



## SECTION 26 27 13 - ELECTRICAL DISTRIBUTION SYSTEM

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions); as appropriate, apply to the work specified in this section.
- B. Refer to all Electrical specification sections, as well as the plans and specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding electrical work.

#### 1.2 ELECTRIC SERVICE

- A. Contractor shall be responsible for obtaining a new 480 volt 3 phase 4 wire underground electric service from the local power company, City of Alexandria Utilities, as specified herein and as shown on the Drawings. The Contractor shall be responsible for all utility company fees and for the timely coordination of all utility company work.

#### 1.3 GENERAL

- A. All electrical gear furnished as part of this project, panelboards, switchboards, motor control centers, dry-type transformers, safety switches, etc. shall be of the same manufacturer unless specified otherwise. Electrical equipment manufactured by a subsidiary or parent company of manufacturer that is prior approved is not itself prior approved unless its own manufacturer's name specifically is listed as being prior approved.

#### 1.4 ARC-FLASH; COORDINATION AND FAULT CURRENT STUDIES

- A. As part of the electrical gear shop drawings, the contractor shall perform and submit complete arc-flash, coordination and fault current studies, including phase-to-phase and ground faults for coordinating all elements of the distribution system. These three studies shall be performed and furnished by the successful electrical gear manufacturer. Contractor shall refer to these specification sections for specific study requirements: These studies shall be submitted simultaneously with the gear submittal, or the gear submittal will be returned un-reviewed.
  - 1. Overcurrent Protective Device Short-Circuit Study (Cannot be VE'd from project)
  - 2. Overcurrent Protective Device Arc-Flash Study (Cannot be VE'd from project)
- B. Provide all arc-flash safety and short circuit current stickers on all panels, switchboards, safety switches, motor control center, etc. as required/specified. Refer to details for additional requirements. Proposed stickers for each individual piece of gear shall be submitted for review as part of shop drawings.
- C. Provide and install a fully coordinated electrical distribution system as directed by the Overcurrent Protective Device Coordination Study at no additional costs to the Owner.
- D. In addition, this study shall indicate all required settings for adjustable circuit breakers and motor circuit protectors. These settings include instantaneous, short time, long time, ground fault trip characteristics and all-time based pick-up, drop-out and re-close parameters.

- E. The contractor shall provide all breakers, trip plugs, solid state breakers, etc. to provide a fully coordinated electrical system as identified in the coordination study. This shall be accomplished as part of the Base Bid and all alternates at no additional costs to the owner and/or design team.
- F. Refer to individual specification sections of each specified study for additional requirements.
- G. Electrical gear submittals will not be reviewed until all device studies specified are performed, submitted and approved.
- H. At the conclusion of the project, contractor shall have the specified studies updated to reflect "As-Installed" conditions and submit the revised studies as part of the O&M manuals. This includes the electronic software data files, PDF of the study and PDFs of the appropriate labels.

## 1.5 SERIES RATING OF EQUIPMENT

- A. The electrical gear provided and installed as part of this project shall not be series rated.

## PART 2 - PRODUCTS

### 2.1 LOW VOLTAGE SWITCHBOARDS

- A. Switchboards shall consist of completely enclosed metal structures of the required number of formed and welded vertical panel sections incorporating circuit breakers and other associated equipment as indicated on the drawings and/or described herein.
- B. All sections of the switchboards shall be nominally ninety inches (90") high and shall be of the depth shown on the drawings. Switchboards shall be furnished in conformance with the dimensions and in the configurations shown on the drawings.
- C. All sections shall align front and back. Internal components shall be removable from the front. Front covers shall be fabricated from sheet steel not less than 12-gauge and shall be sectionalized to permit removal during installation and maintenance. Top and side enclosing plates shall be removable. All of enclosure shall be fabricated of not less than 12-gauge steel and shall be furnished with openings for proper ventilation where required.
- D. All exterior and interior steel surfaces of the switchboard shall be properly cleaned and finished with gray enamel over rust inhibiting phosphatized primer.
- E. Bussing shall be copper. Temperature rise shall not exceed 65° C. Bussing (vertical and horizontal) shall be uniform throughout, not tapered. Bussing shall be braced for short circuit stress level as determined by fault current study.
- F. Sections shall contain group mounted protective devices with trip ratings as shown on the drawings. Circuit Breakers shall be solid-state or molded case type, automatic, with thermal and adjustable magnetic trip elements. Branch breakers shall be mounted in panelboard type construction with bolted connections to the bus and shall be front accessible. Side or rear access shall not be required for proper installation and maintenance. Breakers shall have interchangeable trip units and shall be rated for short circuit stress level as determined by fault current study.
- G. Switchboards shall be completely factory designed, tested, prewired, and assembled all in accordance with the latest applicable NEMA, IEEE, and ANSI standards. Shop drawings

shall show front and side views, floor plan and section views, elementary diagram and wiring diagram.

