PART 1 - GENERAL

1.1 REFERENCES

.1 CSA C22.2 No. 178, Standard for Transfer Switch Equipment.

.2 CAN3-C13-M83, Instrument Transformers.

.3 ANSI/NEMA ICS 2-1988, Industrial Control Devices, Controllers, and Assemblies.

.4 CSA Part 1 - Canadian Electrical Code.

1.2 MEASUREMENT AND PAYMENT

.1 Payment for provision of all items specified in this Section shall be by Lot Price. No separate payment will be made for work specified in the Contract Documents. All costs incurred by Contractor in meeting with the requirements of this Section shall be included in the bid price for the Work.

1.3 SYSTEM DESCRIPTION

.1 Automatic load transfer equipment to:

.1 Monitor voltage on all phases of normal power supply.

.2 Initiate cranking of standby generator unit on normal power failure or abnormal voltage on any one phase below preset adjustable limits for adjustable time period.

.3 Transfer load from normal supply to standby unit when standby unit reaches rated frequency and voltage pre-set adjustable limits.

.4 Transfer load from standby unit to normal power supply when normal power restored, confirmed by sensing of voltage on all phases above adjustable pre-set limit for adjustable time period.

.5 Shut down standby unit after unloaded to cool down using adjustable time delay relay.

1.4 SUBMITTALS

.1 Submittals, product data and shop drawings shall be in accordance with Sections 01 33 00 and 26 05 00.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Instrument transformers: to CAN3-C13.

.2 Contactors: to ANSI/NEMA ICS 2.

2.2 CONTACTOR TYPE TRANSFER EQUIPMENT

.1 The transfer switch shall be electrically operated and mechanically held. The electrical operator shall be a momentarily energized, single-solenoid mechanism.

.2 Front access only.

.3 Two (2) -3 phase contactors mounted on common frame, in double throw arrangement, mechanically and electrically interlocked, with sprinkler proof enclosure.

.4 Rated: 600 V, 60 Hz, amp and number of poles, as indicated.

.5 Main contacts: silver surfaced, protected by arc disruption means.

.6 Switches and relay contacts, coils, spring and control elements accessible for inspection and maintenance from front of panel without removal of switch panel or disconnection of drive linkages and power conductors.

.7 Auxiliary contact: silver plated, to initiate emergency generator start-up on failure of normal power, and two (2) N/C, two (2) N/O.

.8 Fault withstand rating:
- .1 50 kA, symmetrical minimum for ratings larger than 400A.
- .2 50 kA symmetrical, or as indicated, for ratings 400A and below.
- .3 Confirm to the short circuit, System coordination and Arc Flash Study.

.9 The transfer switch shall be built for closed transition operation, with capability to support open transition or delayed transition modes.

2.3 MICROPROCESSOR CONTROLLER

.1 The controller's sensing and logic shall be provided by a single built-in microprocessor for maximum reliability, minimum maintenance, and the ability to communicate serially through an optional serial communication module.

.2 A single controller shall provide twelve selectable nominal voltages for maximum application flexibility and minimal spare part requirements. Voltage sensing shall be true RMS type and shall be accurate to ±1% of nominal voltage. Frequency sensing shall be accurate to ±0.2%. The panel shall be capable of operating over a temperature range of -20 to +60 degrees C and storage from -55 to +85 degrees C.

.3 The controller shall be connected to the transfer switch by an interconnecting wiring harness. The harness shall include a keyed disconnect plug to enable the controller to be disconnected from the transfer switch for routine maintenance. Sensing and control logic shall be provided on multi-layer printed circuit boards. Interfacing relays shall be industrial grade plug-in type with dust covers. The panel shall be enclosed with a protective cover and be mounted separately from the transfer switch unit for safety and ease of maintenance. The protective cover shall include a built-in pocket for storage of the operator's manuals.

.4 All customer connections shall be wired to a common terminal block to simplify field-wiring connections.

