PART 1 – GENERAL

1.1 Scope

A. It is the intent of this specification to secure a transfer switch that has been prototype tested, factory built, production tested and site tested. A transfer switch with the number of poles, voltage and current ratings shown on the plans and specified herein shall be provided.

1.2 Codes and Standards

A. The automatic transfer switch shall conform to the requirements of:

1. UL 1008: Underwriters Laboratories standard for automatic transfer switches
2. CSA: C22.2 No. 178 certified
3. IEC: 947-6-1 certified at 480 VAC
4. NFPA 70: National Electrical Code including use in emergency and standby systems in accordance with Articles 517, 700, 701, 702
5. NFPA 99: Essential electrical systems for health care facilities
6. NFPA 101: Life safety code
7. NFPA 110: Standard for emergency and standby power systems
9. IEEE 446: I.E.E.E. recommended practice for emergency and standby power systems
10. NEMA ICS10: AC automatic transfer switch equipment
11. UL 50/508: Enclosures
12. ICS 6: Enclosures
13. ANSI C33.76: Enclosures
14. NEMA 250: Enclosures
15. IEEE 472: (ANSI C37.90A): Ringing wave immunity
16. EN55022 (CISPR11): Conducted and radiated emissions (Exceeds EN55011 & MILSTD 461 Class 3)
17. EN61000-4-2: (Level 4): ESD immunity test Class B
18. EN61000-4-3: (ENV50140): Radiated RF, electromagnetic field immunity
19. EN61000-4-4: Electrical fast transient/burst immunity test
20. EN61000-4-5: IEEE C62.41: Surge immunity test (1.2 x 50μs, 5 & 8 kV)
21. EN61000-4-6: (ENV50141): Conducted immunity test
22. EN61000-4-11: Voltage dips and interruption immunity

1.3 Approved Manufactures

A. The automatic transfer switch shall be Caterpillar Model CTG. Alternate manufactures shall submit a request two weeks prior to bid and include a written list of deviations from this specification to be considered for approval.
PART 2 – PRODUCTS

2.1 Performance and Construction

A. The automatic transfer switch shall be of double throw construction operated by a reliable solenoid driven mechanism. There shall be a direct mechanical coupling to facilitate transfer in 6 cycles or less.

B. 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.

C. For switches installed in systems having ground fault protective devices, and/or wired so as to be designated a separately derived system by the NEC, a 4th 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 will not be considered.

D. 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 above 400 Amps.

E. 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:

<table>
<thead>
<tr>
<th>Size (Amps)</th>
<th>Coordinated Breaker</th>
<th>Current Limiting Fuse</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 to 225</td>
<td>30,000</td>
<td>200,000</td>
</tr>
<tr>
<td>260 to 600</td>
<td>50,000</td>
<td>200,000</td>
</tr>
<tr>
<td>800</td>
<td>65,000</td>
<td>200,000</td>
</tr>
<tr>
<td>1000 - 1200</td>
<td>85,000</td>
<td>200,000</td>
</tr>
<tr>
<td>1600 - 3000</td>
<td>100,000</td>
<td>200,000</td>
</tr>
</tbody>
</table>

(all values at 480V RMS symmetrical, less than 20% power factor)

F. A dielectric test at the conclusion of the withstand and closing tests shall be performed.

G. The automatic transfer switch manufacturer shall certify sufficient arc interrupting capabilities for 50 cycles of operation between a normal and emergency source that are 120 degrees out of phase at 480 volts, 600% of rated current at .50 power factor. This certification is to ensure that there will be no current flow between the two isolated sources during switching.

H. All relays shall be continuous duty industrial type with wiping contacts. 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.

I. Main and arcing contacts shall be visible without major disassembly to facilitate inspection and maintenance.

J. A manual handle shall be provided for maintenance purposes with the switch de-energized. An operator disconnect switch shall be provided to defeat automatic operation during maintenance, inspection or manual operation.

K. Switches composed of molded case breakers, lighting contactors or other components thereof not intended to transfer between live sources are not acceptable.

L. The current rating shall be a continuous rating when the switch is installed in an enclosure, and shall conform to NEMA temperature rise standards.

M. 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 lamp load.

N. 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.

O. Unless specified otherwise on the drawings, the switch shall be mounted in a NEMA 1 enclosure.

2.2 Control

A. The control panel shall be opto-isolated from electrical noise and provided with the following inherent control functions and capabilities:

1. Easy-to-view 4 x 20 LCD display with long lasting LED indicators.
2. Control panel shall display voltage and frequency of both sources.
3. The user shall be able to view the last 16 recorded events.
5. Adjustments to all settings shall be made from the front of the panel without opening the door.

B. The transfer switch controller shall be microprocessor based. The control panel shall perform the operational and display functions of the transfer switch. The display functions of the control panel shall include ATS position, source availability, sequence indication and diagnostics.

C. All programmable and control functions shall be pass code protected and accessible through the keypad.

D. The control panel shall be provided with a simple user interface for transfer
switch monitoring, control and field changeable functions and settings.

