

SECTION 263600 – TRANSFER SWITCHES

PART 1 - GENERAL

1.1 SUBMITTALS

- A. See section 260510.

1.2 QUALITY ASSURANCE

- A. Furnish and install the low voltage transfer switches having ratings, features/accessories and enclosures as specified herein and as shown on the contract drawings.
- B. The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.
- C. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years.
- D. Factory authorized representative shall maintain a service center capable of providing emergency maintenance and repair services at the project site within 4 hour maximum response time.
- E. Automatic transfer switch, bypass/isolation switch shall be products of same manufacturer.

1.3 APPLICABLE PUBLICATIONS

- A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only:
- B. Institute of Electrical and Electronic Engineers (IEEE):
 - 446-95Recommended Practice for Design and Maintenance of Emergency and Standby Power Systems
 - C37.90.1-02.....IEEE Surge Withstand Capability (SWC) Tests for Protective Relays and Relay Systems
- C. National Electrical Manufacturers Association (NEMA):
 - 250-03Enclosure for Electrical Equipment (1000 Volts Maximum).
 - ICS 6-01Industrial Control and Systems Enclosures
 - IC3 4.....Industrial Control and Systems: Terminal Blocks
 - MG 1-03Motors and Generators, Revision 1
- D. National Fire Protection Association (NFPA):
 - 70-05.....National Electrical Code (NEC)
 - 110.....Emergency and Standby Power Systems
- E. Underwriters Laboratories, Inc. (UL):
 - 50-03Enclosures for Electrical Equipment
 - 508-02Industrial Control Equipment
 - 891-03Dead-Front Switchboards

PART 2 - PRODUCTS

2.1 AUTOMATIC TRANSFER SWITCHES

A. General:

1. Comply with UL, NEMA, NEC, ANSI and NFPA.
2. Automatic transfer switches are to be electrically operated, mechanically held open contact type, without integral overcurrent protection. Transfer switches utilizing automatic or non-automatic molded case circuit breakers as switching mechanisms are not acceptable.
3. The unit shall be completely factory-assembled and wired so that only external circuit connections are required in the field. The unit shall include, but not be limited to, operating mechanism, main contacts, auxiliary contacts, timers, pilot lights, switches, and auxiliary sensing devices.
4. Acceptable manufacturers, contingent upon compliance with the contract documents, are as listed below. Bidders shall carefully review the requirements listed in the technical specifications and only submit products that are equal or better. Equal products by other manufacturers are acceptable providing substitutions are submitted in accordance with requirements listed in the "Instructions to Bidders" and "Supplemental Instructions to Bidders" (SCOSE AIA A701) and approved by the A/E. Bidders shall carefully review the front end documents (SCOSE AIA A701) and submit all information required to allow the A/E the ability to make a fully informed decision.
 - a. GE
 - b. Square D
 - c. ASCO
 - d. Siemens
 - e. Cutler Hammer
 - f. Russ Electric
 - g. Cummins (when provided with associated generator)
 - h. Caterpillar (when provided with associated generator)

B. Ratings, Markings and Tests:

1. Ratings:
 - a. Phase, voltage, ampere rating, number of poles, withstand rating shall be as shown on the drawings. The ampere rating shall be for 100 percent continuous load current.
 - b. Transfer switches are to be rated for total system transfer on emergency systems.
 - c. Ratings shall be with non-welding of contacts during the performance of withstand and closing tests.
2. Markings:
 - a. Markings shall be in accordance with UL 1008.
 - b. Markings for the additional withstand test hereinafter specified shall be included in the nameplate data.
3. Tests:
 - a. Transfer switches shall be tested in accordance with UL 1008. The contacts of the transfer switch shall not weld during the performance of withstand and closing tests when used with the upstream overcurrent device.

C. Housing:

1. Enclose transfer switches in steel cabinets in accordance with UL 508, or in a switchboard assembly in accordance with UL 891, as shown on the drawings. NEMA ICS 6 Type.
2. Doors: Shall have three-point latching mechanism.

3. Padlocking Provisions: Provide chain for attaching a padlock. Attach chain to the cabinet by welding or riveting.
4. Finish: Cabinets shall be given a phosphate treatment, painted with rust inhibiting primer, and finish painted with the manufacturer's standard enamel or lacquer finish.

2.2 FEATURES

- A. Transfer switches shall include the following features:
 1. Operating Mechanism:
 - a. Actuated by an electrical operator.
 - b. Electrically and mechanically interlocked so that the main contact cannot be closed simultaneously in both normal and emergency position.
 - c. Normal and emergency main contacts shall be mechanically locked in position by the operating linkage upon completion of transfer. Release of the locking mechanism shall be possible only by normal operating action.
 - d. Shall not include a neutral position.
 - e. Contact transfer time shall not exceed six cycles.
 - f. Do not use as a current carrying part. Components and mechanical interlocks shall be insulated or grounded.
 2. Contacts:
 - a. For switches 400 amperes and larger, protect main contacts by separate arcing contacts and magnetic blowouts for each pole. Arc quenching provisions equivalent to magnetic blowouts will be considered acceptable.
 - b. Current carrying capacity of arcing contacts shall not be used in the determination of the transfer switch rating, and shall be separate from the main contacts.
 - c. Main and arcing contacts shall be visible for inspection with cabinet door open and barrier covers removed.
 3. Manual Operator:
 - a. Capable of operation in either direction under no load.
 - b. Capable of operation by one person.
 - c. Provide a warning sign to caution against operation when energized.
 4. Replaceable Parts:
 - a. Include the main and arcing contact individually or as units, relays, and control devices.
 - b. Switch contacts and accessories are to be replaceable from the front without removing the switch from the cabinet and without removing main conductors.
 5. Sensing Relays:
 - a. Provide voltage-sensing relays in each phase of the normal power supply.
 - b. Provide adjustable voltage and frequency sensing relays in one phase of the auxiliary power supply.
 6. Controls:
 - a. Control module shall provide indication of switch status –emergency, normal, and be equipped with alarm diagnostic circuitry.
 - b. Control module shall control operation of the transfer switch. The sensing and the logic shall be controlled by a microprocessor equipped with digital communication and battery backup. The control shall comply with IEEE 472.

