

1. Scope

This Specification covers the requirements for furnishing and delivering self-contained 15kV dead-front pad-mounted and submersible relay controlled switchgear with four 3Ø ways of 600 amp 3Ø group-operated vacuum fault interrupter switches. Switchgear shall be rated for use on a 60 Hz, 12.47 Grounded Y/7.2kV electrical distribution system.

2. Reference Standards

All characteristics, definitions, terminology, voltage designations and tests, except as otherwise specified herein, shall be in accordance with the following industry standards. When the following standards are superseded by an approved revision, the revision shall apply.

Industry Standards

- IEEE C37.74-2014** IEEE Standard Requirements for Subsurface, Vault and Pad-Mounted Load-Interrupter Switchgear and Fused Load-Interrupter Switchgear for Alternating Current Systems up to 38kV
- IEEE C57.12.28-2014** IEEE Standard for Pad-Mounted Equipment — Enclosure Integrity
- IEEE 386-2016** IEEE Standard for Separable Insulated Connector Systems for Power Distribution Systems Above 600V
- NEMA 260-1996 (R2004)** Safety Labels for Pad-Mounted Switchgear and Transformers Sited in Public Areas

3. Material ID Numbers

This Specification applies to the following District Material ID Numbers:

| MID | Description |
|---------|---|
| 5000840 | Switch, 15kV 4-Position VFI Submersible |
| 5000841 | Switch, 15kV 4-Position VFI Padmount Single-Sided |
| 5000842 | Switch, 15kV 4-Position VFI Padmount Double-Sided |

4. Ratings

The switchgear shall have the following ratings:

| | |
|---|---------|
| Power Frequency. | 60 Hz |
| Nominal Voltage | 15kV |
| BIL | 95kV |
| Main Bus Continuous Current | 600A |
| | |
| 3Ø Vacuum Fault Interrupters | |
| Continuous Current | 600A |
| Symmetrical Fault Interrupting | 12,500A |
| Asymmetrical Momentary Interrupting | 20,000A |
| Full Load Load-Break Operations | 8,000 |
| Fault Interruptions at 12.5kA | 65 |
| Momentary & Make & Latch (Asymmetrical) | 20,000A |
| | |
| 3Ø Visible Disconnect Device | |
| Continuous Current | 600A |
| Asymmetrical Momentary Interrupting | 20,000A |

At the District's request, the manufacturer shall furnish certified test reports establishing the electrical ratings of the switchgear, including ratings of the vacuum fault interrupters and disconnect device.

5. Switch Tank

5.1 Material

The tank shall be constructed of 7 gauge AISI type 304 stainless steel or District approved equivalent.

5.2 Construction

The tanks shall be of fully welded construction. No bolted or gasketed tank penetrations shall be allowed. The tank shall be fully submersible. Bushings shall be arranged in an offset layout to facilitate cable training with a minimum 8" spacing between bushings. Integral lifting attachment points shall be provided and shall be arranged so as to provide a balanced lift.

5.3 Grounding Provisions

One grounding provision consisting of a 1/2"-13 stainless steel nut shall be welded to each way and located so as to provide easy access for grounding the way.

5.4 Limiting Overall Dimensions

Nominal tank dimensions are shown below. Minor variations may be acceptable with prior District approval.

| MID | Description | Width (in) | Depth (in) | Height (in) |
|---------|---|------------|------------|-------------|
| 5000840 | Switch, 15kV 4-Position VFI Submersible | 80 | 40 | 50 |
| 5000841 | Switch, 15kV 4-Position VFI Padmount Single-Sided | 80 | 65 | 60 |
| 5000842 | Switch, 15kV 4-Position VFI Padmount Double-Sided | 80 | 75 | 60 |

5.5 Dielectric

Switchgear shall use either a mineral oil liquid dielectric or solid dielectric to insulate all internal components. SF6 dielectric gas may not be used.

Liquid insulated switches shall include provisions for adding oil and an indicating device to positively identify a low liquid level condition.

Mineral oil dielectric shall meet the requirements of ASTM D 3487 for Type II (inhibited) oil. At the time the oil is put into the tank it shall contain less than (1) ppm PCB certifiable by a laboratory test approved by the United States Environmental Protection Agency. The insulating oil, or any of its components, shall not be listed by IARC, NTP, OSHA or ACGIH as carcinogens. The successful bidder shall supply an MSDS sheet for each distinct formulation of insulating oil supplied to the District.

Alternative insulating fluids, including ester-based and silicone-based oils may be supplied with prior District review and approval.

6. Enclosure

For pad-mounted switches, the following shall apply. Submersible switches will not include a separate enclosure.

6.1 Material

The switch enclosure, including doors, shall be fabricated from ANSI type 304 stainless steel. Enclosure base, body and doors shall be minimum 11 gauge thickness. Lift-up doors shall be a minimum 14 gauge thickness. All structural joints and butt joints shall be welded and the external seams shall be ground flush and smooth.

