

SECTION 261316 – MEDIUM-VOLTAGE FUSIBLE INTERRUPTER SWITCHGEAR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. This Section specifies the medium voltage switchgear and fusing for buildings and structures.
2. Provide all labor, materials, and equipment as necessary to complete all work as indicated on the drawings, and as specified herein for a complete operating system.
3. Furnish, install, and connect complete for operation new metal clad primary switch unit and make all necessary wiring connections to the primary feeders as required by the drawings and for a complete working job.
4. Medium-voltage switchgear shall include the following items at a minimum:
 - a. Medium voltage interrupter switchgear
 - b. Medium voltage fusible interrupter switchgear
 - c. Medium voltage fuses

B. Related Sections:

1. Applicable sections of Division 26 - Electrical

1.3 SUBMITTALS

A. Shop Drawings

1. Medium-voltage switchgear
2. Medium-voltage fuses

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70, "National Electrical Code"
- C. The switchgear shall conform to the following:
 - 1. ANSI C37.20
 - 2. IEEE Standard 27
 - 3. NEMA SG-5
 - 4. National Electrical Code Article 710-21(e)
- D. Guarantee
 - 1. Furnish full parts and labor warranty to cover the switchgear for one year from date of installation.

1.5 MATERIAL TURNED OVER TO OWNER

- A. Products Supplied But Not Installed Under This Section
 - 1. Provide 3 spare primary fuses for each size used in the primary interrupter switches.
 - 2. Portable control station with 50 ft. cord.
 - 3. Test accessory.
 - 4. Maintenance cable (nine pin).
 - 5. 8'-0" jumper cable, two complete sets of three.
 - 6. Two jumper storage bags.
 - 7. Shotgun stick.
 - 8. Shotgun stick storage bag.
 - 9. Voltage tester with audio/visual signals.
 - 10. Pentahead socket.
 - 11. Universal Pole 8'-0" long.
 - 12. Grappler handling tool.
 - 13. Large clamp.
 - 14. Any other miscellaneous components and accessories.
 - 15. Notebook computer preprogrammed with S&C software for use in configuring source-transfer-control system. Include power and communication cables.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Medium voltage primary switch unit shall consist of two 15 KV primary selector switches with automatic throwover for the incoming feeders and 15 KV fused transformer primary switches and shall be furnished complete with channels.
- B. The ratings for the integrated switchgear assembly shall be as follows:
- | | | |
|----|---|--------|
| 1. | kV, Nominal | 13.8 |
| 2. | kV, Maximum Design | 15.5 |
| 3. | kV, BIL | 95 |
| 4. | Main Bus Continuous, Amperes | 600 |
| 5. | Short-Circuit Ratings | |
| | a. Amperes, RMS Symmetrical | 25,000 |
| | b. MVA Three-Phase Symmetrical at Rated Nominal Voltage | 600 |
| 6. | Duty-Cycle Fault-Closing Amperes, RMS Asymmetrical | 40,000 |
- C. The momentary and duty-cycle fault-closing ratings of switches, momentary rating of bus, and interrupting ratings of fuses shall equal or exceed the short-circuit ratings of the metal-enclosed switchgear.
- D. The interrupter switches shall have two-time duty-cycle fault-closing integrated switchgear assembly. These ratings define the ability to close the interrupter switch, either alone (unfused) or in combination with the appropriate power fuse, against a three-phase fault with asymmetrical current in at least one phase equal to the rated value, with the switch remaining operable and able to carry and interrupt rated current. Tests substantiating these ratings shall be performed at maximum design voltage applied for at least ten cycles and certified copies of tests submitted for record information.
- E. The switch unit shall be arranged to provide control of switches from the front as indicated on the drawing. Unit shall be free standing, consisting of cubicles arranged for bolting together in the electrical room. Cubicles shall be welded, reinforced sheet steel enclosures with hinged doors. Complete unit shall be rustproofed and painted two coats.
- F. The dimensions of the unit as indicated on the drawing are approximate. These shall be varied to suit the particular equipment furnished and such that overall dimensions of the completely assembled unit shall suit the room dimensions and necessary aisle space, subject to the approval of the Engineers. Complete shop drawings shall be submitted to the Engineers before fabrication.
- G. The busses shall be non-insulated flat copper or aluminum bar, mounted on track resistant bus supports. The contact surface for each bus connection shall be silver plated and tightly bolted to insure maximum conductivity.
- H. Primary switch unit shall have a ground bus extending through each compartment for its entire length. Provide connections to ground system as indicated on drawing.

- I. The bracing supporting the switches in the enclosure shall be of sufficient strength to permit laying the unit on its side. Also, the crating shall be arranged to permit laying the unit on its side for shipping.
- J. The primary switch unit shall be completely wired, assembled, and operationally checked at the factory.

2.2 SELECTOR SWITCHES

- A. Primary selector switches shall be heavy duty, quick-make quick-break, 15 KV, 600 ampere, 3 pole, 95 KV BIL, with a minimum load interrupting rating of 600 amperes.
- B. Metal enclosure of this unit shall be strong enough to protect the operator under 25,000 ampere RMS symmetrical short circuit operation of switches. Manufacturer and supplier of these switches shall furnish written guarantee or printed test information for same, stating that operator will not be injured under the above short circuit operation
- C. Each primary selector switch shall have diamond mesh expanded metal inner door with an engraved plate reading - WARNING - OPEN SWITCH BLADES ARE ENERGIZED -.
- D. Primary selector switches shall be as manufactured by S & C.

