

SECTION 262400 – SWITCHBOARDS, PANELBOARDS, AND CONTROL CENTERS

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 switchboards, panelboards, and motor control centers 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.

- B. Related Sections:

- 1. Applicable sections of Division 26 - Electrical

1.3 SUBMITTALS

- A. Shop Drawings

- 1. Switchboards
- 2. Panelboards
- 3. Motor control centers

1.4 QUALITY ASSURANCE

- A. Comply with NEC Article 384 as applicable to the installation of panelboards, cabinets, and cutout boxes.
- B. Comply with applicable requirements of Std. No. 67 “Electric Panelboards”, and Stds. No. 50, 869, 486A, and 1053 pertaining to panelboards, accessories and enclosures. Provide units that are U.L. listed and labeled.
- C. Where indicated or used, provide service entrance type equipment and accessories and label “SUITABLE FOR USE AS SERVICE EQUIPMENT”. Provide all service entrance features per NEC and U.L.

- D. Comply with NEMA Stds. Pub./No. 250 "Enclosure for Electrical Equipment (1000 Volts Maximum)", Pub./No. PB 1 "Panelboards", and Pub./No. PB 1.1 "Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less".

PART 2 - PRODUCTS

2.1 SWITCHBOARDS

- A. Secondary switchboard unit shall consist of metering, main circuit breaker, and four feeder circuit breakers sized as shown on the drawing. Switchboard shall be UL listed as Service Entrance Equipment.
- B. The switchboard shall be dead front NEMA 1 construction, totally enclosed in Code gauge galvanized steel, free standing, front and rear aligned, front accessible only, finished in ANSI medium light gray. Provide one can of touchup paint matching the finish on the switchboard.
- C. Switchboard integrated interrupting capacity shall not be less than 42,000 amperes symmetrical.
- D. All bus bars shall be copper and figured on the basis of 1000 amperes per square inch of cross sectional area for copper bus, and 500 amperes per square inch for lugs and connections.
- E. Switchboard shall be equipped with copper neutral bars.
- F. Lugs shall be of sizes to suit the corresponding feeders as indicated on the drawing.
- G. Circuit breakers shall be molded case, size as shown on the drawing, with long time pickup, long time delay, short time pickup, short time delay, and instantaneous. The main circuit breaker shall also include adjustable ground fault protection. Each breaker shall be individually mounted with the operating handle extending through the front cover of the section.
- H. Switchboard shall be separated into shipping blocks. Each switchboard section shall be capable of being handled individually with the use of removable lifting bars or rollers, capable of being laid on its side, and be clearly labeled with proper handling procedures.

Include the next paragraph if metering is required in the switchboard.

- I. Refer to Section 262713 for metering package.
- J. Switchboard shall be Square D QED-2 or approved equal by Eaton/Cutler-Hammer, General Electric, or Siemens.

2.2 DISTRIBUTION PANELBOARDS

- A. The Contractor shall furnish and install, at locations shown on the drawing, approved distribution panels equipped as indicated on the riser diagram.

Use the following item when distribution panels are to be fuse type. Use fuse type only on circuits 200 amps and smaller. All larger circuits should be circuit breaker.

- B. Fused switch type.
1. These panels shall be of the fusible switch type, equipped with switches and fuses of capacities as indicated on the drawings.
 2. Switch and fuse units shall be quick-make, quick-break type, with silvered contacts and spring reinforced fuse clips. Switch units shall be interlock defeaters for maintenance purposes.
 3. Fusible switch panels shall be Square D QMB, Cutler-Hammer Pow-R-Line 4, General Electric QMR or approved equal by Siemens.
 4. These panels shall be of the circuit breaker type, built up with the number of front operated breakers shown on the drawing.

Use the following item when distribution panels are to be circuit breaker type.

- C. Circuit breaker type
1. Circuit breaker interrupting capacity shall not be less than 42,000 amperes symmetrical at 240 volts and 25,000 amperes symmetrical at 480 volts.
 2. Circuit breaker panels shall be Cutler-Hammer type Pow-R-Line 4, General Electric CCB, Square D I-Line, or approved equal by Siemens.

Note information to be shown on drawing.

- D. Panels shall be surface mounting or flush mounting as shown on drawing, dead front construction, and enclosed in Code gauge galvanized steel.
- E. Panels shall be of voltage and main lug rating as shown on the drawing.
- F. Bus bars shall be copper and figured on the basis of 1000 amperes per square inch of cross sectional area for copper, and 500 amperes per square inch for lugs and connections. All busses shall be copper.
- G. Panels shall be equipped with fully rated neutral bars.

Note information to be shown on the drawing.

- H. Lugs shall be of sizes to suit the corresponding feeders as indicated on the riser diagram.
- I. Each circuit shall be provided with an engraved laminated plastic nameplate indicating the circuit controlled.

- J. Each panel shall have a panel designation as indicated on drawing engraved on laminated plastic and fastened to outside of door. Panels without doors shall have designation fastened at top of panel front.
- K. Door and cover of panels in finished areas shall be furnished with prime coat of paint and shall be painted by the General Contractor to match adjacent area. Door and cover of panels in unfinished areas shall be furnished with standard factory finish. Upon completion of job, Electrical Contractor shall touchup all spots where factory finish has been marred, using paint supplied by the factory.