.5 The controller shall meet or exceed the requirements for Electromagnetic Compatibility (EMC) as follows:

.1 IEEE472 (ANSI C37.90A) Ring Wave Test.
.2 ENC55011 1991 Class A Conducted and Radiated Emission.
.3 EN61000-4-2 Electrostatic Discharge Immunity, Direct Contact and Air Discharge.
.4 EN61000-4-3 Radiated Electromagnetic Field Immunity.
.5 EN61000-4-4 Electrical Fast Transient Immunity.
.6 EN61000-4-5 Surge Immunity.
.7 ENV50141 HF Conducted Disturbances Immunity.

.6 Controller Display and Keypad.

2.3 MICROPROCESSOR CONTROLLER (Cont'd)

.6 (Cont'd)

.1 A four (4) line twenty (20) character LCD display and keypad shall be an integral part of the controller for viewing all available data and setting desired operational parameters. Operational parameters shall also be available for viewing and limited control through the serial communications input port. The following parameters shall only be adjustable via DIP switches on the controller:

.1 Nominal line voltage and frequency.

.2 Single or three phase sensing.

.3 Operating parameter protection.

.4 Transfer operating mode configuration (Open transition, Closed transition or Delayed transition).

.2 All instructions and controller settings shall be easily accessible, readable and accopmlished without the use of codes, calculations, or instruction manuals.

.7 Voltage, Frequency and Phase Rotation Sensing.

.1 voltage and frequency on both the normal and emergency sources (as noted below) shall be continuously monitored with the following pickup, dropout and trip setting capabilities (values as shown % of normal unless otherwise specified:

Parameter	Sources	Dropout/Trip	Pickup/Reset
Undervoltage	N&E, 3Ø	70 to 98%	85 to 100%
Overvoltage	N&E, 3Ø	102 to 115%	2% below trip
Under-frequency	N&E	85 to 98%	90 to 100%
Overfrequency	N&E	102 to 110%	2% below trip
Voltage unbalance	N&E	5 to 20%	1% below dropout

.2 Repetitive accuracy of all settings shall be within ±0.5% over an operating temperature range of -20° to 60°C.

.3 Voltage and frequency settings shall be field adjustable in 1% increments either locally with the display and keypad or remotely via serial communications port access.

2.3 MICROPROCESSOR CONTROLLER (Cont'd)

.7 (Cont'd)

.4 The controller shall be capable (when activated by the keypad or through the serial port) or sensing the phase rotation of both the normal and emergency sources. The source shall be considered unacceptable if the phase rotation is not the preferred rotation selected (ABC or CBA).

.5 Source status screens shall be provided for both normal and emergency to provide digital readout of voltage on all 3 phases, frequency and phase rotation.

.8 Time Delays.

.1 An adjustable time delay of 0 to 6 seconds shall be provided to override momentary normal source outages and delay all transfer and engine starting signals. Capability shall be provided to extend this time delay to 60 minutes by providing an external 24 VDC power supply.

.2 A time delay shall be provided on transfer to emergency, adjustable from 0 to 60 minutes, for controlled timing of transfer of loads to emergency.

.3 Two (2) time delay modes (which are independently adjustable) shall be provided on re-transfer to normal. One (1) time delay shall be for actual normal power failures and the other for the test mode function. The time delays shall be adjustable from 0 to 60 minutes. Time delay shall be automatically bypassed if the emergency source fails and the normal source is acceptable.

.4 A time delay shall be provided on shut down of engine generator for cool down, adjustable from 0 to 60 minutes.

.5 A time delay activated output signal (ASCO Acc.31Z) shall also be provided to drive an external relay(s) for selective load disconnect control. The controller shall have the ability to activate an adjustable 0 to 5 minute time delay in any of the following modes:

.1 Prior to transfer only.

.2 Prior to and after transfer.

.3 Normal to emergency only.

.4 Emergency to normal only.

