

SECTION 26 36 23 - AUTOMATIC TRANSFER SWITCHES**PART 1 GENERAL****1.01 DESCRIPTION**

- A. Provide automatic transfer switches as specified herein and shown on the Drawings for the reconnection of loads from the commercial powered bus to the standby power supply during interruption of the utility service to the building.
- B. Provide associated control wiring.

1.02 QUALITY ASSURANCE

- A. Transfer switches shall comply with the applicable standards of UL, CSA, ANSI, NFPA, IEEE, NEMA, and IEC.

1.03 SUBMITTAL AND RECORD DOCUMENTATION

- A. Product Data: Provide catalog sheets showing voltage, switch size, ratings and size of switching and overcurrent protective devices, operating logic, short circuit ratings, dimensions, and enclosure details.
- B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- C. Operation Data: Instructions for operating equipment under emergency conditions.
- D. Maintenance Data: Routine preventative maintenance and lubrication schedule. List special tools, maintenance materials, and replacement parts.

PART 2 PRODUCTS**2.01 AUTOMATIC TRANSFER SWITCHES**

- A. Acceptable Manufacturers: Kohler, Onan, Asco, Zenith, or approved.
- B. General:
 - 1. The transfer switch shall be rated for the voltage and ampacity as shown on the plans and shall have 600 volt insulation on all parts in accordance with NEMA standards.
 - 2. The current rating shall be a continuous rating when the switch is installed in an unventilated enclosure, and shall conform to NEMA temperature rise standards.
 - 3. The unit shall be rated based on all classes of loads, i.e., resistive, tungsten, ballast, and inductive loads. Switches rated 400 Amperes or less shall be UL listed for 100% Tungsten load.
 - 4. As a precondition for approval, all transfer switches complete with accessories shall be listed by Underwriters Laboratories, under standard UL-1008 (automatic transfer switches), and approved for use on emergency systems.
 - 5. The withstand current capacity of the main contacts shall not be less than 20 times the continuous duty rating for a minimum of three electrical cycles as established by certified test data.
 - 6. Temperature rise tests in accordance with UL-1008 shall have been conducted after the overload and endurance tests to confirm the ability of the units to carry their rated currents within the allowable temperature limits.
 - 7. The transfer switches shall be supplied with a microprocessor-based control panel as detailed further in these specifications.
- C. Sequence of Operation:

1. The ATS shall incorporate adjustable 3-phase under- and over-voltage and 3-phase under- and over-frequency sensing on the normal source.
2. When the voltage of any phase of the normal source is reduced to 80% or exceeds 110% nominal voltage, or frequency is displaced 2 Hz from nominal, for a period of 0-10 seconds (programmable), a pilot contact shall close to initiate starting of the engine generator.
3. The ATS shall incorporate adjustable 3-phase under- and over-voltage and 3-phase under- and over-frequency sensing on the emergency source.
4. When the emergency source has reached a voltage value within +/- 10% of nominal and achieved frequency within +/- 5% of the rated value, the load shall be transferred to the emergency source after a programmable time delay.
5. When the normal source has been restored to not less than 90% of rated voltage on all phases, the load shall be retransferred to the normal source after a time delay of 0 to 30 minutes (programmable). The generator shall run unloaded for 5 minutes (programmable) and then automatically shut down. The generator shall be ready for automatic operation upon the next failure of the normal source.
6. If the engine generator should fail while carrying the load, retransfer to the normal source shall be made instantaneously upon restoration of proper voltage (90%) on the normal source.
7. The transfer switch shall be equipped with a microprocessor-based control panel. The control panel shall perform the operation and display functions of the transfer switch. The display functions of the control panel shall include ATS position and source availability.
8. The digital display shall be accessible without opening the enclosure door and shall be provided with a 4-line by 20-character LCD display screen with touch pad function and display menus. The programming functions shall be pass-code protected.
9. The control panel shall be provided with menu-driven display screens for transfer switch monitoring, control and field changeable functions and settings.
10. The control panel shall be optoisolated from electrical noise and provided with the following inherent control functions and capabilities:
 - a. Multipurpose display for continuous monitoring and control of the ATS functions and settings. All field-changeable functions shall be pass-code protected and accessible through the keypad.
 - b. Built-in diagnostic display that includes the capturing of historical data, such as number of transfers and time on emergency power source, for ease of troubleshooting.
 - c. Capability for external communication and network interface through an RS485 serial port.
 - d. Touch pad test switch with Fast Test/Load/No Load positions to simulate a normal source failure.
 - e. Time delay to override momentary normal source failure prior to engine start. Field programmable 0-10 seconds (adjustable by increments of 0.1 seconds) factory set at 3 seconds.
 - f. Time delay on retransfer to normal source, programmable 0-60 minutes (adjustable by increments of 0.1 minutes) factory set at 30 minutes. If the emergency source fails during the retransfer time delay, the transfer switch controls shall automatically bypass the time delay and immediately retransfer to the normal position.
 - g. Time delay on transfer to emergency, programmable 0-5 minutes, factory set at 1 second.
 - h. Terminals for remote test/peak shave operation and transfer inhibit to the emergency source.
 - i. An in-phase monitor shall be provided. The monitor shall compare the phase angle difference between the normal and emergency sources and be programmed to anticipate the zero crossing point to minimize switching transients.