6.2 Limiting Overall Dimensions

Nominal enclosure dimensions are shown in Figure 1. Minor variations may be acceptable with prior District approval.

6.3 Roof

The enclosure roof and body shall be constructed so as to shed water.

6.4 Base

The enclosure base shall be square and smooth and shall consist of continuous 90° flanges, turned inward and welded at the corners for bolting to a concrete pad. Flange width shall be 1" minimum, 2" maximum.

6.5 Doors

Single-sided switchgear shall be equipped with bulkhead type, side-hinged, horizontal swing doors and lift-up lids. Horizontal doors shall have provisions to latch the doors in the open position. Double-sided switchgear shall be equipped with top-hinged, clam shell type doors. Clam shell doors shall be equipped with an automatic deploying wind latch to prevent unintentional closing and two handles for lifting. All doors shall have a minimum of 3 tamper-proof stainless steel hinges.

Door edge flanges shall overlap with door opening flanges so as to guard against water entry or insertion of foreign objects.

Horizontal doors shall include a three-point latching mechanism with recessed penta head bolt and padlock hasp that requires the doors to be latched before the padlock can be inserted. The passive door shall be independently secured and latched to the enclosure. Clam shell doors shall have a recessed penta head bolt and padlock hasp integrated into the base. Padlock hasps shall include a hood that protects the padlock shackle from tampering and prevents access to the operating bolt. The hood shall be configured so it cannot be padlocked independent of the hasp.

6.6 Finish

The switch shall have a corrosion resistant finish that meets or exceeds the coating system requirements of IEEE C57.12.28-2014. The topcoat color of paint shall be semi-gloss Munsell Number 7GY 3.29/1.5, pad-mount green. All finish components shall be lead free.

7. Switch Design

7.1 General

The switchgear shall be a total dead-front design. All energized parts shall be sealed behind a welded ground plane.

7.2 Vacuum Fault Interrupters

All 3Ø VFI ways shall be equipped with 3Ø gang operated vacuum fault interrupters (VFI) of a quick-make, quick-break design that operates at a speed independent of the operating handle. The trip mechanism shall reset when the operating handle is moved into the open position. The trip mechanism shall be solenoid actuated and shall include capacitor energy storage to provide trip power. The trip mechanism shall be operated independently of the operating handle such that if the device is closed into a fault the device will trip open and the tripping action will not be felt in the operating handle. Each 3Ø VFI way shall include a visual trip indication located next to the operating handle. Each 3Ø VFI way shall be pre-wired for open, closed or tripped status indication.

7.3 Visible Disconnect Device

A visible disconnect device shall be included on all 3Ø VFI ways. The contacts of the device shall be clearly visible in the open and close position through a window located on the tank face next to the operating handle. If the visible disconnect is operated separately from the VFI, then the disconnect operating handle shall be externally interlocked with the VFI operating

handle so as to prevent the disconnect device from performing load-break operations. Submersible switches shall include a bell cover for each visible disconnect window.

7.4 Manual Operating Provisions

Manual operating handles for all 3Ø VFI ways and visible disconnect devices shall be easily operated with standard live-line tools. Operating force shall be such that the VFI's and disconnect devices can be easily operated by a single individual in a standing position. All operating handles shall be capable of being padlocked in the open and closed positions and shall be clearly marked to indicate switch position.

7.5 Motor Operators

Each 3Ø VFI way shall include mechanical and electrical provisions for the addition of motor operators.

7.6 Potential Transformer

Switchgear shall include an internally mounted potential transformer for control power. Transformer shall be connected to the common bus and shall be protected with an externally accessible fuse.

7.7 Switch Terminals

Each 3Ø VFI way shall be equipped with 600A rated bushings, without studs, in accordance with IEEE 386.

Pad-mount termination compartment depth shall be a minimum of 20 inches to accommodate 600A elbows with 200A load-break reducing tap plugs and grounding elbows.

8. Overcurrent Relays

8.1 Relay

Switchgear shall be equipped with two SEL 700GW relays, SEL part number 700GW2B1B1B77870621. The relay shall come with firmware FID SEL-700G-R301-V6-Z007004-D20240329.

8.2 Relay Enclosure

All relays, electronic controls, capacitor trip modules and backup power capacitors shall be housed in a separate stainless steel relay enclosure. Relay enclosure will be mounted on the side of pad-mounted switch enclosures. Relay enclosures for submersible switches shall be mounted separate from the switch tank and connected via a waterproof, detachable umbilical cord. Relay enclosure dimensions and mounting location will be determined at time of order. Pad-mount relay enclosures shall be rated NEMA 4X or better. Submersible relay enclosures shall be rated NEMA 6P or better.

