

SECTION 16425
DISTRIBUTION SWITCHBOARDS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section describes general provisions, products, and methods of execution relating to Distribution Switchboards approved for use at ANC. Type, size, ratings, etc., shall be as required by the application and in accordance with UL and NEMA standards.
- B. Provide factory-assembled, metal enclosed switchboards for distribution and control of power from incoming line terminals to outgoing feeder terminals, installed and tested in place.
- C. Related Sections:
 - 1. 16920 Power Monitoring And Control System

1.2 QUALITY ASSURANCE

- A. Distribution Switchboards shall be of the latest approved design as specified in U.L. standard 891 and as manufactured by Square D Company to match equipment provided in the C Concourse Phase 2 Building Completion Package. Switchboards shall be listed by the Underwriters' Laboratory and bear the UL label.

1.3 REFERENCES

- A. The switchboard(s) and overcurrent protection devices referenced herein shall be designed and manufactured according to latest revision of the following specifications:
 - 1. ANSI/NFPA 70 - National Electrical Code (NEC).
 - 2. ANSI/IEEE C12.1 - Code for Electricity Metering.
 - 3. ANSI C39.1 - Electrical Analog Indicating Instruments.
 - 4. ANSI C57.13 - Instrument Transformers.
 - 5. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches.
 - 6. NEMA KS 1 - Enclosed Switches.
 - 7. NEMA PB 2 - Deadfront Distribution Switchboards.
 - 8. NEMA PB 2.1 - Proper Handling, Installation, Operation and Maintenance of Deadfront Switchboards Rated 600 Volts or Less.
 - 9. NEMA PB 2.2 - Application Guide for Ground Fault Protective Devices for Equipment.
 - 10. UL 50 - Cabinets and Boxes
 - 11. UL 98 - Enclosed and Dead Front Switches
 - 12. UL 489 - Molded Case Circuit Breakers
 - 13. UL 891 - Dead-Front Switchboards
 - 14. UL 943 - Ground Fault Circuit Interrupters
 - 15. UL 977 - Fused Power Circuit Devices

16. CSA 22.2 No. 5 - M1986 Molded Case Circuit Breakers
17. Federal Specification W-C-375B/Gen - Circuit breakers, molded case, branch circuit and service.
18. Federal Specification W-C-870 - Fuse holders (For plug and enclosed cartridge fuses)
19. Federal Specification W-S-865 - Enclosed Knife Switch

1.4 ENVIRONMENTAL REQUIREMENTS

- A. Conform to NEMA PB 2 service conditions during and after installation of switchboards.

PART 2 - PRODUCTS

2.1 SWITCHBOARD - GENERAL

- A. Short Circuit Current Rating: Service equipment shall have an integrated short circuit rating suitable for the available short circuit amps.
- B. Future Provisions: All unused spaces provided shall be fully equipped for future devices, including all appropriate connectors and mounting hardware.
- C. Enclosure: Type 1 - General Purpose.
 1. Sections shall be aligned front and rear.
 2. Switchboard height shall be 91.5 inches including 1.5 inch floor sills and excluding lifting members and pull boxes.
 3. The switchboard(s) shall be of deadfront construction.
 4. The switchboard frame shall be of formed steel rigidly bolted together to support all cover plates, bussing and component devices during shipment and installation.
 5. Steel base channels shall be bolted to the frame to rigidly support the entire shipping section for moving on rollers and floor mounting.
 6. Each switchboard section shall have an open bottom and an individually removable top plate for installation and termination of conduit.
 7. The switchboard enclosure shall be painted on all exterior surfaces. The paint finish shall be a medium gray, ANSI #49, applied by the electro-deposition process over an iron phosphate pre-treatment.
 8. All front covers shall be screw removable with a single tool and all doors shall be hinged with removable hinge pins.
 9. Top and bottom conduit areas shall be clearly indicated on shop drawings.
- D. Pull Sections
 1. Pull sections shall be provided as required by the application.
- E. Nameplates: Provide per Section 16010-1.11.

