

SECTION 26 13 01 – MEDIUM VOLTAGE PAD MOUNTED GEAR

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. The pad-mounted model 9 gear shall consist of a single self-supporting enclosure, containing two interrupter switches and power fuse compartments with the necessary accessory components, all completely factory-assembled and operationally checked. The interrupter switches and fuses shall be enclosed within an inner grounded steel compartment for electrical isolation and for protection from contamination. Switch terminals shall be equipped with bushings rated 600 amperes continuous, and fuse terminals and bus terminals shall be equipped with bushing wells rated 200 amperes continuous to provide for elbow connection. Bushings and bushing wells shall be mounted on the walls of the inner compartment and shall extend into termination compartments. Provide with a termination compartment shall be provided for each three-phase switch, each three-phase set of fuses, and each three-phase set of bus terminals. A mechanical interlock is to be included to prevent opening of the switchgear door when the main switch is closed. Also, closing of the main switch must be performed manually when the switchgear door is closed. Provide within lockable, gasketed, minimum 11 gauge steel cover to prevent tampering and provide owner with keys.
- B. Related Requirements:
 - 1. Section 26 13 00 "Medium Voltage Switchgear" for medium voltage fused interrupter switchgear used as incoming primary equipment.
 - 2. Section 26 05 72 "Overcurrent Protective Device Short-Circuit Study".
 - 3. Section 26 05 73 "Overcurrent Protective Device Coordination Study".
 - 4. Section 26 05 74 "Overcurrent Protective Device Arc-Flash Study" for short-circuit rating of devices and for setting of overcurrent protective devices and protective relays.
 - 5. Electrical drawings, particularly sheet S-E102 – Single Line Diagram.
 - 6. Section 01 91 13 "General Commissioning Requirements" for commissioning requirements.

1.3 DEFINITIONS

- A. ATS: Acceptance Testing Specifications.
- B. GFCI: Ground-Fault Circuit Interrupter.
- C. CDB: Capital Development Board

1.4 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Switchboards shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of switchgear and related equipment, include the following:
 - 1. Rated capacities, operating characteristics, furnished specialties, and accessories for individual interrupter switches and overcurrent protective devices.
 - 2. Time-current characteristic curves for overcurrent protective devices.
- B. Shop Drawings: For each type of switchgear and related equipment, include the following:
 - 1. Dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show method of field assembly and location and size of each field connection. Include the following:
 - a. Tabulation of installed devices with features and ratings.
 - b. Outline and general arrangement drawing showing dimensions, shipping sections, and weights of each assembled section.
 - c. Drawing of cable termination compartments showing preferred locations for conduits and indicating space available for cable terminations.
 - d. Floor plan drawing showing locations for anchor bolts.
 - e. Current ratings of buses.
 - f. Short-time and short-circuit ratings of switchgear assembly.
 - g. Nameplate legends.
 - h. Mimic-bus diagram.
 - i. Utility company's metering provisions with indication of approval by utility company.
 - 2. Wiring Diagrams: For each type of switchgear and related equipment, include the following:
 - a. Power, signal, and control wiring.
 - b. Three-line diagrams of current and future secondary circuits showing device terminal numbers and internal diagrams.
 - c. Schematic control diagrams.
 - d. Diagrams showing connections of component devices and equipment.
 - e. Schematic diagrams showing connections to remote devices including power monitoring and control devices.
- C. Coordination Drawings: Floor plans showing dimensioned layout, required working clearances, and required area above and around switchgear where piping and ducts are prohibited. Show switchgear layout and relationships between components and adjacent structural and mechanical elements. Show support locations, type of support, and weight on each support. Identify field measurements.
- D. Source quality-control test reports.
- E. Field quality-control test reports.
- F. Operation and Maintenance Data: For switchgear and switchgear components to include in emergency, operation, and maintenance manuals. In addition, include the following:
 - 1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
 - 2. Time-current curves, including selectable ranges for each type of overcurrent protective device.

1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of switchgear and associated components through one

source from a single manufacturer.