2.3 ACCESSORIES

- A. Transfer switches shall include the following accessories:
 1. Indicating Lights of different colors:
 - a. Green Signal light for normal source position.
 - b. Red Signal light for emergency source position.
 2. Laminated black phenolic nameplates with white letters to indicate transfer switch position.

- B. Manual Test Switch for simulating normal source failure.
- C. Engine starting contacts.
- D. Time delay relay to accomplish the function as specified.
- E. Auxiliary Contacts:
 1. Provide contacts for connection to elevator controllers, one closed when transfer switch is connected to normal, and one closed when transfer switch is connected to emergency.
 2. Provide additional contacts as necessary to accomplish the functions shown on the drawings, specified, and designated in other sections of these specifications and one spare normally open and normally closed contact.
 3. Contacts shall have a minimum rating of ten amperes and be positive acting on pickup and dropout.
- F. Remote Indicators:
 1. Provide remote pilot lamps to show transfer switch position.
 2. Provide remote manual test switch to simulate normal source failure.
 3. Provide remote contact to bypass retransfer time delay to normal source.
- G. In-Phase Band Monitor: Monitor shall control the operation of the transfer switch. It shall monitor the voltage and frequency of the normal and emergency voltage.
- H. Auxiliary Relay: Provide an auxiliary pre-signal relay on all automatic transfer switches, which will feed elevator loads for use as elevator control.

2.4 TRANSFER SWITCH OPERATION

- A. A voltage decrease in one or more phases of the normal power source to less than 70 percent of normal shall initiate the transfer sequence. The transfer switch shall start the engine-generator unit after a time delay of two or three seconds to permit override of momentary dips in the normal power source. The time-delay shall be field adjustable from zero to fifteen seconds.
- B. The transfer switch shall transfer the load from normal to emergency source when the frequency and voltage of the engine-generator unit have attained 90 percent of rated value.
- C. The transfer switch shall retransfer the load from emergency to normal source upon restoration of normal supply in all phases to 90 percent or more of normal voltage, and after a time delay. The time delay shall be field adjustable from five to twenty-five minutes (preset for twenty-five minutes). Should the emergency source fail during this time, the transfer switch shall immediately transfer to the normal source whenever it becomes available. After restoring to normal source, the generator shall continue to run for five minutes unloaded before shut down. Time delay shall be adjustable from zero to fifteen minutes.
- D. Engine Start: A voltage decrease, at any transfer switch, in one or more phases of the normal power source to less than 70 percent of normal shall start the engine-generator unit after a time delay of two to three seconds. The time delay shall be field adjustable from zero to fifteen seconds.
- E. Transfer to Emergency (Emergency System Loads): Transfer switches for emergency system loads shall transfer their loads from normal to emergency source when frequency and voltage of the engine-generator unit have attained 90 percent of rated value. Only those switches with deficient normal source voltage shall transfer.

- F. Transfer to Emergency (Equipment System Loads): Transfer switches for equipment system loads shall transfer their loads to the generator on a time delayed staggered basis, after the emergency system switches have transferred. Total delayed transfer time of an equipment system switches shall not exceed two minutes. Time-delay relays shall be field adjustable zero to two minutes.
- G. Retransfer to Normal (All Loads): Transfer switch shall retransfer the load from emergency to normal source upon restoration of normal supply in all phases to 90 percent or more of normal voltage, and after a time delay. The time delay shall be field adjustable from five to twenty-five minutes (preset for twenty-five minutes). Should the emergency source fail during this time, the transfer switch shall immediately transfer to the normal source whenever it becomes available. After restoring to normal source, the generator shall continue to run for five minutes unloaded before shut down. Time delay shall be adjustable from zero to fifteen minutes.
- H. Exercise Mode: Transfer to emergency power source shall be accomplished by remote manual test switches on a selective basis.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install automatic transfer switch(s) in accordance with the NFPA and as shown on the drawings.
- B. Level and anchor the automatic transfer(s) switch to floor or wall.
- C. Ground equipment as shown on the drawings and as required by NFPA 70.

3.2 START UP AND TESTING

- A. After the complete system has been installed, and before energizing the system, check all components of the system, including insulation resistance, phase to phase and phase to ground, complete electrical circuitry and safety features according to the manufacturer's written instructions
- B. After energizing circuits, test the interlocking sequence and operation of the complete system, including time delays of transfer from normal source to emergency and back to normal source, pick-up and voltage drop, and function of bypass/isolation switch in the presence of the Resident Engineer prior to the final inspection.
- C. When any defects are detected, correct the defects and repeat the test as requested by the Resident Engineer, at no additional cost to the owner.

END OF SECTION 263600