

## Technical Specification 033.01

### AUTOMATIC TRANSFER SWITCH (ATS) WITH MICROPROCESSOR CONTROLLED LOGIC

#### 1.0 General

- a) It is the intent of this specification to secure an automatic transfer switch (ATS) that has been prototype tested, factory built, production tested, and site tested, together with all accessories necessary for a complete installation as shown on the plans and drawings and specified herein.
- b) The ATS shall be provided with the correct number of poles, proper voltage and amperage rating, and correct frequency as shown by the Engineer on the approved plans.
- c) Each ATS shall consist of an inherently double-throw power transfer switch unit and a microprocessor controller, interconnected to provide complete automatic operation. All transfer switches and control panels shall produced by the same manufacturer.
- d) All equipment shall be new and of current production by a firm which has the final assembly of the ATS in the continental United States.
- e) All transfer switches utilized in Brunswick County owned applications shall have programmable exercise timers, Utility and Generator source Available monitoring contacts, and Emergency / Normal position contacts.
- f) The ATS will shall be completely compatible with the selected and approved emergency generator unit – refer to Technical Specification 032.01 – Emergency Generators for Pump Stations for additional information.
- g) The complete ATS shall be tested to ensure proper operation of the individual components and correct overall sequence of operation, and to ensure that the operating transfer time, voltage, frequency and time delay settings are in compliance with the specification requirements.
- h) The ATS unit shall be free of defects in materials and workmanship, and the supplier shall be responsible for ensuring the compatibility of all components of the ATS.

#### 2.0 Approved Automatic Transfer Switches

- a) Approved ATS units shall be:
  - 1) ASCO 300 with the 11BG option
  - 2) Cummins Power Command OTPC
  - 3) or approved equal.

### **3.0 Codes and Standards**

- a) The ATS shall conform to the requirements of:
  - 1) UL 1008 – Standard for Automatic Transfer Switches
  - 2) NFPA 70 - National Electrical Code
  - 3) NFPA 110 - Emergency and Standby Power Systems
  - 4) IEEE Standard 446--Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications
  - 5) NEMA ICS10-1993 (formerly ICS2-447) – AC Automatic Transfer Switches
  - 6) International Standards Organization ISOP 9001:2000

### **4.0 Required Submittals**

- a) The utility contractor shall submit the following items to the Engineer for review and approval prior to providing the ATS:
  - 1) Manufacturer's drawings showing the physical layout with outline dimensions, cable entry and exit locations, interior and exterior component layouts, and connection data.
  - 2) Electrical schematic to include internal wiring, customer connection terminals, optional components, and controller settings.
  - 3) Product Data Sheets with Equipment Ratings.
  - 4) A marked-up copy of this specification with notations clearly showing all deviations and/or exceptions to this specification for the submitted unit – if any.

### **5.0 Ratings and Construction**

- a) The ATS shall be furnished in a NEMA Type 4X stainless steel enclosure unless it is located inside an electrical building in which case NEMA Type 12 is acceptable.
- b) The ATS shall be listed and labeled with UL, CSA, etc.
- c) All material and parts shall be new, unused, of current manufacture, or best industrial grade, and free from defects and imperfections.
- d) All moveable parts of the operating mechanism shall remain in positive mechanical contact with the main contacts during the transfer operation

without the use of separate mechanical interlocks. The transfer switch shall be electrically operated and mechanically held.

- e) The ATS shall have the correct amount of switched poles plus a solidly connected neutral unless otherwise specified by Brunswick County.
- f) Inspection and removal of all contacts, coils, springs, and control elements shall be possible from the front of the transfer switch without disassembly or disconnection of operating linkages and without disconnection of the power conductors.
- g) Automatic transfer switches not intended for continuous duty or repetitive load transfer switching are not acceptable.
- h) The automatic transfer switch shall be rated for proper voltage, amperes, frequency, # of phases, and # of wires for total system transfer including all motor loads, lighting, and miscellaneous loads.
- i) The automatic transfer switch shall be rated to withstand the RMS symmetrical short circuit current available at the automatic transfer switch terminals, with the type of overcurrent protection shown on the approved plans. The RMS symmetrical short circuit current shall be clearly labeled inside the ATS enclosure per NEC requirements.
- j) A label plate shall be affixed – without drilling the enclosure or using any type of screws – that specifies: \_\_\_\_\_ **VAC**, \_\_\_\_\_ **AMPS**, \_\_\_\_\_ **Hz**,  
\_\_\_\_\_ **# OF PHASES**, \_\_\_\_\_ **# OF WIRES** on the outside of the ATS.
- k) The transfer switch mechanism shall provide a simple means of manual operation using only components that are permanently affixed in the operating position.
- l) The ATS shall permit manual operation of the transfer mechanism while the system is energized and carrying the rated load.
- m) The ATS shall provide front accessible components and wiring for easy serviceability. Power or control connections which are not readily serviceable while the transfer switch mechanism is mounted within its enclosure are not acceptable.
- n) All internal control devices used in the ATS shall be capable of being de-energized and isolated from the system by use of an accessible isolation plug for servicing procedures.
- o) All power contacts shall operate in a quick-make / quick – break manner with the speed of operation independent of the supply voltage and / or speed of operation by manual methods.