8.3 Submersible Relay Pendant Control

Submersible switches shall include separate submersible pendant to allow operators to interrogate and control the relay without opening the relay enclosure. backup battery power with charger, mounting provisions and wiring.

8.4 Wiring

For Padmount switchgear the Trip circuit/OL Protection, DC wiring for Motor Operators, and DC Control wiring should match the drawing number, 181013 RevB, 181014 RevA, and 181015 RevA, unless otherwise approved by the Snohomish PUD.

For submersible switchgear the Trip circuit/OL Protection, DC wiring for Motor Operators, DC Control wiring, Submersible Battery Enclosure, and Pendant Control wiring should match the drawing number, 181023 RevA, 181024 RevC, 181025 RevB, 181027 RevB, 181028 RevA, unless otherwise approved by the Snohomish PUD.

9. SCADA Control

Switchgear shall be designed such that they may be outfitted or converted at any time for full SCADA communication and control. Provisions and optional hardware shall be available for adding communications, motor operators and backup battery power with charger, mounting provisions and wiring.

10. Identification / Nameplate

A stainless steel nameplate securely welded to the switchgear tank shall be provided and shall contain at least the following information stamped, embossed or engraved on it:

- a) Name of manufacturer
- b) Date of manufacture (month and year)
- c) Unique serial number
- d) Model or style number and catalog number if any
- e) Rated maximum voltage
- f) Rated power-frequency
- g) Rated impulse withstand voltage (BIL)
- h) Rated continuous current
- i) Rated load interrupting current
- j) Rated momentary current
- k) Rated making current
- l) 3-line terminal oriented schematic diagram using standard symbols
- m) Total weight with insulating medium
- n) Type and quantity of insulating medium

The following statement shall appear on the nameplate: "Contains less than 1 ppm PCB at the time of manufacture".

11. Instruction Manual

One instruction manual covering installation, operation and maintenance of the equipment shall be provided with each switchgear cabinet. This manual shall be packaged in a weatherproof bag or envelope and secured on the inside of the door of compartment No. 1.

12. Certification

Upon the District's request, the manufacturer shall provide certified test reports verifying that the equipment meets or exceeds the electrical ratings, tamper resistance and finish required by this specification.

13. Packaging

Each switchgear shall be completely assembled and packaged in accordance with good commercial practice to ensure safe delivery without damage to the finish or any other part of the unit. Each switchgear shall be shipped on a nonreturnable wood pallet designed for handling with a forklift. Provisions shall be made to protect switchgear shipped on flatbed trucks from contamination of the cabinet exterior and interior from rocks, dirt, insects and other foreign materials encountered in shipment. No material or other switchgear shall be stacked or carried on top of the switchgear.

14. Equipment Data Sheet

Each shipment of switchgear shall include a digital spreadsheet of all switchgear in the shipment and their nameplate data. The spreadsheet shall be formatted to the District's requirements shown below. Prior to delivery of the switchgear, the spreadsheet shall be emailed to the District's Standards Department (standards2@snopud.com).

The following table describes the layout of the digital spreadsheet. Each column in the spreadsheet shall have a header with the field name and each row shall represent an individual piece of equipment. On request, the District will provide a template of the spreadsheet to the manufacturer.

| Column | Field Name | Data Type | Sample Date | Valid Values |
|--------|----------------------------|---------------|-----------------|-----------------------------------|
| 1 | Manufacturer Serial Number | Char(30) | JR102-2 | |
| 2* | Equipment Number | BLANK | BLANK | |
| 3 | Object Type | Char(10) | ED_SWCAB | ED_SWCAB |
| 4* | Start Up Date | BLANK | BLANK | |
| 5 | Manufacturer | Char(30) | S&C | |
| 6 | Model Number | Char(20) | 1037-418997-000 | |
| 7 | Manufacturer Part Number | Char(30) | 1765201303 | |
| 8 | Weight | Numeric(10,2) | 1213.1 | |
| 9 | Unit of Weight | Enum | LB | [LB, KG, TON] |
| 10 | Acquisition Value | Numeric(10,2) | 3000.02 | In USD |
| 11* | Acquisition Date | BLANK | BLANK | |
| 12 | Manufacturer Country | Char(2) | US | [US, MX, CA] - contact for others |
| 13 | Construction Year | Char(4) | 2017 | YYYY |
| 14 | Construction Month | Char(2) | 12 | MM |
| 15* | District Number | BLANK | BLANK | |
| 16 | MATERIAL_ID | Char(7) | 5000786 | PUD Internal Material ID |
| 17 | PURCH_ORDER_NUMBER | Char(10) | 4500014093 | PUD Purchase Order Number |
| 18 | PO_LINE_NUMBER | Char(2) | 1 | PUD Purchase Order Line Number |

*Column values must be blank and will be filled out by the District