

SECTION 16400

DISTRIBUTION EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

A. Description of Systems

1. Provide distribution systems as required, receptacle panels, lighting panels and install all materials and equipment, including panelboards, distribution transformers, as indicated or specified. Provide equipment supports and identification as specified. Provide touch-up painting as specified.

1.2 RELATED WORK SPECIFIED UNDER OTHER SECTIONS

1.3 SUBMITTALS

- ###### A. Furnish submittals for items that are identified in this SECTION by a different typeface and a bracketed code (e.g., *Item [L]*). Refer to SECTION 01340 for definition of codes for types of submittals and the administrative requirements governing submittal procedure. Additional submittal requirements pertaining to this SECTION are specified herein under this Article.

- ###### B. Include complete data on each item. Coordinate the items as they relate to the work, prior to submittal.

PART 2 PRODUCTS

2.1 MATERIALS

A. Panelboards For 480 Or 480Y/277 Volt Power Distribution - Circuit Breaker Type

1. *Circuit Breaker Type General Description [B,D,P]*: Dead front type, per NEMA Standard PB 1 and UL 67, and consisting of a 3 phase, 3 wire or 4 wire solid neutral main bus with main lugs or main circuit breaker as indicated, and branch circuit breakers, all in a flush or surface mounted steel cabinet as indicated.
 - a. General Electric Spectra Series
 - b. Square D "I-Line"
 - c. Eaton/Cutler-Hammer PRL4-B.
2. Ratings: As indicated on the drawings.
3. Busses: Provide copper buss only with main bus continuous current rating equal to the current rating of the main disconnecting device or main lugs. Provide (where indicated) a full size insulated neutral bus arranged for connection of incoming and outgoing neutral wires with suitable lugs for each circuit position, including spares and spaces when indicated. Provide a ground bus the full length of the panelboard for grounding of the equipment and structural frame. Furnish incoming line bus arrangement for connection of wiring entering from above or below as indicated.

4. Circuit Breakers: Bolt-in molded plastic case type, AC rated, 3 pole, quick-make, quick-break, with trip-free operating handle, position indication, common trip from thermal magnetic trip device, and minimum interrupting rating of 65,000 symmetrical amperes at 480 volts AC.
5. Enclosures: NEMA 12 unless otherwise noted, with trim covering wiring gutters only. Provide sheet metal covers over individual breakers with openings for protrusion of the operating handle and with means for padlocking the operating handle in the "off" position. Equip trim on surface mounted panels in factory areas and all flush mounted panels with an overall hinged door having a flush latch and cylinder lock. Key all locks alike or to the existing master system. Galvanize or phosphatize and prime and finish paint all surfaces in manufacturer's standard finish. Galvanize all recessed boxes.
6. Spaces: When future circuit breakers designated as "space" are noted, equip the panelboard with bus and minimum hardware ready to receive future circuit breakers. Furnish a blank removable spacer plate to cover the "space" until future use.
7. Circuit Directory: Heavy plastic covered metal frame card holder and card on individual breaker covers.
8. Lugs for Mains: Compression type; manufacturer's standard.

B. Panelboards For 480Y/277 Volt Lighting Service

1. *Lighting Service General Description [U]*: Dead front type, per NEMA Standard PB 1 and UL 67, and consisting of a 3 phase, 4 wire solid neutral main bus with main lugs or main circuit breaker as indicated, and branch circuit breakers, all in a flush, surface, or column mounting steel cabinet as indicated.
 - a. General Electric AE and AEC
 - b. Square D NF
 - c. Siemens Energy & Automation, Inc., P2 and C2
 - d. Eaton/Cutler-Hammer PRL2a and PRL2a-LX.
2. Ratings: As indicated on the panel schedules. Where the indicated combinations consist of current-limiting fuses in main or feeder fusible switches and branch breakers in series, the devices shall have been tested as combinations in accordance with UL67 Standards. All panelboards shall be the product of the same manufacturer who shall provide certification that the equipment is adequately rated for use in the indicated configurations and applications.
3. Busses: Provide copper buss only.
4. Circuit Breakers: Bolt-in molded plastic case type, AC rated, single pole, quick-make, quick-break, with trip-free operating handle, position indication, thermal magnetic trip device, and minimum interrupting rating of 65,000 RMS symmetrical amperes at 277 volts AC.
5. Enclosures: NEMA 12 unless otherwise noted, with trim having hinged door with flush latch and cylinder lock. Key all locks alike or to the existing master system. Galvanize or phosphatize and prime and finish paint in manufacturer's standard finish, including cable duct and pullbox. Galvanize all recessed boxes.
6. Spaces: When future circuit breakers designated as "space" are noted, equip the panelboard with bus and minimum hardware ready to receive future breakers. Furnish a blank removable spacer plate to cover the "space" until future use.
7. Circuit Directory: Heavy plastic covered metal frame and card on inside of door.
8. Lugs for Mains: Compression type; manufacturer's standard.

