

ATTACHMENT B

LEE COUNTY UTILITIES TECHNICAL SPECIFICATIONS AUTOMATIC TRANSFER SWITCHES SECTION 26 36 00

PART 1 - GENERAL

1.01 GENERAL

- A. Automatic transfer switches shall be furnished as shown on plans, with full load current and voltage rating as shown, normal and emergency. The transfer switch shall be capable of switching all classes of load and shall be rated for continuous duty when installed in a non-ventilated enclosure NEMA ICS 6 or 4X that is constructed in accordance with Underwriters' Laboratories, Inc., Standard UL-1008. Provide transfer switches by Cummins or equal. The generator set manufacturer shall warrant transfer switches to provide a single source of responsibility. Transfer switches shall be rated to carry 100 percent of rated current continuously in the enclosure supplied, in ambient temperatures of -40 to +60 degrees C, relative humidity up to 95% (non-condensing).
- B. Provide complete factory assembled power transfer equipment with field programmable digital electronic controls designed for fully automatic operation and including: surge voltage isolation, voltage sensors on all phases of both sources, linear operator, permanently attached manual handles, positive mechanical and electrical interlocking, and mechanically held contacts for both sources.
- C. Transfer switch equipment shall have withstand and closing ratings (WCR) in RMS symmetrical amperes greater than the available fault currents. The transfer switch and its upstream protection shall be coordinated. The transfer switch shall be third party listed and labeled for use with the specific protective device(s) installed in the application.
- D. Transfer switches shall be double-throw, electrically and mechanically interlocked, and mechanically held in the source 1 and source 2 positions. The transfer switch shall be specifically designed to transfer to the best available source if it inadvertently stops in a neutral position. Transfer switches shall be equipped with permanently attached manual operating handles and quick-break, quick-make over-center contact mechanisms. Transfer switches over 1000 amperes shall be equipped with manual operators for service use only under de-energized conditions. The transfer switch shall be configurable to control the operation time from source to source (program transition; delayed transition operation). Sync checked two position transfer switches without delayed transition are not acceptable
- E. The transfer switch shall be capable of transferring successfully in either direction with 90% of rated voltage applied to the switch terminals. Transfer switches that are designated on the drawings as 3-pole shall be provided with a neutral bus and lugs. The neutral bus shall be sized to carry 100% of the current designated on the switch rating. Transfer switch shall be provided with copper long barrel Hi-Press lugs sized to accept the full output rating of the switch. Lugs shall be suitable for the number and size of conductors shown on the drawings.

- F. Operator Panel. Each transfer switch shall be provided with a control panel to allow the operator to view the status and control operation of the transfer switch. The operator panel shall be provided with the following features and capabilities.
1. High intensity LED lamps to indicate the source that the load is connected to (source 1 or source 2); and which source(s) are available. Source available LED indicators shall operate from the control microprocessor to indicate the true condition of the sources as sensed by the control. High intensity LED lamps to indicate that the transfer switch is “not in auto” (due to control being disabled or due to bypass switch (when used) enabled or in operation) and “Test/Exercise Active” to indicate that the control system is testing or exercising the generator set.
 2. “OVERRIDE” pushbutton to cause the transfer switch to bypass any active time delays for start, transfer, and retransfer and immediately proceed with its next logical operation. “TEST” pushbutton to initiate a preprogrammed test sequence for the generator set and transfer switch. The transfer switch shall be programmable for test with load or test without load. “RESET/LAMP TEST” pushbutton that will clear any faults present in the control, or simultaneously test all lamps on the panel by lighting them.
 3. The control system shall continuously log information on the number of hours each source has been connected to the load, the number of times transferred, and the total number of times each source has failed. This information shall be available via the operator display panel.
 4. Analog AC meter display panel, to display 3-phase AC Amps, 3-phase AC Volts, Hz, KW load level, and load power factor. The display shall be color-coded, with green scale indicating normal or acceptable operating level, yellow indicating conditions nearing a fault, and red indicating operation in excess of rated conditions for the transfer switch.
- G. Engine starting contacts shall be provided in transfer switch to start the generating plant if any phase of the normal source drops below 85% of rated voltage, after an adjustable time delay period of 1-120 seconds. Provide loss of normal source circuit with phase sequence sensing capability that verifies phase angle relationship of source voltage.
- H. The transfer switch shall transfer to emergency as soon as the generator source voltage and frequency have reached 90% of rated. After restoration of normal power on all phases to 95% of rated voltage, adjustable time delay period of 2-25 minutes shall delay transfer to normal power until it has had time to stabilize. If the emergency power source should fail during the time delay period, the time delay shall be by-passed, and the switch shall return immediately to the normal source. Whenever the switch has retransferred to normal, the engine-generator shall be allowed to operate at no load for an adjustable period of time (10 minutes initially) to allow it to cool before shut-down. Transfer switch voltage sensors shall be close differential type, providing source availability information to the control system based on the following functions:
1. Monitoring all phases of the normal service (source 1) for under voltage conditions (adjustable for pickup in a range of 85 to 98% of the normal voltage level and dropout in a range of 75 to 98% of normal voltage level).
 2. Monitoring all phases of the emergency service (source 2) for under voltage conditions (adjustable for pickup in a range of 85 to 98% of the normal voltage level and dropout in a range of 75 to 98% of pickup voltage level).
 3. Monitoring all phases of the normal service (source 1) and emergency service

(source 2) for voltage imbalance, loss of single phase, phase rotation, over voltage conditions (adjustable for dropout over a range of 105 to 135% of normal voltage, and pickup at 95-99% of dropout voltage level), over or under frequency conditions.