- H. Before energizing, the Contractor shall check all accessible connections for tightness including factory connections and shall tighten those found to be loose.
- I. Switchboard shall be complete with electronic amperage, voltage and power monitor. Monitor shall display amperage per phase, voltage, phase neutral, voltage phase-phase, and maximum kW and kWh. Maximum kW and kWh shall be re-settable. Provide RJ-45 jack, all required software for monitoring/logging of metered parameters via remote PC (PC not provided as part of this project).
- J. Switchboards shall be NEMA Class 1 for indoor locations and NEMA Class 3R plus Gasketing for exterior location as manufactured by General Electric, Square D, Eaton-Cutler Hammer, Siemens or approved equivalent.

## 2.2 LABELS

- A. All switchboards, panelboards, starters, VFD's, contactors, transformers, safety switches and fused safety switches installed by this contractor shall have laminated phenolic tags with 1/4" characters embossed thereon identifying the equipment by name, voltage, ampacity, phase and number of current carrying conductors such as:

Panel Name  
120/208 V - 400A  
3 Phase - 4 Wire  
Fed From Panel: \_\_\_\_\_, Circuit \_\_\_\_\_  
Fused @ \_\_\_\_\_\*\*

The tags shall be fixed to the center of the equipment cover/door with a suitable heavy duty industrial grade adhesive.

\*\*Note – For fused safety switches, label shall include fuse sizes contained therein.

- B. Color Coding of labels shall be as follows:

Normal Power

White Background with Black Letters

## 2.3 SAFETY SWITCHES

- A. Furnish and install safety switches at locations and in capacities shown on the drawings, as hereinafter specified and/or as required by the latest edition of the National Electrical Code.
- B. Safety switches shall be rated heavy duty and fusible.
- C. Safety switches exposed to the weather shall be rated NEMA 3R.
- D. Safety switches shall be of the solid neutral type where required by circuit or feeder specified.
- E. Safety switch covers shall be internally mechanically held closed when in the ON position and shall be allowed to open in the OFF position. The switch shall come equipped with provisions to allow the switch to be padlocked in the off position.

- F. Galvanized angle or other suitable supports shall be provided for switches that cannot be mounted on walls or other rigid surfaces. Switches shall not be supported by conduit alone and shall not be mounted on HVAC or other equipment unless specifically approved by the Architect/Engineer. Verify mounting heights for all exterior locations with Architect/Engineer prior to rough-in.
- G. Fuses shall be installed so that fuse rating and type are clearly and easily readable from the front of the disconnect.
- H. Safety switches shall be General Electric, Square "D", Eaton Electrical, Siemens or approved equivalent.

## 2.4 FUSES

- A. Unless otherwise noted or specified, all fuse holders shall be equipped with dual-element, time-lag, and current limiting fuses. Provide one (1) spare set of fuses for each size initially installed, with a minimum of three (3) fuses of each size. Spare fuses shall be turned over to the Owner's maintenance supervisor prior to requesting substantial completion inspection.
- B. Fuses shall be Gould, Bussman, or approved equivalent.

## PART 3 - EXECUTION

### 3.1 MANUFACTURER'S DIRECTION

- A. All electrical gear shall be installed in accordance with the manufacturer's directions. Contractor shall review these directions prior to rough-in. Should any discrepancies exist between the contract documents and the manufacturer's direction, contractor shall advise the engineer in writing.
- B. All electrical terminations shall be properly tightened to manufacturer's specifications. Where manufacturer's specifications are not available, contractor shall refer to the NEC and adjust tightness valves (torque) to the NEC published values.
- C. Install all safety switches, breakers, disconnects, etc., in accordance with manufacturer's directions and maintain all required NEC clearances. Coordinate exact locations in field with applicable contractors.

END OF SECTION 26 27 13