C. Panelboards For 208Y/120 Volt Lighting And Receptacle Service

1. *208/120 Volt, Lighting and Receptacle Service General Description [U]*: Dead front type, per NEMA Standard PB 1 and UL 67, and consisting of a 3 phase, 4 wire solid neutral main bus with main lugs or main circuit breaker as indicated, and branch circuit breakers, all in a flush, surface or column mounted steel cabinet as indicated.
 - a. General Electric AL and ALC
 - b. Square D NQOD and NQOB
 - c. Siemens Energy & Automation, Inc., P1 and C2
 - d. Eaton/Cutler-Hammer PRL1a and PRL1a-LX.
2. Ratings: As indicated on the panel schedules.
3. Busses: Provide copper buss only.
4. Integrated Equipment Short Circuit Ratings: Where the indicated panelboard short circuit ratings exceed the interrupting capacities of the branch breakers specified, combinations of current-limiting main breaker and branch breakers in series may be used. The combinations shall have been tested in accordance with UL67 Standards for use in the applications indicated and shall be UL-listed for such utilization.
5. Circuit Breakers: Bolt-in molded plastic case type, AC rated 1, 2, or 3 pole as indicated, quick-make, quick-break, with trip-free operating handle, position indication and thermal magnetic trip device. Furnish 2 and 3 pole breakers having a common operating handle and common trip mechanism. Furnish breakers having a minimum interrupting capacity of 10,000 symmetrical amperes at 120 volts AC for single pole breakers and at 240 volts for 2 and 3 pole breakers.
6. Enclosure: NEMA 12 unless otherwise noted, minimum 20 inch wide box except column type, and with trim having hinged door with flush latch and cylinder lock. Key all locks alike or to the existing master system. Galvanize or phosphatize and prime and finish paint in manufacturer's standard finish.
7. Spaces: When future circuit breakers designated as "space" are noted, equip the panelboard with bus and minimum hardware ready to receive future breakers. Furnish a blank removable spacer plate to cover the "space" until future use.
8. Circuit Directory: Heavy plastic covered metal frame and card on inside of door.
9. Lugs for Mains: Compression type; manufacturer's standard.

D. Distribution Transformers

1. General: All insulating materials shall be in accordance with NEMA Standard ST20 for UL component recognized insulation systems. Minimum insulations for transformers shall be 150 degC, 80 degC rise for 2 KVA and lesser ratings; 185 degC, 115 degC rise for 3 KVA through 30 KVA ratings; 220 degC, 150 degC rise for ratings greater than 30 KVA. Transformer nameplate rating shall provide full KVA capacity without the use of cooling fans.
2. *Indoor Dry Locations in General [U]*: Metal-enclosed, ventilated indoor dry, two - winding quiet type with copper windings only. Provide a minimum of two 2-1/2% full capacity above and below normal voltage taps in the primary windings, and provisions for conduit connections. Furnish transformers having voltage and KVA ratings and connections as indicated.
 - a. General Electric QL
 - b. Square "D"
 - c. Uptegraf DFV and DFTV
 - d. Eaton/Cutler-Hammer DS-3 and DT-3

