

Section 16621A - AUTOMATIC TRANSFER SWITCH**Part 1 – General**

- 1.01 One 600 Amp, 3 Phase, 480 Volt Automatic Transfer Switch (ATS) shall be provided with gasketed enclosure. The ATS shall consist of an inherently double throw power transfer switch unit and a control module interconnected to provide complete automatic operation. The operating transfer time* in either direction shall not exceed one-sixth (1/6) of a second.
- 1.02 Refer to Specification 16622 for isolation bypass transfer switches.

Part 2 – Products

- 2.01 The transfer switch unit shall be electrically operated and mechanically held. The electrical operator shall be a single-solenoid mechanism, momentarily energized to minimize power consumption and heat generation. The switch shall be positively locked and unaffected by voltage variations or momentary outages so that contact pressure is maintained at a constant value and temperature rise at the contacts is minimized for maximum reliability and operating life. The switch shall be mechanically interlocked to ensure only one of two possible positions – normal or emergency.
- 2.02 All main contacts shall be silver composition.
- 2.03 Inspection of all contacts (movable and stationary) shall be possible from the front of the switch without disassembly of operating linkages and without disconnection of power conductors. A manual operation handle shall permit the operator to stop the contacts at any point throughout the entire travel to properly inspect and service the contacts when required.
- 2.04 A control module shall direct the operation of the transfer switch. The module's sensing and logic shall be controlled by a built-in microprocessor for maximum reliability, minimum maintenance and inherent digital communications capability. The control module shall be connected to the transfer switch by an interconnecting wiring harness. The harness shall include a keyed disconnect plug to enable the control module to be disconnected from the transfer switch for routine maintenance.
- 2.05 The control panel shall meet or exceed the voltage surge withstand capability in accordance with IEEE standard 472-1974 (ANSI C37, 90a-1974) and the impulse withstand voltage test in accordance with the proposed NEMA Standard ICS 1-109.

* Operating transfer time is the time measured from instant of monitored source deviation to closing of main contacts on an available alternate power source exclusive of any purposefully introduced time delay.

- 2.06 Operation:
- A. The voltage of each phase of the normal source shall be monitored, with pickup adjustable from 85 to 100% and dropout adjustable from 75 to 98% of pickup setting, both in increments of 1%, and shall be fully field-adjustable without the use of any tools, meters or power supplies. Repetitive accuracy of settings shall be +/- 2% or better over an operating temperature range of -20C to -70C. Factory set to pickup at 90% voltage and 95% frequency.

- B. The control module shall include four time delays that are fully adjustable over the entire range as follows:
1. Time delay to override momentary normal source outages to delay all transfer switch and engine starting signals. Adjustable from 0 to 6 seconds. Factory set at 1 second.
 2. Transfer to emergency time delay. Adjustable from 0 to 5 minutes. Factory set at 0 minutes unless indicated otherwise on the plans.
 3. Retransfer to normal time delay. Time delay is automatically bypassed if emergency source fails and normal source is acceptable. Adjustable from 0 to 30 minutes. Factory set at 10 minutes.
 4. Unload running item delay for emergency engine generator cool down. Adjustable from 0 to 60 minutes. Factory set at 15 minutes.
 5. Exercising and cool down clocks.
 6. All standard features commonly shown in manufacturer's literature.
- 2.07 A set of DPDT gold-flashed contacts rated 10 Amps, 48 VDC shall be provided for a low-voltage engine start signal when the normal source fails. The start signal shall prevent dry cranking of the generator by requiring the generator to reach proper output and to run for the duration of the cool down setting regardless of whether the normal source restores before the load is transferred. Also provide a "commit/no commit to transfer" selector switch to select whether the load should be transferred to the emergency generator if the normal source restores before the generator is ready to accept the load.
- 2.08 A momentary-type test switch shall be provided to simulate a normal source failure. Also, terminals for a remote contact which opens to signal the ATS to transfer to emergency and terminals for remote contacts which open to inhibit transfer to emergency and/or retransfer to normal shall be provided.
- 2.09 Output terminals to signal the actual availability of the normal and emergency sources, as determined by the voltage sensing pickup and dropout settings for each source, shall be provided.
- 2.10 One set of auxiliary contacts shall be provided rated 10 Amps, 480 VAC consisting of one contact closed when the ATS is connected to normal and one contact closed when the ATS is connected to emergency. Also, one set of signal lights to indicated when the ATS is connected to normal source and when the ATS is connected to emergency source shall be provided.
- 2.11 See attached sheet 6 figure #1 for maximum allowable dimensions of ATS without enclosure.
- 2.12
1. For each switch provide trouble shooting hints.
 2. For each switch provide O & M manual.
 3. For each switch provide complete ladder schematic.
 4. For each switch provide wiring diagram.
 5. For each switch provide parts list.