4. Monitoring the neutral current flow in the load side of the transfer switch. The control shall initiate an alarm when the neutral current exceeds a preset adjustable value in the range of 100-150% of rated phase current for more than an adjustable time period of 10 to 60 seconds.
- I. The transfer switch shall include a test switch to simulate normal power failure with actual load transfer. A remote contact from the plant control system shall be accepted by the ATS to provide generator start and load control testing. Pilot lights shall be included on the cabinet door to indicate the main switch closed on normal (green) or emergency (Red); a yellow pilot light shall indicate the emergency power source running.
 - J. The transfer switch shall include two auxiliary contacts on the main operating shaft indicating closed on normal and two auxiliary contacts indicating closed on emergency. In addition, two sets of relay contacts shall be provided to operate upon loss of the normal power supply. All relays, timers, control wiring and accessories to be front accessible. Auxiliary contacts shall be provided for remote plant control system monitoring.
 - K. Include an exerciser with transfer switch for exercising generator in loaded condition every 168 hours for a period adjustable to 15 minute increments from 20 minutes minimum. Include automatic return to normal should the genset fail to provide load during the exercise run, if normal power is available. Provide programmed transition controls with adjustable time delay option to limit inductive load inrush currents. Switches without adjustable programmed transition are not acceptable.
 - L. Provide for utility to genset ATS dry maintained contact input from the Pump Control Panel to start generator and transfer ATS on load. Provide a 20 light remote annunciator to be mounted adjacent to or within the front panel of ATS. I/O List from the ATS/Standby power system and standby system annunciator to the plant controls:
Contact outputs from ATS:
ATS/Genset not in Auto
Utility Supplying Load
Generator Supplying Load
Utility Available
Generator Available
ATS Common Alarm

Contact inputs to ATS:
Remote Test
 - M. The transfer switch shall be provided in a NEMA 12 (interior installation locations) or NEMA 4X stainless steel (exterior installation locations) wall mounted enclosure with a continuous hinge, gasketed and a 3 point latch. HMI deadfront mounted through enclosure door shall be fitted with a hinged window kit, Schaefer's SPHWKSS-(####)-BC or approved equal.

1.02 SUBMITTALS

- A. Submit shop drawings and product data clearly indicating:
 - 1. Cabinet dimensions.
 - 2. All applicable options and accessories.
 - 3. Wiring diagrams.
 - 4. Interrupting or withstanding current rating.
 - 5. All electrical characteristics and data as required showing compliance with these specifications.
 - 6. Digital Metering device and wiring.

PART 2 - EXECUTION

2.01 QUALITY ASSURANCE/TESTS

- A. As a precondition for approval, transfer switch, complete with timers relays and accessories shall be listed by Underwriters' Laboratories, Inc. in their Electrical Construction Materials Catalog under Standard UL-1008 (automatic transfer switches) and approved for use on emergency systems.
- B. When conducting temperature rise tests to paragraph 99 of UL-1008 the manufacturer shall include post-endurance temperature rise tests to verify the ability of the transfer switch to carry full rated current after completing the overload and endurance tests.
- C. Electrical Field Tests: Field testing shall be performed prior to substantial completion.
 - 1. Perform insulation resistance tests phase-to-phase and phase-to-ground with switch in both source positions.
 - 2. Perform a contact resistance test across all main contacts.
 - 3. Verify settings and operation of control devices in accordance with the specifications provided by the manufacturer.
 - 4. Calibrate and test all relays and timers including voltage and frequency sensing relays, in phase monitor (synchronism check), engine start and cool-down timers, transfer and retransfer timers, etc.
 - 5. Perform automatic transfer tests: Simulate loss of normal power. Test Return to normal power. Simulate loss of emergency power. Simulate all forms of single phase conditions. Monitor and verify correct operation and timing of the following simulations: Normal voltage-sensing relays: Engine start sequence: Time delay upon transfer: Alternate voltage-sensing relays: Automatic transfer operation: Interlocks and limit switch function: Time delay and retransfer upon normal power restoration: Engine cool-down and shutdown feature.
 - 6. SYSTEM FUNCTION TESTS: Perform system function tests upon completion of equipment tests. It is the purpose of system function tests to prove the proper interaction of all sensing, processing, and action devices.
 - a. Develop test parameters for the purpose of evaluating performance of all integral components and their functioning as a complete unit within design requirements.
 - b. Test all interlock devices.
 - c. Record the operation of alarms and indicating devices.

2.02 SHOP DRAWINGS

- A. Submit Shop Drawings and product data clearly indicating:
1. Cabinet dimensions.
 2. All applicable options and accessories.
 3. Wiring diagrams.
 4. Interrupting or withstanding current rating.
 5. All electrical characteristics and data as required showing compliance with these specifications.
 6. Digital Metering device and wiring.

END OF SECTION