- j. Auxiliary contacts (1 N.O.) shall be provided to indicate normal and emergency source availability.
- k. A load/no load clock exerciser shall be incorporated within the microprocessor and shall be programmable to start the engine generator set and transfer the load (when selected) for exercise purposes on a weekly basis. The exerciser shall contain a lithium battery for memory retention during an outage.
- l. A timed auxiliary contact (1 N.C.) adjustable 0-60 seconds shall be provided to allow motor loads to be disconnected prior to transfer in either direction.
- m. Provide a momentary pushbutton to bypass the time delays on transfer and retransfer and programmable commit/no commit control logic.

D. Construction and Performance:

1. The automatic transfer switch shall be of double throw construction operated by a reliable electrical mechanism momentarily energized. There shall be a direct mechanical coupling to facilitate transfer in 3 cycles or less.
2. The normal and emergency contacts shall be mechanically interlocked such that failure of any coil or disarrangement of any part shall not permit a neutral position.
3. For switches installed in systems having ground fault protective devices, and/or wired so as to be designed a separately derived system by the N.E.C., a fourth pole shall be provided. This additional pole shall isolate the normal and emergency neutrals. The neutral pole shall have the same withstand and operational ratings as the other poles and shall be arranged to break last and make first to minimize neutral switching transients. Add-on or accessory poles that are not of identical construction and withstand capability are not acceptable.
4. The contact structure shall consist of a main current carrying contact which is a silver alloy with a minimum of 50% silver content. The current carrying contacts shall be protected by silver tungsten arcing contacts on all sizes.
5. The transfer switch manufacturer shall submit test data for each size switch, showing it can withstand fault currents of the magnitude and the duration necessary to maintain the system integrity. Minimum UL listed withstand and close into fault ratings shall be as follows:

Any Molded Case Breaker*

<u>Size (Amps)</u>	<u>(RMS Symmetrical)</u>
up to 400	30,000
401-1200	50,000
1201-4000	100,000

<u>Size (Amps)</u>	<u>Specific Coordinated Molded Case Breaker</u>
Up to 400	50,000
401-600	65,000
601-1200	85,000
1201-4000	100,000

<u>Size (Amps)</u>	<u>Current Limiting Fuse</u>
Up to 4000	200,000

*All values 480 volt, RMS symmetrical, less than 20% power factor.

6. A dielectric test at the conclusion of the withstand and closing tests shall be performed.
7. The automatic transfer switch manufacturer shall certify sufficient arc interrupting capabilities for 50 cycles of operation to operate between normal and emergency source that are 120 degrees out of phase at 480 volts, 600% of rated current at 0.50 power factor.

This certification is to ensure that there will be no current flow between the two isolated sources during switching.

8. All relays shall be continuous duty industrial type with wiping contacts. Customer interface contacts shall be rated 10 amperes minimum. Coils, relays, timers and accessories shall be readily front accessible. The control panel and power section shall be interconnected with a harness and keyed disconnect plugs for maintenance.
9. Main and arcing contacts shall be visible without major disassembly to facilitate inspection and maintenance.
10. A manual handle shall be provided for maintenance purposes. An operator disconnect switch shall be provided to defeat automatic operation during maintenance, inspection or manual operation.
11. The switch shall be mounted in a NEMA-1 enclosure unless otherwise indicated on the Drawings.
12. Switches composed of molded case breakers, contactors or components thereof not specifically designed as an automatic transfer switch will not be acceptable.
13. The automatic transfer switch shall be protected by a 5 year warranty, with a 10 year warranty on the main contact assembly.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install transfer switches at locations shown on drawings. Install per manufacturer's recommendations.
- B. Provide engraved plastic nameplates.
- C. Provide the services of the manufacturer's technical representative to check transfer switch connections and operations and place into service.

3.02 DEMONSTRATION

- A. Arrange and pay for the services of a factory-authorized service representative to demonstrate adjustment, operation, and maintenance of the system and to train Owner's personnel. Conduct a minimum of two hours of training.

END OF SECTION