2.12 Switching Monitor: Manufacturer shall provide one of the following:

A. Inphase Monitor:

An inphase monitor shall be built-in to the ATS and shall control transfer so that motor load inrush currents do not exceed normal starting currents to avoid nuisance tripping of circuit breakers and possible mechanical damage to motor couplings. The inphase monitor shall operate without external control of electrical loads and without any external control of the power sources. The monitor shall compare the phase relationship and frequency difference between the normal and emergency sources and permit transfer can be accomplished within 60 electrical degrees as determined by monitoring the frequency difference. Inphase transfer shall be accomplished if the sources are within 2 Hz of nominal frequency and 70% or more of nominal voltage.

B. Programmed Monitor:

Monitor shall detect motor decay and provide delayed open transition switching where in phase monitors are provided as part of the software. Provide UofA with codes to activate and deactivate.

2.13 Code Compliance:

The ATS shall conform to the requirements of:

- A. 3 cycle rating in excess of UL 1008 – Standard for Automatic Transfer Switches. (Fully rated.)
- B. UL 1008 – Standard for Automatic Transfer Switches. Optional 3 cycle testing.
- C. NFPA 70 – National Electrical Code including use in emergency and standby systems in accordance with Articles 571, 700, 701 and 702.
- D. NFPA 99 – Essential Electrical Systems for Health Care Facilities.
- E. NFPA 110 – Standard for Emergency and Standby Power Systems.
- F. IEEE Standard 446 – IEEE Recommended Practice for Emergency and Standby Power Systems (Orange Book).
- G. IEEE Standard 241 – IEEE Recommended Practice for Electric Power Systems in commercial buildings (Gray Book).
- H. NEMA Standard ICS – 2-447 – AC Automatic Transfer Switches.
- I. IEC – Standard for Automatic Transfer Switches.
- J. The ATS shall be UL listed in accordance with UL 1008 as follows:
 - 1. Rated in amperes for total system transfer including control of motors, electric-discharge lamps, electric-heating and tungsten-filament lamp loads as referred to in Paragraph 38.13 of UL 1008.

2. Overload and endurance at 480 Volts AC per tables 25.1, 25.2, 27.1 and 27.2 of UL 1008 when enclosed according to Paragraph 1.6.
 3. Temperature rise tests after the overload and endurance tests to confirm the ability of the transfer switches to carry their rated current within the allowable temperature limits.
 4. No welding of contacts. Transfer switch must be electrically operable to alternate source after the withstand current tests.
 5. Dielectric tests at 1960 Volts, RMS, minimum after the withstand current tests.
 6. Additional optional testing for 3 cycle compliance.
- K. The ATS shall be "fully" rated to withstand the RMS symmetrical short circuit current available at the ATS terminals for 3 full cycles, verified by oscillograph testing by an independent test agency, in EXCESS of UL 1008, without series protection of fuses or circuit breakers.

Part 3 Execution

3.01 All production units shall be subjected to the following factory tests:

- A. 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.
- B. The switch shall be subjected to a dielectric strength test per NEMA Standard ICS 1-109.21.
- C. ATS must be monitored by Fire Alarm System and report to the UA fire Safety Shop.

3.02 The manufacturer shall provide a notarized letter certifying compliance with all of the requirements of this specification including compliance with the above codes and standards and withstand current ratings. The certification shall identify by serial number(s) the equipment involved. No exceptions to the specifications other than those stipulated at the time of submittal shall be included in the certification.

3.03 Manufacturer

- A. The ATS manufacturer shall maintain a local service center capable of emergency service or routine preventative maintenance contracts. The manufacturer shall maintain records of each switch by serial number for minimum of 20 years.
- B. The ATS manufacturer shall provide same day emergency parts available to customer.
- C. Whenever the words "AS MAY BE DIRECTED", "SUITABLE", "OR EQUIVALENT", "AS APPROVED", or other words of similar intent and meaning are used implying that judgment, discretion, or decision is to be exercised, it is understood that it is the judgment, discretion, or decision of the Owner to which the reference is made. All materials and articles necessary for the work are subject to the approval of the Owner.

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- D. The following manufacturers are approved, subject to approval, based on conformance to this specification:
- i. Russelectric
 - ii. Others: By prior approval submittal. 3 cycle testing in excess of UL 1008 is required prior to the prior approval submittal.

End of Appendix Section 16621A