

SECTION 16400 - SERVICE AND DISTRIBUTION

PART I - GENERAL

1.01 DESCRIPTION

- A. Division 1, General Requirements and Section 16050, Basic Electrical Materials and Methods, shall be considered a part of these specifications.
- B. Codes, Ordinances, and Permits: All permits, licenses, stamping, approvals, and other arrangements for work shall be obtained by the electrical contractor. All expenses shall be included in the base bid. All electrical work shall be executed in strict accordance to the National Electrical Manufacturers Association (N.E.M.A.), National Board of Fire Underwriters (N.B.F.U.), National Electrical Code (N.E.C.), Underwriters Laboratories (U.L.), all electrical ordinances of the city, county, and state, and all others applicable to all codes and are of the minimum requirements. Any conflict between drawings, local power company, codes, etc., shall be brought to the attention of Walgreen Co. by this contractor at the time the bids are submitted.
- C. Scope of Work: The work covered by this specification shall include furnishing all labor, tools, material, equipment and services to construct and install the complete electrical system as shown on the accompanying plans and as specified herein. This work includes, but is not limited to, the following:
  - 1. Service entrance equipment bus to be standard aluminum alloy, including main distribution equipment, metering, secondary distribution equipment. Transformers with aluminum windings are acceptable. All wiring to be copper, Aluminum wiring, etc. is not approved, unless noted otherwise. The electrical utility company metering shall include a demand meter available for billing purposes.
  - 2. Complete distribution system bus of standard aluminum alloy for lighting and power, including the necessary transformers, distribution panel boards, disconnect switches, control switches, and receptacles, All wiring to be copper (feeders, branch circuits, etc.)
  - 3. Empty raceways as required.
  - 4. Receiving, handling, setting, and connecting motors and controls.
  - 5. Furnish and install a complete emergency lighting and/or exit lighting system if required by local codes.
  - 6. Furnish and install all conduit and wiring for temperature control system. Wiring to be copper.
  - 7. Complete copper distribution system for power, including the necessary transformers, feeders, distribution panelboards, branch circuits, lighting fixtures, control switches, and receptacles.

1.02 SUBMITTALS

- A. This contractor shall submit to Walgreen Co. product data for Power distribution equipment before starting work.

PART II - PRODUCTS

2.01 MAIN DISTRIBUTION PANELBOARDS

- A. Panelboards shall be manufactured by General Electric Co. Siemens OR Square D.

- B. Panelboards shall be molded case main circuit breaker type with factory installed service entrance type UL label. **Bus in all panelboards shall be standard aluminum alloy.** Panelboards and device contained therein shall have **fully rated** interrupting rating as shown on the drawings but **in no case less than 65,000 amperes rms.** Panelboard shall be labeled with UL short circuit withstand rating. Panelboards shall be assembled complete with bolt-on circuit breakers and spares. Circuit breakers shall be with thermal and magnetic trip elements and shall be quick-make, quick-break and trip indicating. Circuit breaker type, ampere rating and interrupting rating at common application voltages shall be marked on the circuit breaker in a manner that will be durable and visible after installation.
- C. Equipment shall be enclosed in cabinets with proper gutter supports and hinged doors. Provide a laminated bakelite nameplate on the front of each panel and one at each branch circuit device.
- D. Panelboard enclosures shall be marked per NEC 1999, Art. 110-22 to indicate the downstream lighting panelboards fed from MDP have been applied with a series combination interrupting rating. The following typically readily visible label shall be permanently installed by the manufacturer on panel MDP enclosure:

**"CAUTION"**  
**SERIES RATED SYSTEM**  
 To Maintain UL Series Combination Interrupting Rating  
 of Downstream Panelboards Replace Only with  
**Siemens 200 A Type FXD6 Circuit Breakers.**

- E. The following safety sign shall be provided on Panel MDP enclosure:

**"CAUTION"**  
**Only Qualified Technician Shall reclose Circuit Breaker**

- F. Panelboard shall be equipped with an integral transient voltage surge suppressor (TVSS). The TVSS shall be factory installed as close as possible to the neutral bus. The TVSS shall satisfy the following minimum requirements:

1. Surge current per mode: 60 KA
2. Seven modes of protection
3. Status LED's
4. Audible alarm
5. Dry contact for remote monitoring
6. 5 year warranty

The following TVSS shall be utilized by the current vendors:

General Electric: TME120Y065PP (120/208) V,3 ph, 4W)

Siemens: XF120 (120/208 V, 3ph, 4 w)

Square D: FC21MA10 (120/208 V, 3ph, 4 w), FC31MA10 (120/240 V, 3 ph, 4 w).

