

SECTION 16496D

MANUAL TRANSFER SWITCHES – LOW VOLTAGE

PART 1 GENERAL

1.01 SCOPE

- A. Furnish and install non-automatic transfer switches having the ratings, features/accessories and enclosures as specified herein and as shown on the contract drawings.

1.02 RELATED SECTIONS

1.03 REFERENCES

- A. The automatic transfer switches and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of UL and NEMA as follows:
  - 1. UL 1008 – Transfer Switches
  - 2. UL 991
  - 3. NFPA 70 – National Electrical Code
  - 4. NFPA 99 – Essential Electrical Systems of Health Care Facilities
  - 5. NFPA 110 – Emergency and Standby Power Systems
  - 6. NEMA ICS 10 – AC Transfer Switch Equipment
  - 7. IEEE 446 – Recommended Practice for Emergency and Standby Power Systems
  - 8. IEC 801-2, 3, 4, and 5
  - 9. CISPR 11
  - 10. Compliant with FCC Part 15, Subpart B, Class A.

1.04 SUBMITTALS – FOR REVIEW/APPROVAL

- A. The following information shall be submitted to the Engineer:
  - 1. Master drawing index
  - 2. Front view and plan view of the assembly
  - 3. Schematic diagram
  - 4. Nameplate schedule
  - 5. Component list
  - 6. Conduit space locations within the assembly.
  - 7. Assembly ratings including:
    - a. Short-circuit rating
    - b. Voltage
    - c. Continuous current rating.
  - 8. Major component ratings including:
    - a. Voltage
    - b. Continuous current rating

- c. Interrupting ratings.
- 9. Cable terminal sizes
- 10. Product Data Sheets.

- B. Where applicable, the following additional information shall be submitted to the Engineer:
  - 1. Busway connection
  - 2. Connection details between close-coupled assemblies
  - 3. Composite front view and plan view of close-coupled assemblies
  - 4. Key interlock schematic drawing and sequence of operations
  - 5. Mimic bus.

#### 1.05 SUBMITTALS – FOR CONSTRUCTION

- A. The following information shall be submitted for record purposes:
  - 1. Final as-built drawings and information for items listed in section 1.04
  - 2. Wiring diagrams
  - 3. Certified production test reports
  - 4. Installation information
  - 5. Seismic certification.
- B. The final (as-built) drawings shall include the same drawings as the construction drawings and shall incorporate all changes made during the manufacturing process.

#### 1.06 QUALIFICATIONS

- A. The manufacturer of the assembly shall be the manufacturer of major components and control modules installed within the assembly.
- B. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
- C. The equipment and major components shall be suitable for and certified to meet all applicable seismic requirements of Uniform Building Code (UBC) for zone 4 application. Guidelines for the installation consistent with these requirements shall be provided by the switchgear manufacturer and be based upon testing of representative equipment. The test response spectrum shall be based upon a 5% minimum damping factor, UBC: a peak of 2.15g's (3.2–11 Hz), and a ZPA of 0.86g's applied at the base of the equipment. The tests shall fully envelop this response spectrum for all equipment natural frequencies up to at least 35 Hz.

-- OR --

- C. The equipment and major components shall be suitable for and certified to meet all applicable seismic requirements of the California Building Code (CBC) through zone 4 application. Guidelines for the installation consistent with these requirements shall be provided by the switchgear manufacturer and be based upon testing of representative equipment. The test response spectrum shall be based upon a 5% minimum damping

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factor, CBC: a peak of 2.15g's (3.2–11 Hz), and a ZPA of 0.86g's applied at the base of the equipment. The tests shall fully envelop this response spectrum for all equipment natural frequencies up to at least 35 Hz.

-- OR --

- C. The equipment and major components shall be suitable for and certified to meet all applicable seismic requirements of the BOCA National Building Code, paragraph 1612.6. This shall include both vertical and lateral required response spectra as specified. Alternatively, the manufacturer's certification may be based on a detailed computer analysis of the entire assembly structure and its components. Guidelines for the installation consistent with these requirements shall be provided by the switchgear manufacturer and be based upon testing of representative equipment. The equipment manufacturer shall document the requirements necessary for proper seismic mounting of the equipment. The test response spectra shall meet or exceed the required response spectra peak acceleration of 1.6g's (3.2–11 Hz), and a ZPA of 1.0g as specified in the BOCA National Building Code, for all equipment natural frequencies up to at least 35 Hz.
- D. The following minimum mounting and installation guidelines shall be met, unless specifically modified by the above referenced standards.
1. The Contractor shall provide equipment anchorage details, coordinated with the equipment mounting provision, prepared and stamped by a licensed civil engineer in the state. Mounting recommendations shall be provided by the manufacturer based upon approved shake table tests used to verify the seismic design of the equipment.
  2. The equipment manufacturer shall certify that the equipment can withstand, that is, function following the seismic event, including both vertical and lateral required response spectra as specified in above codes.
  3. The equipment manufacturer shall document the requirements necessary for proper seismic mounting of the equipment. Seismic qualification shall be considered achieved when the capability of the equipment, meets or exceeds the specified response spectra.

#### 1.07 REGULATORY REQUIREMENTS

- A. Provide a certificate of compliance with UL 1008 for the transfer switches furnished under this section.

#### 1.08 DELIVERY, STORAGE AND HANDLING

- A. Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment.

