

15KV DEAD-FRONT PAD-MOUNTED SWITCHGEAR

SPECIFICATION #1513.03



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1 SCOPE

This specification covers the requirements for furnishing and delivering free-standing, self-contained, cabinet enclosed 15kV air-insulated, deadfront, padmounted switchgear with 600 amp 3Ø group-operated interrupter switches and 3Ø sets of 200 amp single-pole fuse ways configured as shown below. Switchgear shall be rated for use on a 60 Hz, 12.47 Grd Y/7.2kV electrical distribution system. Electrical loads include residential, commercial and industrial customers.

2 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 When the following standards are superseded by an approved revision, the revision shall apply.

IEEE C37.74 – IEEE Standard Requirements for Subsurface, Vault, and Pad-mounted Load-Interrupter Switchgear and Fused Load-Interrupter Switchgear for Alternating Current Systems Up to 38 kV

IEEE C37.60 – High-voltage switchgear and control gear

IEEE C57.12.28 – IEEE Standard for Pad-Mounted Equipment – Enclosure Integrity

IEEE 386 – IEEE Standard for Separable Insulated Connector Systems for Power Distribution Systems Above 600v

ANSI Z535.1 – American National Standard for Safety Colors

ANSI Z535.2 – American National Standard Environmental and Facility Safety Signs

ANSI Z535.3 – American National Standard Criteria for Safety Symbols

ANSI Z535.4 – American National Standard Product Safety Signs and Labels

ANSI Z535.6 – American National Standard for Product Safety Information in Product Manuals, Instructions, and Other Collateral Materials

NEMA 260 – Safety Labels for Pad-Mounted Switchgear and Transformers Sited in Public Areas

3 RATINGS

The switchgear shall have the following minimum ratings:

Power Frequency	60 Hz
Nominal Voltage	14.4kV
Maximum Voltage	17kV
BIL	95kV
Main Bus Continuous Current (Excl Config 4; 200A).....	600A
Three-Pole Interrupter Switches	
Continuous Current	600A
Load Dropping Current	600A
Short Circuit Current	
One-Second Short Time Withstand, RMS Symmetrical	14,000A
Peak Withstand, Peak	35,000A
Three-Time Duty-Cycle Fault-Closing	
RMS, Asymmetrical	22,400A
Fused Bays	
Continuous Current (Fuse)	200A
Load Dropping Current (Fuse)	200A
Short Circuit Current, RMS Asymmetrical	22,400A
3Ø Symmetrical Load at Rated Voltage	350 MVA

The manufacturer shall furnish certified tests establishing the electrical ratings of the switchgear including ratings of the basic switches and fuse components upon request.

4 ENCLOSURE

4.1 General

The switchgear cabinet shall be of unitized construction (not structural frame and bolted sheet). All medium-voltage switch and fuse components shall be completely encased in an inner grounded steel compartment.

The switchgear shall meet or exceed the tamper resistance requirements of IEEE C57.12.28 latest revision.

4.2 Material

The cabinet, including doors, shall be fabricated from minimum 11 gauge steel sheet. All structural joints and butt joints shall be welded and the external seams shall be ground flush and smooth.

4.3 Overall Dimensions

The base of the enclosure shall be:

- For configuration styles 3 and 5 (two compartment layout):
Dimensioned such that it will fit over a 44" x 74" cable opening in CPU's padmounted switchgear vault covers. Maximum dimensions allowed are 52" wide x 78" deep.
- For configuration styles 9, 10, 11, 12 (four compartment layout):
Dimensioned such that it will fit over a 54" x 65" cable opening and 60" x 65" cable opening in CPU's padmounted switchgear vault covers. The maximum outside dimensions of the cabinet shall be 78" wide x 78" deep.

4.4 Roof

The cabinet shall be constructed so as to shed water. If two roofs are used, water shall not collect at their intersection.

A heavy coat of insulating "no-drip" compound shall be applied to the inside roof surface to reduce condensation.

4.5 Base

The cabinet 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 and 2" maximum. A resilient, closed-cell, waterproof gasket shall be applied to the bottom base flange of the enclosure to protect the integrity of the finish during installation. The gasket shall provide a corrosion barrier between the enclosure base flange and equipment foundation.

4.6 Barriers

Insulating interphase and end barriers of NEMA GPO3-grade fiberglass-reinforced polyester shall be provided for each interrupter switch and each fuse where required to achieve BIL ratings. Additional insulating barriers of the same material shall separate the front compartments from the rear compartments.

Steel barriers shall separate side-by-side compartments.

4.7 Doors

Doors shall be bulkhead type, side-hinged to swing open horizontally. Top-hinged, clam shell type doors are unacceptable. Doors shall have a minimum of three tamperproof stainless steel hinges and pins. The hinge pins shall be secured in place to guard against tampering. The doors shall have a minimum 12" clearance off the ground to allow the doors to swing over snow and ice.