E. Touch pad test switch with Fast Test/Load/No Load selection capability to simulate a normal source failure.

F. The controller shall provide digital timer adjustments with 1-second resolution. Voltage and Frequency shall be adjustable to 1% resolution to facilitate accurate transfer.

G. To ensure reliable and consistent user operation the controls must be equipped with nonvolatile memory and allow automatic daylight savings time adjustment.

PART 3 – OPERATION

3.1 Sequence of Operation

A. The ATS shall incorporate adjustable three phase under voltage sensing on the normal source (or single phase, as appropriate for a single phase ATS).

B. When the voltage of any phase of the normal source is reduced to 80% (adjustable) of nominal voltage, for a period of 0-10 seconds (programmable) a pilot contact shall close to initiate starting of the engine generator.

C. The ATS shall incorporate adjustable under voltage and under frequency sensing on the emergency source.

D. When the emergency source has reached a voltage value of 90% of nominal and achieved frequency within 95% of the rated value, the load shall be transferred to the emergency source after a programmable time delay.

E. 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 60 minutes (programmable; factory set at 30 minutes). 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.

F. 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.

G. Inspection and operational testing/demonstration of the ATS shall be conducted in the presence of the owner's representative to indicate the ATS satisfies these specifications.

3.2 ATS Features

In addition to the operational elements required to satisfy the sequence of operation and
other functions specified herein, the following ATS features shall be provided:

A. Adjustable time delay to override momentary normal source failure prior to engine start. Field programmable 0-10 seconds factory set at 3 seconds.

B. Adjustable time delay on retransfer to normal source, programmable 0-60 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.

C. A time delay on transfer to emergency, programmable 0-5 minutes, factory set at 1 second.

D. 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.

E. An exerciser timer with momentary test pushbutton shall be incorporated within the microprocessor and shall be capable of starting the engine generator set and transferring the load (when selected) for exercise purposes on a daily, weekly or monthly basis. The exerciser shall contain a battery for memory retention during an outage.

F. Provide a momentary pushbutton to bypass the time delays on transfer and retransfer and programmable commit/no commit control logic.

G. The controller shall accept a remote peak shave or test input to signal the transfer switch to the emergency position.

H. A set of dry customer contacts shall be provided to indicate both emergency and normal source position.

The following optional Exerciser Package shall be included (specifier to select):

A. Additional Auxiliary Contact (A3) - Closed when the transfer switch is in Source 2 position.

B. Additional Auxiliary Contact (A4) - Closed when the transfer switch is in Source 1 position.

C. Programmable Clock Exerciser (CDP) – This will replace the timer exerciser and allow for a 365 day cycle.

D. Voltage Imbalance Monitor (VI) - Three Phase sensing shall detect an imbalance and initiate a transfer to the alternate source. Adjustable 5-20% of nominal with a time delay of 10-30 seconds for nuisance conditions.

The following additional accessories shall be included (specifier to select):
A. Heater and Thermostat (HT) – Recommended for NEMA 3R applications.

B. Elevator pre-signal (T3/W3) – Contact Opens 0-60 seconds prior to transfer in either direction, re-closes after transfer.

C. Universal Motor Load Disconnect (UMD) - Auxiliary contacts opens 0 – 5 minutes prior to transfer in either direction, re-closes after transfer. Can be configured for pre-transfer, post transfer or both.

D. Sequential Universal Motor Load Disconnect (A62) – Multiple auxiliary contacts open prior to transfer in either direction, re-closes after transfer. Can be configured for pre-transfer, post transfer or both.

E. Communications interface card (ZNETM) – RS-485 Modbus

F. Test Switch (6A) - Maintained

G. Digital Meter (M80) - Measures and displays true RMS volts, amps and frequency in a three-phase power system.

H. Digital Meter (M82) - Includes M80 functions plus Watts, KVA, KVAR, PF, etc. w/Modbus RS485 port

I. Digital Meter (M83) – Includes M82 functions plus THD capability and Modbus RS485 port

J. Additional Auxiliary Contacts (A3) - Closed when the transfer switch is in Source 2 position.

K. Additional Auxiliary Contacts (A4) - Closed when the transfer switch is in Source 1 position.

L. Alarm panel (CTAP) – Alarm on transfer to emergency w/silence button & light

M. Disconnect Switch (DS) - Inhibits transfer in either direction when in inhibit. (Std on 800A and above)

N. Protective Cover (OCVR) - Lockable see-through microprocessor and meters cover for NEMA 3R or 12.

PART 4 – EXECUTION

4.1 General

A. The transfer switch shall be installed as shown on the plans, in accordance with the manufacture’s recommendations and all applicable codes.
4.2 Factory Tests

A. The transfer switch manufacturer shall perform a complete functional test on the switch, controller and accessories prior to shipping from the factory. A certified test report shall be available upon request.

4.3 Service

A. The supplier of the ATS shall be the same as that of the engine generator set and shall maintain a national service organization that is factory trained and certified for transfer switch equipment. In addition, the genset dealer organization shall be available 24 hours per day, 365 days per year.

4.4 Warranty

A. The automatic transfer switch shall be warranted against defective workmanship for a period of two years, including both parts and labor.