SECTION 16442

PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section

1.2 SUMMARY

A. Section Includes

1. Distribution panelboards
2. Lighting and appliance branch-circuit panelboards

1.3 DEFINITIONS

A. SVR: Suppressed voltage rating

1.4 SUBMITTALS

A. In accordance with Section 01340

B. Product Data: For each type of panelboard, switching and overcurrent protective device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes

C. Shop Drawings: For each panelboard and related equipment

1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings
2. Detail enclosure types and details for types other than NEMA 250, Type 1
3. Detail bus configuration, current, and voltage ratings
4. Short-circuit current rating of panelboards and overcurrent protective devices
5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components
6. Include wiring diagrams for power, signal, and control wiring

D. Qualification Data: For qualified testing agency

E. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing

F. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 01730 include the following

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application

C. Comply with NEMA PB 1

D. Comply with NFPA 70

1.6 DELIVERY, STORAGE, AND HANDLING

A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation

B. Handle and prepare panelboards for installation according to NECA 407

1.7 PROJECT CONDITIONS

A. Environmental Limitations

1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period
2. Rate equipment for continuous operation under the following conditions unless otherwise indicated
   a. Ambient temperature: Within the range of negative 22 deg F to plus 104 deg F
   b. Altitude: Not exceeding 6600 feet

1.8 COORDINATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels

B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression and panelboard devices that fail in materials or workmanship within specified warranty period

1. Warranty period: Two years from date of Substantial Completion

1.10 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents

1. Keys: Two spares for each type of panelboard cabinet lock
2. Circuit breakers including GFCI and ground fault equipment protection (GFEP) Types: Two spares for each panelboard

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

A. Enclosures: Surface-mounted cabinets

1. Rated for environmental conditions at installed location
   a. Indoor dry and clean locations: NEMA 250, Type 1
   b. Outdoor locations: NEMA 250, Type 3R
   c. Wash-down areas: NEMA 250, Type 4X, stainless steel
   d. Other wet or damp indoor locations: NEMA 250, Type 4
   e. Indoor locations subject to dust, falling dirt, and dripping noncorrosive liquids: NEMA 250, Type 5
2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box
3. Hinged front cover: Entire front trim hinged to box and with standard door within hinged trim cover
4. Skirt for surface-mounted panelboards: Same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor
5. Finishes
   a. Panels and trim: Steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat
6. Directory card: Inside panelboard door, mounted in metal frame with transparent protective cover

B. Incoming Mains Location: Top and bottom

C. Phase, Neutral, and Ground Buses

1. Material: Hard-drawn copper, 98 percent conductivity
2. Equipment ground bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box

D. Conductor Connectors: Suitable for use with conductor material and sizes

1. Material: Hard-drawn copper, 98 percent conductivity
2. Main and neutral lugs: Mechanical type
3. Ground lugs and bus-configured terminators: Mechanical type

E. Service Equipment Label: NRTL labeled for use as service equipment for panelboards with one or more main service disconnecting and overcurrent protective devices

F. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices

G. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals

2.2 DISTRIBUTION PANELBOARDS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric

B. Panelboards: NEMA PB 1, power and feeder distribution type

C. Doors: Secured with vault-type latch with tumbler lock; keyed alike

1. For doors more than 36 inches high, provide two latches, keyed alike

D. Mains: Circuit breaker and Lugs only as indicated

E. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers

F. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers where individual positive-locking device requires mechanical release for removal

2.3 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric

B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type

C. Mains: Circuit breaker or lugs only as indicated

D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units

E. Doors: Concealed hinges; door-in-door construction with secured with flush latch with tumbler lock; keyed alike

2.4 ACCESSORY COMPONENTS AND FEATURES

A. Accessory Set: Include tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation

PART 3 - EXECUTION

3.1 EXAMINATION

A. Receive, inspect, handle, and store panelboards according to NECA 407

B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation

C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work

D. Proceed with installation only after unsatisfactory conditions have been corrected

3.2 INSTALLATION

A. Install panelboards and accessories according to NECA 407

B. Equipment Mounting

1. Attach panelboard to the vertical finished or structural surface behind the panelboard

C. Mount top of trim 6'-6" above finished floor unless otherwise indicated

D. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box

E. Install overcurrent protective devices and controllers not already factory installed

F. Install filler plates in unused spaces

G. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing

H. Comply with NECA 1

3.3 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Section 16075

B. Create a directory to indicate installed circuit loads after balancing panelboard loads; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 16075

D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Section 16075

3.4 FIELD QUALITY CONTROL

A. Acceptance Testing Preparation

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit
2. Test continuity of each circuit

B. Tests and Inspections

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest
3. Perform the following infrared scan tests and inspections and prepare reports
    a. Initial infrared scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each panelboard. Remove front panels so joints and connections are accessible to portable scanner
    b. Follow-up infrared scanning: Perform an additional follow-up infrared scan of each panelboard 11 months after date of Substantial Completion
    c. Instruments and Equipment
        1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device

C. Panelboards will be considered defective if they do not pass tests and inspections

D. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action

3.5 ADJUSTING

A. Adjust moving parts and operable component to function smoothly, and lubricate as recommended by manufacturer

B. Set field-adjustable circuit-breaker trip ranges as indicated

C. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes

1. Measure as directed during period of normal system loading
2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment
3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records
4. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement

3.6 PROTECTION

A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions

END OF SECTION