- B. Product Options: Drawings indicate size, profiles, and dimensional requirements of switchgear and are based on the specific system indicated.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by UL and marked for intended use.
- D. Comply with IEEE C2.
- E. Comply with Using Agency Design Standards.

1.7 DELIVERY, STORAGE, AND HANDLING

- D. Deliver in sections of lengths that can be moved past obstructions in delivery path as indicated.
- E. Store switchgear indoors in clean dry space with uniform temperature to prevent condensation. Protect switchgear from exposure to dirt, fumes, water, corrosive substances, and physical damage.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation at indicated ampere ratings for the following conditions:
 - 1. Ambient temperature not exceeding 122 deg F (50 deg C).
 - 2. Altitude: Sea level to 1000 feet (300 m).
 - 3. Wind Resistant to 150 MPH.
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for switchgear, including clearances between switchgear and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- C. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Using Agency or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:
 - 1. Notify CDB no fewer than seven days in advance of proposed interruption of electrical service.
 - 2. Do not proceed with interruption of electrical service without CDB's written permission.
 - 3. CDB Lock-out/Tag-out procedures shall be used with Contractor controlled locks and tags.
 - 4. Comply with NFPA 70E.

1.9 COORDINATION

- A. Coordinate layout and installation of switchgear and components with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required clearances for workspace and equipment access doors and panels.
- B. Coordinate size and location of concrete bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

1.10 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fuses: Six of each type and rating used. Include spares for future transformers, control power circuits, and fusible devices.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. All products supplied for this project must comply with the Illinois Procurement of Domestic Products Act (30 ILCS 517).
- B. Available Manufacturers:
 - 1. S & C Custom Metal EnclosedPME Padmount Switchgear
 - 2. Eaton Corp. Electrical Group "MVS, or equal.
 - 3. Square D; a brand of Schneider Electric.
 - 4. General Electric Company; GE Consumer & Industrial - Electrical Distribution.

2.2 MANUFACTURED UNITS

- A. Description: Factory assembled and tested.
- B. Ratings: Suitable for application in 3-phase, 60-Hz, solidly grounded-neutral system.
- C. System Voltage: 12.47 kV nominal; 15 kV maximum.

2.3 METAL-ENCLOSED, PAD MOUNTED GEAR

- A. Comply with ANSI C57.12.28.
- B. Comply with NEC 710.21(e).

2.4 COMPONENTS

- A. Main Bus: Copper, silver plated at connection points; full length of gear.
- B. Ground Bus: Copper, silver plated or copper, tin plated; minimum size 1/4 by 2 inches (6 by 50 mm); full length of gear.
- C. Bus Insulation: Covered with flame-retardant insulation.
- D.A. Enclosure Design.
 - a. Feeder Module Switch with (2) fuse compartments and (2) switch compartments per enclosure and the following:
 - b. Switch Type: S&C Mini-Rupter
 - c. Fuse Type: S&C SM-20
 - d. Outdoor construction – PME Dead front; light grayolive green finish

- ee. 600A copper bus and copper switch terminals.
- f. Key interlocks that provide an open loop scheme which does not allow all of the switches in the loop to be closed at the same time as well as providing fuse access which requires all switches within the individual pad-mount to be open to allow access to the fuses within that unit.
- f. g. Include 12" carbon steel base spacer.

E.B. Provide insulating boots on all cable terminations.

G.C. Surge Elbow Arresters: Distribution class B, 3KV, metal-oxide- varistor type. Comply with ANSI C37.90.1 and NEMA LA 1.

1. Install in cable termination compartments in each phase of circuit.
 2. Coordinate rating with circuit voltage.
- 2.

2.5 IDENTIFICATION

A. Materials: Refer to Section 26 05 53 "Identification for Electrical Systems." Identify units, devices, controls, and wiring.

2.6 SOURCE QUALITY CONTROL

A. Before shipment of equipment, perform the following tests and prepare test reports:

1. Production tests on circuit breakers according to ANSI C37.09.
2. Production tests on completed switchgear assembly according to IEEE C37.20.2.