2.02 PANELBOARDS

- A. Panelboards shall be manufactured by General Electric Co., Siemens or Square D.
- B. Panelboards shall be main lug only, assembled complete with circuit breakers and spares. **Bus in all panelboards shall be standard aluminum alloy.** Circuit breakers shall be rated at 10,000 amperes rms for 120/240 volt system. Panelboards shall also have additional series combination interrupting rating equal to the rating of the main distribution panel MDP by utilizing **UL tested and certified** circuit breaker combinations. Each lighting panelboard shall be marked per NEC 1999, Art. 110-22 and 240-86 to indicate that the series combination interrupting rating is applied. It shall also indicate **additional UL series combination interrupting rating** of the panelboard and type and size of replacement upstream and branch devices. The following typical readily visible label shall be permanently installed by the manufacturer on panel dead front:

**"CAUTION"**

**SERIES RATED SYSTEM**

To Maintain UL Series Combination Interrupting Rating  
of Downstream Panelboards Replace Only with

**Siemens Type Circuit Breakers.**

Short Circuit Rating: **65,000 Amperes RMS Symmetrical**  
Feeder Breaker in MDP: **Siemens 200 A Type**

- C. Circuit breakers shall be with thermal/magnetic trip, quick-make/quick-break and trip-free handles. For circuits that are not to be turned off, use handle lock-on. Breakers for either 120/240 or 120/208 volt shall be similar to Siemens, bolted in type as furnished in lighting panels. Panels shall have a minimum of 20% spare circuit breakers. Circuit breaker type, ampere rating and interrupting rating at common application voltages shall be marked on the circuit breaker in a manner that will be durable and visible after installation.
- D. Provide a laminate bakelite nameplate on the front of each panel.

2.03 DISCONNECT SWITCHES

- A. Disconnect switches shall be of positive action, quick-make/quick-break type with interlocking cover that prevents opening door when the external operating handle is in the "on" position. Switches outside the building shall be NEMA type 3R raintight enclosures. 240 volt switches shall be general duty, for voltages above 240 V switches shall be heavy duty.

2.04 OUTLET BOXES

- A. All pull boxes and junction boxes shall be standard galvanized steel type.

2.05 RACEWAYS

- A. Conduit, unless otherwise noted, shall be either rigid electrical metallic tubing (EMT) or rigid steel. All appropriate requirements for raceways of the authority having jurisdiction must be met.
- B. EMT to be used above grade, where permitted by code, except for service and in moist areas. EMT shall be thoroughly protected from corrosion by electro-galvanizing, hot dipped galvanizing, or an appropriate plating.
- C. Rigid steel conduit shall be used below subbase material (and above vapor barrier when required) of ground bearing floor slabs, where subject to damage, in moist or outdoor areas, and for underground installations- except where another type of raceway is specified. Rigid steel conduit, conduit bends, elbows, couplings, and nipples shall be hot-dipped galvanized. All conduit joints shall be cut square, threaded, reamed smooth, and drawn up tight. Bends or offsets shall be made

with standard conduit elbows, field bends made with an approved bender or hickey, or hub type conduit fittings. Number of bends per run shall conform to National Electrical Code limitations.

- D. Plastic conduit (PVC) and fittings are acceptable only below subbase material of ground bearing floor slabs and direct earth burial. Type PVC conduit must be UL listed for application and acceptable to the authority having jurisdiction. Minimum cover shall be as required by the NEC.
- E. Hot-dipped flexible steel conduit shall be used for connections to vibrating or motorized equipment. In areas where such connections will be exposed to oil, grease, water, or weather, flexible liquid-tight conduit shall be used.
- F. Conduit shall be sized as indicated on drawings, or required by the National Electrical Code for number and size of conductors installed. Minimum conduit size shall be 3/4 inch. Conduit shall be installed concealed in walls, piers, and above ceilings wherever possible, except as otherwise indicated. Install conduit exposed in stock areas, bailer rooms, or similar spaces. Conduit shall be separated at least 12 inches from parallel runs of steam or hot water piping.
- G. BX, nonmetallic cable (NMC/ROMEX) or pre-wired flexible conduit systems are not acceptable.
  - 1. Steel MC cable allowed above slab, color coded type W, when acceptable to the local code authority. Contact AFC @ (630) 968-8914 for more information
  - 2. MC cable shall be properly secured and supported at intervals not exceeding 6 feet, per NEC article 330.

## 2.06 CONDUCTORS

- A. All wire and cable for feeder and branch circuits shall conform to the requirements of the current edition of the National Electrical Code.
- B. All conductors shall be soft drawn copper and unless otherwise noted on the drawings, branch circuit conductors shall be type "THHN" and/or "THWN" insulated.

