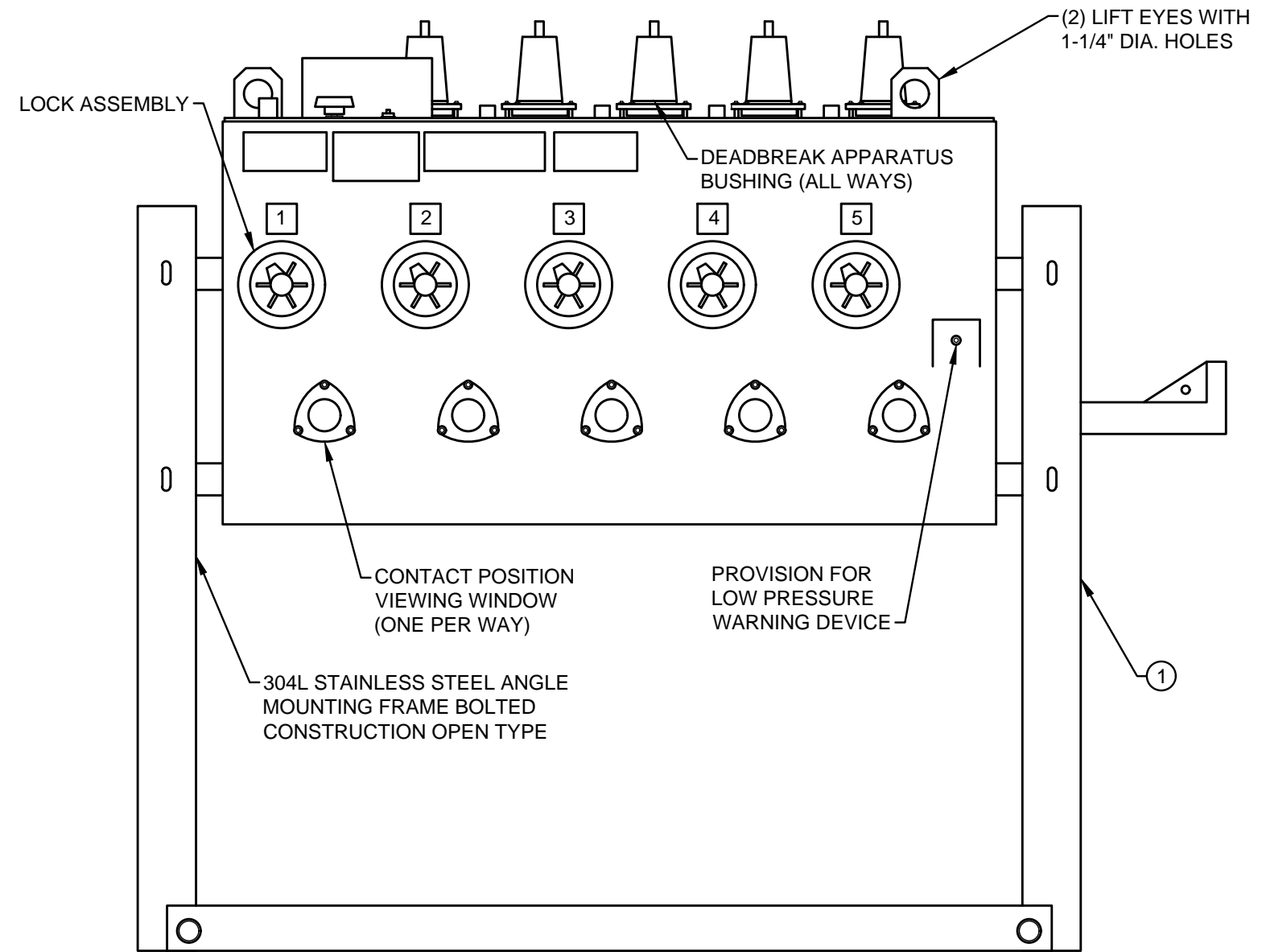
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DETAIL 2
SF6 SWITCH - TOP VIEW



DETAIL 1
SF6 SWITCH - RIGHT VIEW



DETAIL 3
SF6 SWITCH - FRONT VIEW

ITEM LIST			
ITEM#	DESCRIPTION	PART #	QTY.
①	SF6 SWITCH, 5 WAY	20512	1
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SF6 SWITCH			
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SCALE: NTS			