B. Assemble switchgear and equipment in manufacturer's plant and perform the following:

1. Functional tests of all relays, instruments, meters, and control devices by application of secondary three-phase voltage to voltage circuits and injection of current in current transformer secondary circuits.
2. Functional test of all control and trip circuits. Connect test devices into circuits to simulate operation of controlled remote equipment such as circuit-breaker trip coils, close coils, and auxiliary contacts. Test proper operation of relay targets.

C. Prepare equipment for shipment.

1. Provide suitable crating, blocking, and supports so equipment will withstand expected domestic shipping and handling shocks and vibration.
2. Weatherproof equipment for shipment. Close connection openings to prevent entrance of foreign material during shipment and storage.

2.7 FACTORY FINISHES

A. Finish: Manufacturer's standard color finish applied to equipment before shipping.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive switchgear for compliance with requirements for installation tolerances, required clearances, and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Anchor switchgear assembly to concrete base and attach by bolting.
 - 1. Interior location: Concrete base 4 inches high, reinforced, with chamfered edges. Extend base no less than 3 inches in all directions beyond the maximum dimensions of switchgear, unless otherwise indicated. Construct concrete bases according to Division 26 Section "Hangers and Supports for Electrical Systems."
 - 2. Exterior location: Mount switchgear on concrete slabs. Unless otherwise indicated, the slab shall be at least 8 inches thick, reinforced with a 6 by 6 inch No. 6 mesh placed uniformly 4 inches from the top of the slab. Slab shall be placed on a 6 inch thick, well-compacted gravel base. The top of the concrete slab shall be approximately 4 inches above the finished grade. Edges shall be chamfered. The slab shall be of adequate size to project at least 8 inches beyond the equipment.
 - a. Use 3000-psi 28-day compressive-strength concrete and reinforcement as specified in Division 03 Sections.
- B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from switchgear units and components.

3.3 DOCUMENTATION

- A. Diagram and Instructions:
 - 1. Frame under clear acrylic plastic inside front cover of switchgear.
 - a. Operating Instructions: Printed basic instructions for switchgear, including control and key-interlock sequences and emergency procedures.
 - b. System Power Riser Diagrams: Depict power sources, feeders, distribution components, and major loads.

3.4 CONNECTIONS

- A. Cable terminations at switchgear are specified in Division 26 Section "Medium-Voltage Cables."
- B. Tighten bus joints, electrical connectors, and terminals according to manufacturer's published torque-tightening values using a calibrated torque wrench. Provide a list of all torqued connections and values.
- C. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- D. Connect wiring according to Division 26 Sections "Low-Voltage Electrical Power Conductors and Cables" and "Medium-Voltage Cables."

3.5 FIELD QUALITY CONTROL

- A. Prepare for acceptance tests as follows:
 - 1. Test insulation resistance for each switchgear bus, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.

- B. Manufacturer's Field Service: Engage a factory-authorized service representative to perform the following:
 - 1. Inspect switchgear, wiring, components, connections, and equipment installation. Test and adjust components and equipment.
 - 2. Assist in field testing of equipment.
 - 3. Report results in writing.
- C. Perform the following field tests and inspections and prepare test reports:
 - 1. Perform each electrical test and visual and mechanical inspection stated in NETA ATS. Certify compliance with test parameters. Perform NETA tests and inspections for each of the following NETA categories:
 - a. Switchgear.
- D. Remove and replace malfunctioning units and retest as specified above.

3.6 CLEANING

- A. On completion of installation, inspect interior and exterior of switchgear. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair damaged finishes.

3.7 DEMONSTRATION

- A. Engage a factory-authorized service representative to train CDB's maintenance personnel to adjust, operate, and maintain gear.

PART 4 CONTRACTOR'S QUALITY CONTROL REQUIREMENTS

4.1 GENERAL

- A. Comply with applicable provisions of division 01 Section "Quality Requirements" for requirements for Contractor's Quality Control Program.

END OF SECTION 26 13 01