## 2.07 WIRING DEVICES

- A. Wiring devices shall include all general purpose receptacles and wall switches with high impact nylon cover plates, ivory in color. Receptacles (with high impact nylon cover plates) circuited from Panel LP-CR shall be brown in color.
- B. Light switches shall be ivory in color. Hubbell (A.C. rated) 1200 or 1220 series. Acceptable Alternate Manufacturers: Pass and Seymour (P&S), General Electric Co. (G.E. Co.) or Leviton.
- C. General purpose receptacles shall be ivory in color. Acceptable Manufacturers: Hubbell, Pass and Seymour (P&S), General Electric Co. (G.E. Co.) or Leviton.
- D. Transient voltage surge suppressor receptacles, brown in color, shall be as manufactured by Pass and Seymour (P&S). (No substitutions.)

## PART III - EXECUTION

### 3.01 INSTALLATION

- A. Temporary Light and Power: Electrical contractor shall furnish all labor and material required to provide temporary light and power. The general contractor shall pay all charges for electric current used for temporary lighting and power.
- B. Electrical Service: Electrical service and meters shall be installed and shall conform to the requirements of serving utility and codes. The type and voltage must be checked with serving

utility and any conflict between drawings and utility shall be immediately brought to the attention of Walgreen Co.

- C. Main Distribution Panelboards, Panelboards, and Cabinets: Electrical contractor shall furnish and install the main distribution boards, power and lighting panelboards, and cabinets.
- D. Disconnect and Safety Switches: Electrical contractor shall furnish and install fusible and/or non-fusible safety switches.
- E. Electric Heaters: Electrical contractor shall furnish and install all electric-type heaters.
- F. The electrical contractor shall install all starters, switches, and electrical equipment furnished under other contracts and shall furnish and install all disconnect switches and electrical that is required for the completion of the job.
- G. Conduit shall be installed concealed wherever possible, except where indicated otherwise indicated. Install the conduit exposed in stock areas, baler rooms, or similar spaces. Conduit shall be separated by at least 12 inches from parallel runs of steam or hot water piping.
- H. Conduits shall be continuous from outlet to outlet, from outlets to cabinets, pull, or junction boxes, and shall be secured to all boxes with locknuts and bushings (insulating type) in such a manner that each system shall be electrically continuous throughout. Conduit ends shall be capped to prevent entrance of foreign materials during construction. Conduits shall be securely and rigidly supported.
- I. Furnish and install pull boxes and junction boxes where necessary in the raceway system to facilitate conductor installation (allow for pulling tension and other National Electrical Code criteria).
- J. Receptacle Circuits:
  - 1. No wire smaller than # 12 shall be used for any branch circuit supplying convenience outlets. Branch circuit wiring shall be sized to limit the voltage drop to National Electrical Code requirements. All wire to be copper.
  - 2. Receptacle circuits shall be circuit breaker controlled.
  - 3. Receptacle for specific areas shall be of the size and type required.
- K. Lighting Circuits:
  - 1. No wire smaller than # 12 shall be used for any lighting branch circuit.
  - 2. Branch circuit wiring shall be sized to limit the voltage drop to National Electrical Code requirements.
  - 3. No 120 volt lighting shall exceed 1600 watts. No 277 volt lighting circuit shall exceed 3600 watts.
- L. Panel 'LP-CR' Feeder and branch circuit conductors must be run separate from other panel conductors. **DO NOT** run through a common raceway or trough.
- M. Lighting Controls: Certain circuits in lighting panels LP-1, LP-SP and LP-2 shall be remotely controlled to control individual lighting circuits. Power wiring between relays and circuit breakers shall be furnished by the manufacturer. Refer to lighting control system drawings E2.1A E2.1B, and E2.1C.
- N. Critical Loads: Provide lock-on hardware for all Critical loads (such as: cooler/freezer equipment, computers, cash registers, etc.).

- O. Temperature Control Wiring: All conduit and control wiring for mechanical equipment, unit heaters, circulating pumps, air conditioning equipment, and ventilation fans shall be installed by the electrical contractor, as directed and supervised by the temperature control contractor.
- P. Equipment Connections: All equipment provided under this section of the specifications or other sections of these specifications requiring electrical service, including all equipment furnished and installed by Walgreen Co. shall be completely wired and connected under this section.
- Q. Labeling: All circuits shall be labeled. Panel schedules shall be typed and securely mounted on the inside of the electrical panel box doors.
- R. Balancing: Contractor shall phase balance all panelboards such that loads on each phase are within 10% of each other.

3.02 TESTING

- A. After wires are in place and connected to devices and equipment, the system shall be tested for shorts and grounds. All hot wires, if shorted or grounded, shall be removed and replaced if trouble is within circuit.
- B. Any wiring device or apparatus furnished under this contract, if grounded or shorted shall be removed and the trouble rectified by replacing all defective parts of materials as directed.

END OF SECTION