The door openings shall have 90° flanges, facing outward, that shall provide strength and rigidity as well as deep overlapping between doors and door openings to guard against water entry.

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

Each pair of double doors shall consist of one active and one passive door. The active door shall include a three-point latching mechanism with recessed Pentahead 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. The padlock hasp 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.

Each door shall be provided with a stainless steel door holder located in or above the door opening. These holders shall be hidden from view when the door is closed. It shall not be possible for the door holders to swing inside the enclosure. The door holders shall hold the door open at an angle of at least 100° and at most 120°.

Each switch compartment door shall have mounting provisions with a viewing window to accommodate one 3Ø fault indicator on the associated door.

4.8 Lifting Tabs

Factory-installed removable lifting tabs shall be provided. A resilient material shall be placed between the lifting tabs and the enclosure to prevent damaging the enclosure finish. This material shall be non-hydroscopic to prevent moisture from being absorbed and retained between the tabs and enclosure in the event that the lifting tabs are not removed.

4.9 Finish

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

5 SWITCH COMPONENTS

5.1 Switch Terminals

Switch terminals shall be equipped with 600A rated bushings with removable threaded studs in accordance with IEEE Std. 386. Dust covers shall be installed for shipping. Parking stands shall be provided adjacent to each bushing. Switch termination compartment depth shall be a minimum of 20 inches to accommodate 600A elbows with 200A loadbreak reducing tap plugs and grounding elbows.

Bushings and bushing wells shall be mounted so that the semiconducting coating of these devices is solidly grounded to the enclosure.

5.2 Visible Break

Interrupter switches shall have a readily visible open gap when in the open position. In addition, an open/close label shall be provided to give a visual indication of the switch position. Viewing windows will be provided in the switch termination compartments to allow visual verification of the switch position and open/close labels.

5.3 Interrupter Switches

All interrupter switches shall be dry type, in-air, three-pole, externally group-operable through an operating handle external to the enclosure. Interrupter switches shall be provided with contact blades and interrupters for circuit closing, including fault-closing, continuous current carrying and circuit interrupting. Interrupter switches shall have a three-time duty-cycle fault-closing rating equal to or exceeding the short circuit rating of the padmounted gear assembly.

5.4 Switch Operation

The group-operated interrupter switches shall be actuated through a non-defeatable quick-make, quick-break mechanism installed by the switch manufacturer. The quick-make, quick-break mechanism shall assure high speed closing and opening of the switches independent of the speed of the manual switch operating handle and operating hub. Circuit interrupting shall take place completely within the interrupter with no external arc or flame. Any exhaust shall be vented in a controlled manner.

5.5 Switch Contacts

Interrupter switch contacts shall be silver-plated and backed up by stainless steel springs to provide constant high-contact pressure.

5.6 Operating Handle

An operating handle shall be provided for each interrupter switch. The switch-operating handle shall be secured to the inside of the switch operating hub pocket by a corrosion-resistant chain. The handle shall be stored behind the switch operating hub access door.

5.7 Switch-Operating Hub Pocket

The switch-operating hub pocket shall include a padlockable access cover that shall use a hood to protect the padlock from tampering. The hood shall be configured so it cannot be padlocked independent of the hasp. Stops shall be provided on the switch-operating hub to prevent overtravel and thereby guard against damage to the switch mechanism. Labels or targets to indicate switch positions shall be provided in all switch operating hub pockets.

Provision to padlock switch-operating hub in open or closed position shall be provided.

6 FUSE COMPARTMENTS

6.1 Fuse Terminals

Fuse terminals shall be equipped with 200A rated bushing wells and bushing inserts in accordance with IEEE Std. 386. The 200A bushing wells shall have a replaceable well stud. Dust covers shall be installed for shipping. Parking stands shall be provided adjacent to each bushing. Fuse termination compartment depth shall be a minimum of 14 inches to accommodate 200A elbows mounted on portable feed-through or standoff insulators.

Bushings and bushing wells shall be mounted so that the semiconducting coating of these devices is solidly grounded to the enclosure.

6.2 Power Fuse Type

Switchgear with fuse termination compartments shall be configured to accept SM-4 power fuses with the appropriate fuse end fittings and silencer. Switchgear with fuse termination compartments will include S&C SM-4 fuse unit with 100E fuse curve with appropriate end fittings and silencer.

Termination compartments shall be provided with one parking stand for each bushing or bushing well. The parking stand shall be located immediately adjacent to the associated bushing or bushing well and shall accommodate standard feedthrus and standoff insulators, and other similar accessories.

A fuse-storage feature shall be provided in at least one source interrupter-switch compartment. Each fuse-storage feature shall provide space for storing three spare fuse units. Three spare SM-4 100E fuse units will be provided with each switch.