E. Mini Power Center

1. Center shall be UL listed, self contained enclosure, suitable for interior or exterior use and designed for continuous operation at rated kVA, with normal life expectancy as defined in ANSI C57. Transformer KVA rating, voltages, number and ratings of circuit breakers shall be as indicated.
2. Each mini-power center shall include a main primary breaker, an encapsulated dry-type transformer, and a secondary panelboard with main breaker.
3. Transformer:
 - a. Transformer shall be insulated with a 185 degrees C insulation system.
 - b. All insulation materials shall be flame-retardant and shall not support combustion as defined in ASTM Standard Test Method.
 - c. Transformer core shall be constructed with high-grade, nonaging, grain oriented silicon steel. The transformer core volume shall allow efficient transformer operation at 10% above the highest tap voltage
 - d. The core and coil assembly shall be completely encapsulated to provide a moistureproof, shock-resistant seal. and minimize the sound level.
 - e. The core of the transformer shall be grounded to the enclosure.
4. Wiring and Terminations:
 - a. All interconnecting wiring between the primary main breaker and transformer, secondary main breaker and transformer, and distribution section shall be factory installed.
 - b. Transformers shall be equipped with a wiring compartment suitable for conduit entry and large enough to allow convenient wiring.
5. Each mini-power center shall include a main primary breaker with an interrupting rating of 25 kA at 480 volts; and a secondary panelboard with main and secondary breakers rated 10 kA interrupting rating at 240 volts. Main breaker shall be equipped with shunt trip mechanism where indicated on the DRAWINGS. Panel shall be capable of accepting one, two or three pole common trip circuit breakers and ground fault breakers.
6. Enclosure:
 - a. The enclosure shall be made of heavy-gauge steel, totally enclosed, nonventilated, NEMA 3R, with lifting eyes and the maximum temperature of the enclosure shall not exceed 90 degrees C.
 - b. Main primary, secondary, and feeder breakers shall be enclosed with a padlockable hinged door.
7. Manufacturer:
 - a. General Electric
 - b. Square D
 - c. Eaton/Cutler-Hammer

F. Fuses

1. *Fuses in General [U]*: One-time high interrupting capacity, UL Class RK5 dual element type, for motor circuits and UL Class RK1 current-limiting fuses for distribution circuits. Class H fuses are not acceptable.
 - a. Bussmann "Fusetron".
 - b. Gould-Shawmut "Trionic".
 - c. Reliance Fuse "ECSR" or "ECNR".
 - d. Littelfuse "FL SLO-BLO".

2. *Current-Limiting Fuses [U]*:
 - a. Bussmann “Low-Peak”
 - b. Gould-Shawmut “Amp-Trap”
 - c. Reliance Fuse “LESRK” or “LENRK”.
 - d. Littelfuse “LL Series”.

G. Miscellaneous

1. Decals:
 - a. Meyercord “Kwickway”
 - b. Panduit
 - c. Seton

PART 3 EXECUTION

3.1 INSTALLATION

A. General

1. Mount panelboards at uniform heights throughout the building as indicated, and such that the distance from the floor to the center of the top switch or circuit breaker does not exceed 78 inches. Install handle locking devices on all breakers for night lighting, emergency lighting and similar circuits.

B. Equipment Supports

1. Mount all electrical equipment, not self supporting, including panelboards, starters, safety switches, and similar equipment, securely to walls, columns and machine frames with 1/4 inch minimum separation from same, and provide all necessary spacers, brackets, structural pieces, inserts, anchors and bolts for this purpose. Provide supports for truss structural pieces, inserts, anchors and bolts for this purpose. Provide supports for truss mounted and wall mounted transformers. Anchor all self-supporting equipment securely to floors and to supporting steel where such supports are indicated or required. Provide structural channels in concrete floors for support and leveling of distribution equipment as indicated or required.

C. Installation Requirements

1. Install all equipment such that sufficient working clearances are maintained per the NEC requirements.
2. After balancing loads, provide typewritten circuit directory card in panelboard directory card holder. Provide accurate identification of all circuits.
3. Install filler plates in all unused spaces.

D. Grounding

1. Provide grounding of all equipment per NEC requirements and per Specification Section 16450 “Grounding.”

- E. Touch-Up Painting
 - 1. On all equipment installed, touch-up paint all manufacturer’s standard finished equipment surfaces damaged during construction to “as new” condition with original manufacturer’s finish paint.

- F. Equipment Identification
 - 1. Provide equipment identification labels per specification SECTION 16050 - Appendix “A”.
 - 2. Owner will provide arc flash analysis results and BNL standard arc flash labels. Install labels on equipment in accordance with analysis provided prior to startup.

3.2 ELECTRICAL TESTING

- A. Perform electrical testing of all equipment per Specification SECTION 16999 “Electrical Acceptance Tests”.

END OF SECTION

Revision History	
Date	Rev. No.
A	0
B	0
D	0
E	0
F	0
02-19-09	0

EY/ca

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