- F. Bus Composition: Shall be plated copper. Plating shall be applied continuously to all bus work. The switchboard bussing shall be of sufficient cross-sectional area to meet UL Standard 891 temperature rise requirements. The phase and neutral through-bus shall have an ampacity as required by the application. For 4-wire systems, the neutral shall be of equivalent ampacity as the phase bus bar. Tapered bus is not acceptable. Full provisions for the addition of future sections shall be provided. Bussing shall include all necessary hardware to accommodate splicing for future additions.
- G. Bus Connections: Shall be bolted with Grade 5 bolts and conical spring washers.
- H. Ground Bus: Sized per NFPA70 and UL 891 Tables 25.1 and 25.2 and shall extend the entire length of the switchboard. Provisions for the addition of future sections shall be provided.
- I. Accessibility: Accessible from the front of the switchboard.
- J. The distribution section shall contain provisions for mounting distribution circuit breakers. Distribution circuit breakers shall be totally front accessible and front connectable. They shall be mounted in the switchboard to permit installation, maintenance and testing without reaching over any line side bussing. The distribution circuit breaker's connection to the distribution panel bussing shall be of a "blow-on" design such that the connections grip the bus bars firmly under heavy fault current conditions. The distribution section shall have a continuous current rating as required by the application. Bussing shall be "full length" of the section to provide maximum usable space. "I-Line" type construction shall be provided for maximum flexibility to mount any branch device in any location.

2.2 SWITCHBOARD - INCOMING MAIN SECTION DEVICE

- A. Electronic trip insulated case full function 100 percent rated circuit breaker individually fixed mounted. Circuit breaker shall have power terminals to accommodate cable connections.
- B. Electronic trip circuit breaker with Full Function Trip System shall be Square D Full function type SE as specified in Section 16475.

2.3 SWITCHBOARD - DISTRIBUTION SECTION DEVICES

- A. Branch circuit breakers over 400 A shall be electronic trip molded case circuit breakers with Full Function Trip System.
- B. Electronic trip breakers with Full Function Trip System shall be Square D Full function type LE, ME, NE as specified in Section 16475.
- C. Branch circuit breakers 400 A and under shall be Square D molded case circuit breakers as specified in Section 16475.

2.4 POWER AND TRIP HISTORY MONITORING

- A. System Description
 - 1. Customer monitoring shall consist of an electronic Circuit Monitor, as described in Section 16920 - Power Monitoring And Control System, installed as designated in Section 16920.
 - 2. Provide a Square D PowerLogic Series 4000 circuit monitor with waveform capture provisions to monitor the main disconnect in the switchboard.
- B. Circuit Monitor Installation

1. Electronic circuit monitors shall be installed by the switchboard manufacturer for circuits as indicated in this Section and in Section 16920.
2. All control power (current and voltage transformers) and communications wire shall be factory wired and harnessed within the switchboard lineup.
3. Where external circuit connections are required, terminal blocks shall be provided and the manufacturer's drawings shall clearly identify the interconnection requirements including wire type to be used.

2.5 MIMIC BUS

- A. Show the entire single line switchboard bus work, as depicted on the factory record drawing, on a photo engraved nameplate. The nameplate plate shall be at least .032 inch thick anodized aluminum and located at eye level on the front cover of the switchboard incoming service section.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine area to receive switchboard to insure adequate clearance for switchboard installation.
- B. Check that concrete pads are level and free of irregularities.
- C. Start work only after unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Install switchboard in accordance with manufacturer's written instructions, and NEC.
- B. Provide minimum 3 inch high concrete pad with minimum 2 inch reveal on front and sides for mounting switchboard. Concrete pad shall comply with code requirements.
- C. Provide switchboard sections with adequate lifting means; capable of being rolled or moved into position and bolted directly to floor without use of floor sills.
- D. Level switchboard and securely fasten to floor. Carefully align bus connection before bolting together.
- E. Provide cable supports for all cables entering switchboard from point of entrance to their respective overcurrent devices.

3.3 FIELD QUALITY CONTROL

- A. Inspect completed installation for physical damage, proper alignment, anchorage, and grounding.
- B. Measure, using a Megger, the insulation resistance of each bus section phase to phase and phase to ground for one minute each, at minimum test voltage of 1000 volts DC; minimum acceptable value for insulation resistance is one megohms. NOTE: Refer to manufacturer's literature for specific testing procedures.
- C. Check tightness of accessible bolted bus joints using calibrated torque wrench per manufacturer's recommended torque values.
- D. Conduct a performance test of the ground-fault protection system in accordance with NEC Article 230-95(c) and the equipment manufacturer's instructions.

3.4 ADJUSTING

- A. Adjust all operating mechanisms for free mechanical movement per manufacturer specifications.
- B. Tighten bolted bus connections in accordance with manufacturer's instructions.
- C. Adjust circuit breaker trip and time delay settings to values established by coordination study.

3.5 CLEANING

- A. Touch up scratched or marred surfaces to match original finish.

END OF SECTION