2.3 LIGHTING PANELBOARDS

- A. Furnish and install thermal magnetic, quick-make, quick-break, plug-in type circuit breakers in existing branch panel, ampere rating and number of poles as indicated on drawing. Circuit breakers shall have a minimum interrupting capacity of 10,000 amperes symmetrical, as manufactured by Cutler Hammer or General Electric.

Note information to be shown on the drawing.

- B. The Contractor shall furnish and install surface or flush mounting branch lighting panels where noted and shown on the drawing. Panels shall be dead front construction, enclosed in code gauge galvanized steel box with hinged steel door.
- C. Panels shall be equipped with 120/240 volt 1 and 2 pole, or 240 volt 3 pole, thermal magnetic quick-make, quick-break, plug-in type circuit breakers, size and quantity as indicated on drawing. Two and three pole breakers shall be common trip. Circuit breakers shall have minimum interrupting capacity of 10,000 amperes symmetrical.
- D. Bus bars shall be copper and figured on the basis of 1000 amperes per square inch of cross sectional area for copper, and 500 amperes per square inch for lugs and connections. All busses shall be copper.
- E. Panel fronts shall be equipped with concealed hinges and semiflush Corbin catalog no. 15751 catch, lock, and no. TEU-1 key.

Select the following paragraph if the completion date does not allow for factory installed Corbin locks and keys.

- F. Panel fronts shall be equipped with concealed hinges. Lock and latch not required.
- G. Panels shall be provided with a directory frame, minimum of 5 inches wide and 12 inches long. All circuits shall be catalogued on typewritten directory cards.
- H. Each breaker serving a computer circuit shall be protected with a breaker lock to prevent accidental de-energizing.
- I. Catalog all new or reworked circuits in existing branch panels.

- J. Branch panels shall have panel designation engraved on black and white laminated plastic, white letters on black back ground, and fastened to outside of door.
- K. Door and cover of panels in finished areas shall be furnished with prime coat of paint and shall be painted by the General Contractor to match adjacent area. Door and cover of panels in unfinished areas shall be furnished with standard factory finish. Upon completion of job, Electrical Contractor shall touch up all spots where factory finish has been marred, using paint supplied by the factory.
- L. Panels shall be 120/208 volt, 3 phase, 4 wire, solid neutral with copper busses and main lugs, rating as shown on drawing such as Cutler-Hammer POW-R-LINE 1, General Electric AL, Square D NQOD, or approved equal by Siemens.

2.4 MOTOR CONTROL CENTERS

A. General

- 1. Motor control centers shall be built in accordance with all applicable NEMA Standards, ANSI Standards, and U.L. requirements. Voltage, amperage, and phases shall be as shown on the drawing. Main lugs or lugs for main breaker units shall be provided to accommodate feeders as shown on the drawings. The entire motor control center shall be built to withstand an available fault of 50,000 RMS symmetrical amperes
- 2. The motor control center shall be wired NEMA Class I, Type B.
- 3. Structures shall be totally enclosed, deadfront, free standing assemblies, 90 inches high. Removable lifting angles shall be provided. Structures shall be fabricated from minimum 12 ga. Steel.
- 4. Structures shall contain a horizontal wireway at the top, isolated from horizontal bus and readily accessible. Each structure shall contain an isolated vertical wireway with cable supports, accessible through hinged doors and a horizontal wireway at the bottom. All structure and unit doors to be mounted concealed hinges and secured with quarter turn indicating type fasteners. Structure enclosure shall be NEMA 1A (all doors gasketed).
- 5. Main horizontal bus shall have an ampacity as shown on the drawings. Vertical bus shall have a minimum ampacity sufficient to accommodate the maximum load of a vertical section of starters and/or disconnect switches, but shall not be less than 300 amperes. A ground bus with a minimum ampacity of 300 amperes shall be installed in each section and shall run the entire length of the center when assembled. All bus bars shall be tin plated copper. The entire bus assembly shall be completely enclosed within grounded steel barriers with insulated cutouts provided for the stab connections to the vertical bus.

Designate in the specifications or on the drawings what components are needed for each motor starter.

B. Units

1. Combination starter units shall be furnished with the following components as specified or shown on the drawings:
 - a. Fused disconnect or circuit breaker (as shown on drawing) with interlock defeater for maintenance purposes;
 - b. 120 Volt control transformer, fused;
 - c. Pilot lights in cover as shown on drawing;
 - d. Holding coil rated 120 volts;
 - e. Selector switch in cover as shown on drawing;
 - f. Stop-Start buttons in cover as shown on drawing;
 - g. Overload protection and number of auxiliary contacts needed for each application on motor starters;
 - h. Disconnect switch electrical interlock where indicated.
2. Motor starters shall be a minimum NEMA Size 1.
3. Fused disconnect switch units, circuit breaker units, and combination motor starter units shall have the disconnect and the door interlocked to prevent the unit door from being opened when the unit is on. The interlock shall have a defeater for maintenance purposes.
4. Starters for all motors 20 HP and larger shall include time delay relays to provide an adjustable time delay on starting from 0 to 3 minutes.
5. Motor control centers shall be Square D Model 5, Siemens Model 95, or equal by General Electric, Cutler-Hammer, or Allen Bradley.

PART 3 - EXECUTION

3.1 EQUIPMENT SUPPORTS

- A. Electrical equipment shall be mounted on ½" spacers when mounted in a room on a below grade exterior wall.

END OF SECTION 262400