## **6.0. Automatic Transfer Switch Functional Requirements**

- a) The ATS shall automatically transfer the load to the standby emergency generator in the event of a utility supply failure and return the load back to the normal utility supply upon restoration of normal utility power. The ATS power switching devices shall be mechanically and electrically interlocked to prevent the utility and generator power supplies from being interconnected.
- b) When the voltage on any phase of the normal utility supply is below the preset level of rated voltage for the preset time delay a contact shall close to start the emergency generator. The voltage of each phase of the normal source shall be monitored, with pickup adjustable to 95% of nominal and dropout adjustable from 70% to 90% of pickup setting.
- c) The load shall transfer to the generator supply when the generator voltage and frequency have stabilized and reached a preset level and after the generator warm-up time delay has expired.
- d) Required Time Delays:
  - 1) An adjustable time delay shall be provided to override momentary normal source outages and delay all transfer and engine starting signals.
  - 2) An adjustable time delay shall be provided on transfer to emergency, adjustable from zero (0) to five (5) minutes for controlled timing of transfer of loads to emergency.
  - 3) A generator stabilization time delay shall be provided after transfer to emergency.
  - 4) An adjustable time delay shall be provided on re-transfer to normal power, adjustable to thirty (30) minutes. Time delay shall be automatically bypassed if the emergency source fails and normal source is acceptable.
  - 5) A five (5) minute cool down time delay shall be provided on shutdown of the generator.
  - 6) All adjustable time delays shall be field adjustable without the use of special tools.

## **7.0. Automatic Transfer Switch Standard Control Features**

- a) The controller shall direct the operation of the transfer switch. Sensing and logic shall be controlled by a built-in microprocessor for maximum reliability, minimum maintenance, and inherent serial communications.
- b) The controller shall be connected to the transfer switch with an interconnecting wiring harness. The harness shall have a keyed disconnect plug to allow the controller to be disconnected from the transfer switch for routine maintenance.

- c) The controller shall be enclosed with a protective cover and be mounted separate from the transfer switch unit for safety and ease of maintenance. Interfacing relays shall be industrial grade plug-in type with dust covers.
- d) The ATS control power must be obtained from the source being transferred to. The controls shall not require any connection to external power sources. Transfer switches requiring power from the engine starting battery (or any other battery) are not acceptable.
- e) The controller shall have a flush mounted display with LED indicators for switch position and source acceptability. It shall also include test and time delay bypass switches.
- f) The voltage of each phase of the normal source shall be monitored.
- g) Single phase voltage and frequency of the emergency source shall be provided.
- h) Provisions for local and remote operator initiated system test modes shall be provided. Test modes shall allow “on load” testing of the emergency generator set.

#### **8.0. Additional Features**

- a) Engine start signal contacts, five (5) amperes, thirty-two (32) VDC is required.
- b) Push button type test switch to simulate a normal source failure is required.
- c) Engine exercising timer to include the ability to select engine exercise with or without load Transfer is required.
- d) Programmable Engine Exerciser, fourteen (14) day programmable, with digital readout display, shall include one (1) Form C contact for availability of Normal or Emergency Sources.
- e) Required Pilot Lights (must be long life LED type lights):
  - a) Green light – load on Normal Utility Source
  - b) Red light – load on Generator Source
  - c) Green light – Normal Utility Source Available
  - d) Green light – Generator Source Available
- f) Lamp Test Function to test all LED lights is required.
- g) Programmable clock and calendar is required.
- h) Control settings shall be stored in non-volatile EEPROM.
- i) The control module shall be capable of storing the following records in memory or access either locally (at the control module) or remotely (at a computer):

- 1) Number of hours transfer switch is in the emergency position (total and since record reset)
  - 2) Number of hours the emergency is available (total and since record reset)
  - 3) Total days that control has been energized (total and since record reset)
  - 4) Total transfers in either direction (total and since record reset)
  - 5) Date of record reset
  - 6) Date of last exercise period
  - 7) Date, time and description of the last four source failures
  - 8) Elapsed time during the most recent source outage
- j) Auxiliary contacts, rated ten (10) amperes, (250) VAC, shall be provided consisting of one contact, closed when the ATS is connected to the normal source and one contact, closed, when the ATS is connected to the emergency source.
- k) A push-button type switch to bypass the time delay on transfer to emergency, or the engine exerciser period on the re-transfer to Normal Power time delay, whichever delay is active at the time the push-button is activated.
- l) Terminals shall be provided for a remote contact which opens to signal the ATS to transfer to Emergency Power and for a remote contact which opens to inhibit transfer to Emergency Power and / or re-transfer to Normal Power.
- m) Terminals shall be provided to indicate actual availability of the Normal and Emergency Sources, as determined by the voltage sensing pickup and dropout settings for each source.

#### **9.0. Other Items**

- a) The supplier shall be able to provide the services of a field technician to test and adjust the system for satisfactory operation. The supplier shall be factory warranted and trained to work the complete system. A factory certified service shop shall be located within a two (2) hour / one hundred (100) mile radius of the Brunswick County Utilities Field Operation Center in Supply, North Carolina. Service response shall be guaranteed to be eight (8) hours or less upon receipt of service call notification.
- b) Each transfer switch shall be provided with two operator manuals providing installation and operating instructions.
- c) Each automatic transfer switch and generator set shall be warranted by the manufacturer for one year from the date placed in service. Where manufacturer's standard guarantees or warranties are written for a period of more than one year, at no additional cost to the County, such longer terms shall apply.