Use one the following paragraphs depending on the type of cable entering the switchgear. Note information to be shown on drawing.

- E. Primary selector switch units shall each be provided with lugs inside enclosure for termination of 2/0 AWG or 350 KCMIL as necessary with outdoor type Class 1 terminations, 15 KV single conductor Kerite cable entering the compartment.
- F. Primary selector switch units shall each be provided with a 15 KV pothead with wiping sleeve inside the enclosure for termination of 2/0 AWG, 3/C, 15 KV paper and lead cable entering the compartment as shown on the drawing.

2.3 PRIMARY AUTOMATIC THROWOVER

- A. The automatic throwover unit shall automatically close and open the primary selector switches by means of two 14400-120 volt control transformers with primary fuses on each incoming line, and necessary motor drives, limit switches, relays, and accessories. The automatic throwover unit shall include the following features:
 - 1. Provisions for disconnecting the motor operators from the primary selector switches for manual operation of the switches, and disconnecting mechanism to allow testing automatic transfer equipment without operating 600 amp, 15 KV selector switch.
 - 2. Three phase sensing.

3. Interlock to prevent closing both primary selector switches simultaneously, except for manual operation.
 4. Three current transformers and necessary relays shall be provided with necessary controls to prevent transfer in the event of a phase-to-phase bus fault.
 5. Source selector to permit random selection of either incoming line as preferred or alternate source.
 6. Field selection of Automatic Hold Return to select automatic return to a preferred source or holding on the alternate source after the initial automatic transfer operation.
 7. Field selection of open transition or closed transition on automatic retransfer.
 8. Field selection of Automatic-Manual operation.
 9. Source-voltage indicating lamps of the push-to-test type that shall indicate presence of correct voltage on each high-voltage source.
 10. A field-adjustable time delay between loss of voltage and initiation of automatic switching to confirm that loss of voltage on either source is not transient. The timer range shall be from 1/4 to 10 seconds.
 11. A field-adjustable time delay between return of voltage and initiation of retransfer switching to confirm that return of voltage on either source is not temporary. The timer range shall be from 1/2 to 15 minutes.
 12. An indicating lamp of the push-to-test type which shall indicate that all switch operators are coupled to their respective interrupter switches and are in the correct positions; that all doors providing access to interrupter switches powered by stored-energy switch operators are closed and latched; that the source-transfer control is in the automatic mode; and that all control circuitry is properly connected for automatic transfer.
 13. Pushbutton test switches shall be provided to simulate loss of voltage on either source and to allow convenient field testing of the entire source-transfer scheme.
 14. Controls located in a removable drawer and a low voltage compartment completely isolated from high voltage circuits.
 15. Switch operating mechanism shall be removable for repairs and capable of decoupling without access to high-voltage compartment. It shall be in a grounded compartment.
 16. Current transformer and relays for ground fault blocking to prevent transfer if fault occurs in this unit.
- B. Primary automatic throwover switch shall be S & C utilizing S & C Micro-AT Source-Transfer Control.

2.4 TRANSFORMER LOAD BREAK SWITCHES

- A. Transformer primary switches shall be fused, heavy duty, quick-make quick-break, 15 KV, 600 ampere, 3 pole, 95 KV BIL, with a minimum load interrupting rating of 600 amperes.
- B. Transformer primary switches shall each be provided with three 15 KV fuses sized to properly protect the unit substation transformer. Fuses shall be power type with condensers and minimum interrupting rating of 600 MVA. Fuses shall be S & C, General Electric, Westinghouse, or approved equal.
- C. Switches shall be provided with lugs for No. 2 AWG, 15 KV cable connection to transformer primary and sufficient space for termination of cables and terminators.
- D. Transformer switches shall have mechanically interlocked doors to prevent access to switches or fuses when the switch is closed.
- E. Transformer load break switches shall be as manufactured by S & C.

2.5 PRIMARY CONNECTIONS

- A. Primary connections between primary selector switches, transformer load break switches, and transformers shall be bus and/or cable, as shown on the drawing.
- B. Primary cable shall be three, minimum size no. 2 AWG, 1/C, 15KV, shielded cable. Cable construction shall be uncoated soft or annealed copper, strand shield, ethylene propylene rubber insulation (133% insulation level), semiconducting insulation shield with 26-#14 copper wires wound over shield, and 80 mil polyethylene jacket. Cable shall be manufactured by Kerite, Okonite, BICC, or Pirelli.
- C. Terminations where required shall be made by a cable splicer or qualified journeyman using packaged Class 1 Outdoor termination kits. Terminations shall be Raychem HVT-150-SJ series or 3M 7640-T series.
- D. Phasing shall be marked at each termination location of 15KV cable in switchgear using 1 inch high, white, adhesive labels. Marking to be X, Y, Z reading left to right, or front to back while facing front of switchgear.

PART 3 - EXECUTION

Not Used

END OF SECTION 261316