6.3 Viewing Windows

Viewing windows shall be provided in the fuse compartments to allow inspection of the blown fuse indicator on power fuses.

6.4 Fuse Access

Fuse access panels shall have a mechanical interlock that restricts access to the fuse until the elbow for that fuse has been disconnected. Cable guides shall be provided to assist in cable training and prevent cables from interfering with the fuse-access panels. The fuse shall be accessible to operating personnel only when de-energized and isolated.

6.5 Fuse Storage Hooks

Switchgear with fuse termination compartments shall include at least one set of fuse storage hooks on a fuse compartment door (Or similar arrangement). These hooks shall allow storage of three SM-4 fuses with appropriate end fittings and silencer.

7 GROUNDING PROVISIONS

7.1 Grounding Pads

A ground connection pad shall be provided in each termination compartment of the switchgear. The pad shall be welded to the enclosure, have a NEMA 2-hole pattern and shall have a short-circuit rating equal to that of the switchgear.

7.2 Grounding Rod

A full width 3/8 inch copper grounding rod shall be provided in each cable termination compartment. The grounding rod shall have a short-circuit rating equal to that of the switchgear.

8 BUSES

All buses shall be of copper or aluminum bar of at least 56% IAC conductivity. Flexible braid or cable shall not be used in any part of the bus.

All joints shall have suitable hardware and treatment to prevent harmful oxidation and loss of optimum contact pressure.

Bus and interconnections shall withstand the stresses associated with short circuits up through the maximum rating of the switchgear.

9 IDENTIFICATION

9.1 Nameplate

The outside of each set of double doors shall be provided with a nameplate including the manufacturer's name, catalog number, model number, date of manufacture and serial number.

The inside of each set of double doors shall be provided with a ratings label indicating the ratings required in Section 2 of this specification.

A three-line connection diagram showing interrupter switches, fuses with integral load interrupter, and bus along with the manufacturer's model number shall be provided on the inside of each set of double doors and on the inside of each switch-operating-hub access cover.

9.2 ANSI Z535 Danger and Warning Labels

The manufacturer shall install standard ANSI Z535 Danger and Warning Labels.

10 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 #1.

11 MATERIALS SOURCE

The manufacturer shall furnish a list of all out-sourced materials provided with the switch, name of the supplier, and number of similar units used in the past.

12 CURRENT CUSTOMERS

The manufacturer will provide a list of five customers who have similar equipment in service. The list should include contact name for the customer, telephone number, number of units in service, date when placed in service, and any major modification(s) performed since delivery of switches. Manufacturer will list any operations or component-related unresolved problems currently under investigation, together with the name and phone number of the related customer.

13 WARRANTY

The manufacturer shall provide a minimum two-year warranty for all components supplied with the switch.

14 PACKAGING/SHIPPING

The equipment shall be shipped f.o.b. destination to 1150 Hawley Street, Wenatchee, WA. 98801. The delivery will be accepted Monday through Friday between the hours of 9:00 am and 2:00 pm. No delivery of equipment will be accepted on holidays. Please call the Hawley Street Warehouse Forman at (509) 663-8121, ext. 4730, 24 hours prior to delivery. No transformers will be received on national holidays.

Each switch shall be completely assembled, properly packaged, and braced to prevent damage to the finish or any other part of the unit during transportation. Package shall not fracture during shipping or handling.

Each switch shall be shipped on a nonreturnable wood pallet designed for handling with a forklift. The pallet shall have a minimum of 3 ½” vertical clearance for the forks. The pallets shall be of adequate strength to withstand normal shipping and handling of the switch. The switches shall be shipped so that they may be removed from the truck or the trailer by forklift.

The entire upper portion of the switchgear shall be wrapped with plastic made to protect switchgear shipped on flatbed trucks from contamination of the cabinet exterior and from rocks, dirt, insects and other foreign materials encountered in shipment. The pallet will be completely covered by a full width piece of heavy cardboard or plywood before the switch is set on it to prevent road debris front entering the interior of the switchgear during shipping. Alternatively, the switchgear may be shipped in an enclosed trailer or curtain side trailer.

No material or other switchgear shall be stacked or carried on top of the switchgear.

Each switch shall be marked with manufacturer’s name or symbol and CPU’s purchase order number in such a manner that it is easily identifiable on incoming inspection. This need not be permanent marking. Tags, stickers or markings on pallets are acceptable.

A packing list and handling instructions shall be attached to each unit in a clear, weatherproof, plainly marked envelope.

15 REJECTION OF SHIPMENT

Equipment exhibiting damaged parts, broken securing devices, or are dirty from lack of proper shipping, shall be cause for rejection of shipment.

16 SPECIFICATIONS REVISIONS LOG

#	Date	Section	Description
1	2/16/16	All	Formatted to match transformer spec format.
2	5/23/16	4.3	Dimensions for configuration 3 and 5 changed.