#### 1.09 FIELD MEASUREMENTS

#### 1.10 OPERATION AND MAINTENANCE MANUALS



- A. Equipment operation and maintenance manuals shall be provided with each assembly shipped, and shall include instruction leaflets and instruction bulletins for the complete assembly and each major component.

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## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Cutler-Hammer
- B.  \_\_\_\_\_
- C.  \_\_\_\_\_

The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others not named will be considered only if pre-approved by the engineer ten (10) days prior to bid date.

### 2.02 RATINGS


- A. The transfer switch shall have equal withstand, closing and interrupting ratings of  \_\_\_\_\_ amperes.
- B. The transfer switch shall be 100% equipment rated for continuous duty.
- C. The transfer switch shall be 100% equipment rated for continuous duty as shown on the drawings and shall conform to the applicable requirements of UL 1008 for emergency system total load.
- D. The manual transfer switches shall be fully rated for all types of loads, inductive and resistive, without derating, either open or enclosed.

### 2.03 CONSTRUCTION

- A. Non-automatic transfer switches shall be manually or electrically operated. The transfer switches shall consist of completely enclosed contact assemblies. Control power for electrical operation shall be derived from a control power transformer connected to the line side of the source to which the load is being transferred.
- B. Main contacts shall be designed to withstand multiple fault currents and shall meet UL 489 and/or UL 1087 requirements.
- C. The transfer switch shall be mechanically interlocked to prevent cross connection of sources when operated either automatically, or manually.
- D. Transfer switches shall be capable of being operated manually under full rated load conditions. Manual operation shall be accomplished by a permanently attached manual operator, or by integrally mounted pushbuttons. Removable manual operating handles are not acceptable. Manual operators requiring source or load disconnection prior to manual operation are not acceptable.
- E. On transfer switches requiring a fourth pole for switching the neutral, the neutral shall be fully rated with equal withstand, closing and interrupting ratings to the power poles. Switched neutral poles which are add-on or overlap, or that are not capable of breaking full rated load current are not acceptable.

### 2.04 WIRING/TERMINATIONS

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- A. Terminal blocks shall conform to NEMA ICS 4. Terminal facilities shall be arranged for entrance of external conductors from the top or bottom of the enclosure. The main transfer switch terminals shall be suitable for the termination of conductors shown on the plans.

#### 2.05 ENCLOSURE

- A. Each transfer switch shall be provided in an enclosure suitable for use in environments indicated in the drawings. Enclosures shall be NEMA 1, NEMA 12, NEMA 3R, NEMA 4, or NEMA 4X.

#### 2.06 FINISH

- A. NEMA 1, 12 or 3R enclosures shall be painted with the manufacturer's standard light gray ANSI 61 paint. NEMA 4 or 4X shall be stainless steel, non-painted.

#### 2.07 ACCESSORIES

- A. The following accessories shall be provided:
  1. ☒ Main contact assemblies shall be equipped with thermal magnetic or electronic trip units and AB DE-ION arc extinguishers. Trip units shall have adjustable instantaneous trip values for each pole. Tripping mechanisms shall be designed "trip-free" so that the contacts cannot be held closed against an abnormal circuit condition.
  2. ☒ Auxiliary contacts (2 NO and 2 NC) for each source to indicate transfer switch position.
  3. ☒ Pilot lights to indicate source position and/or availability of voltage.

### PART 3 EXECUTION

#### 3.01 FACTORY TESTING

- A. The following standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of UL and NEMA standards.
  1. Insulation check to ensure the integrity of insulation and continuity of the entire system
  2. Visual inspection to ensure that the switch matches the specification requirements and to verify that the fit and finish meet quality standards
  3. Mechanical tests to verify that the switch's power sections are free of mechanical hindrances
  4. Electrical tests to verify the complete electrical operation of the switch and to set up time delays and voltage sensing settings of the logic.
- B. The manufacturer shall provide three (3) certified copies of factory test reports.

#### 3.02 INSTALLATION

- A. The Contractors shall install all equipment per the manufacturer's recommendations and the contract drawings.

#### 3.03 FIELD QUALITY CONTROL

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- A. Provide the services of a qualified factory-trained manufacturer's representative to assist the contractor in installation and start-up of the equipment specified under this section for a period of  working days. The manufacturer's representative shall provide technical direction and assistance to the contractor in general assembly of the equipment, connections and adjustments, and testing of the assembly and components contained therein.
- B. The contractor shall provide three (3) copies of the manufacturer's field start-up.

#### 3.04 MANUFACTURER'S CERTIFICATION

- A. A qualified factory-trained manufacturer's representative shall certify in writing that the equipment has been installed, adjusted and tested in accordance with the manufacturer's recommendations.
- B. The Contractor shall provide three (3) copies of the manufacturer's representative's certification.

#### 3.05 TRAINING

- A. The contractor shall provide a training session for up to five (5) owner's representatives for  normal workdays at a jobsite location determined by the owner.
- B. The training session shall be conducted by a manufacturer's qualified representative. The training program shall consist of the instruction on the operation of the assembly, circuit breakers and major components within the assembly.

#### 3.06 INSTALLATION

- A. The contractor shall install all equipment per the manufacturer's recommendations and the contract drawings.
- B. All necessary hardware to secure the assembly in place shall be provided by the contractor.
- C. The equipment shall be installed and checked in accordance with the manufacturer's recommendations.

#### 3.07 FIELD SERVICE

- A. The manufacturer of the ATS shall also have a national service organization that is available throughout the contiguous United States and is available on call 24 hours a day, 365 days a year.