.5 Normal to emergency and emergency to normal.

.6 All transfer conditions or only with both sources available.

2.3 MICROPROCESSOR CONTROLLER (Cont'd)

.8 (Cont'd)

.5 (Cont'd)

.6 All time delays shall be adjustable in 1 second increments, except the extended parallel time, which shall be adjustable in .01 second increments.

.7 All time delays shall be adjustable by using the LCD display and keypad or with a remote device connected to the serial communications port.

.8 Frequency sensing, to prevent transfer from normal power supply until frequency of standby unit reaches preset adjustable values.

2.4 BYPASS-ISOLATION SWITCH

.1 A two-way bypass-isolation switch shall provide manual bypass of the load to either source and permit isolation of the automatic transfer switch from all source and load power conductors. All main contacts shall be manually drive.

.2 Power interconnections shall be silver-plated copper bus bar. The only field installed power connections shall be at the service and load terminals of the bypass-isolation switch. All control interwiring shall be provided with disconnect plugs.

.3 Separate bypass and isolation handles shall be utilized to provide clear distinction between the functions. Handles shall be permanently affixed and operable without opening the enclosure door. Designs requiring insertion of loose operating handles or opening of the enclosure door to operate are not acceptable.

.4 Bypass to the load-carrying source shall be accomplished with no interruption of power to the load (make before break contacts). Designs which disconnect the load when bypassing are not acceptable. The bypass handle shall have three operating modes: "Bypass to Normal", "Automatic", and "Bypass to Emergency". The operating speed of the bypass contacts shall be the same as the associated transfer switch and shall be independent of the speed at which the manual handle is operated. In the "Automatic" mode, the bypass contacts shall be out of the power circuit so that they will not be subjected to fault currents to which the system may be subjected.

2.4 BYPASS-ISOLATION SWITCH (Cont'd)

.5 The isolation handle shall provide three operating modes: "Closed", "Test", and "Open". The "Test" mode shall permit testing of the entire emergency power system, including the automatic transfer switches with no interruption of power to the load. The "Open" mode shall completely isolate the automatic transfer switch from all source and load power conductors. When in the "Open" mode, it shall be possible to completely withdraw the automatic transfer switch for inspection or maintenance to conform to code requirements without removal of power conductors or the use of any tools.

.6 When the isolation switch is in the "Test" or "Open" mode, the bypass switch shall function as a manual transfer switch.

.7 Designs requiring operation of key interlocks for bypass isolation or ATSs which cannot be completely withdrawn when isolated are not acceptable.

2.5 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Requirements - Electrical.

.2 Lamacoid identification plate on outside of door with inscriptions of Normal Power, Off, and Standby Power. Size of plate minimum 25 mm with black letters on white background.

2.6 ENCLOSURE

.1 The ATS shall be furnished in a NEMA 4X type outdoor enclosure.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Locate, install and connect transfer equipment.

.2 Check relays and adjust as required.

.3 Install and connect battery and remote alarms.

3.2 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Electrical Requirements - Electrical.

3.2 FIELD QUALITY CONTROL (Cont'd)

.2 Energize transfer equipment from normal power supply.

.3 Set selector switch in "Test" position to ensure proper standby start, running, transfer, retransfer. Return selector switch to "Auto" position to ensure standby shuts down.

.4 Set selector switch in "Auto" position and open normal power supply disconnect. Standby should start, come up to rated voltage and frequency, and then load should transfer to standby. Allow to operate for 10 minutes, then close main power supply disconnect. Load should transfer back to normal power supply and standby should shutdown.

.5 Repeat, at 1 hour intervals, several times, complete test with selector switch in each position, for each test.

.6 The complete Transfer Switch shall be factory 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.

.7 Upon request, 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 and closing ratings. The certification shall identify, by srial number(s), the equipment involved. No exceptions to the specification, other than those stipulated at the time of the submittal, shall be included in the certification.

END OF SECTION