

PART 1 General

1.1 SYSTEM INCLUDES

- .1 Materials and installation for automatic load transfer equipment which can monitor voltage on all phases of normal power supply, initiate cranking of standby generator units, transfer loads and shut down standby units.

1.2 RELATED SECTIONS

- .1 Section 26 05 01 - Common Work Results - Electrical.

1.3 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CAN3-C13-M83(R1998), Instrument Transformers.
 - .2 and Circuit-Breaker Enclosures (Tri-national standard with UL 489, tenth edition, and the second edition of NMX-J-266-ANCE).
 - .3 CSA C22.2No.178-1978(R2001), Automatic Transfer Switches.
- .2 American National Standards Institute (ANSI)/National Electrical Manufacturers Association (NEMA)
 - .1 ANSI/NEMA ICS 2-2000, Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.

1.4 SYSTEM DESCRIPTION

- .1 Automatic load transfer equipment to:
 - .1 Monitor voltage on 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 period of time.
 - .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 phases above adjustable pre-set limit for adjustable time period.
 - .5 Shut down standby unit after running unloaded to cool down using adjustable time delay relay.
- .2 Should normal power fail, the automatic transfer switch shall sense the voltage failure, send a signal to the standby generator unit to start and transfer the load to the emergency system as soon as voltage appears on the emergency feeds. When normal power is restored, the sequence shall be automatically reversed.
- .3 The manufacturer shall be capable of maintaining and servicing this equipment without causing the Owner either to carry expensive parts, or to be subject to the inconvenience of long periods of interrupted service because of lack of available parts.

1.5 SHOP DRAWINGS

- .1 Three (3) sets of complete operating, maintenance and parts manuals, drawings, and a sequence of operation covering all equipment shall be provided.
- .2 Before fabrication and/or assembly, submit shop drawings and complete wiring diagrams for review.
- .3 Submit shop drawings in accordance with specifications.
- .4 Include:
 - .1 Make, model and type.
 - .2 Single line diagram showing controls and relays.
 - .3 Description of equipment operation including:
 - .1 Automatic starting and transfer to standby unit and back to normal power.
 - .2 Test control.
 - .3 Manual control.
 - .4 Automatic shutdown.

1.6 CLOSEOUT SUBMITTALS

- .1 Provide operation and maintenance data for automatic load transfer equipment for incorporation into manual.
- .2 Detailed instructions to permit effective operation, maintenance and repair.
- .3 Technical data:
 - .1 Schematic diagram of components, controls and relays.
 - .2 Illustrated parts lists with parts catalogue numbers.
 - .3 Certified copy of factory test results.

PART 2 Products

2.1 MATERIALS

- .1 Instrument transformers: to CAN3-C13.
- .2 Contactors: to ANSI/NEMA ICS2.

2.2 CONTACTOR TYPE TRANSFER EQUIPMENT

- .1 Contact Type Transfer Equipment: to CSA C22.2No.178.
- .2 The automatic transfer switch shall be suitable for resistive or inductive loads, and rated for (1) - 400A, 600 volts, 60 Hz, for use on a 3 phase, 4 wire system.
- .3 The transfer switch shall be enclosed in a EEMAC 1 enclosure and shall be free. The enclosure & switch shall be factory assembled. Provision of the enclosure separate from the transfer switch will not be permitted.
- .4 Transfer switch shall be electrically operated, mechanically held, and shall obtain control and transfer power from the source to which it is being transferred. It shall operate so that a neutral position will not be possible, except for requirements noted otherwise.

- .5 Full protection shall be provided by means of 3 solid state voltage sensing relays, and these relays shall have adjustable pick-up and drop-out settings.
- .6 The transfer switches shall be an Asco 7000 series closed transition switch with a microprocessor based controller with full draw-out two-way bypass-isolation switch. The two-way bypass-isolation switch shall provide manual bypass of the load to either source and shall permit isolation of the automatic transfer switch from all source and load power conductors. The switch shall incorporate "Failure to synchronize" indication and "Extended parallel time protection". The switch shall allow bypass-isolation without load interruption. Transfer switch shall meet all SaskPower requirements for a closed transition switch utilizing a standby generator. Contractor shall send all transfer switch status information to the Metasys building management system.
- .7 A non-chattering relay shall be provided to prevent transfer to the emergency source until both the frequency and voltage have reached a preset value. An auxiliary contact shall be provided to initiate generator start-up on failure of normal power supply.
- .8 The following timing adjustments to be supplied:
 - .1 Time delay for re-transfer from emergency to normal after restoration of normal power 0-10 minutes.
 - .2 Time delay normal to emergency 0-60 seconds.
 - .3 Time delay on engine starting to over-ride momentary voltage fluctuations 0-60 seconds.
- .9 Maintained contact Test selector switch to simulate failure of normal power.
- .10 The transfer switch unit shall be installed with a draw out mechanism and mechanical interlocks to allow complete removal of the transfer switch after the load has been by-passed. Disconnection of incoming service and load cables shall not be necessary.
- .11 The transfer switch control panel shall be mounted separately on the door and connected to the transfer switch by means of a wire harness and disconnect plug. The control panel shall also be capable of being removed for bench maintenance, without disturbing the power being supplied to the load.
- .12 The by-pass switch shall have the same basic design as the transfer switch and shall have identical electrical ratings. It shall be operated manually by means of a by-pass handle, with quick-make/quick-break action. The handle shall have three positions: automatic, by-pass to normal and by-pass to emergency. In the automatic position, the by-pass to normal and by-pass to emergency contacts shall remain open and not exposed to the destructive effects of full currents of wear during normal operation.
- .13 When the isolation switch is in the 'isolate' position, the by-pass switch shall serve as a manual transfer switch, allowing the load to be switched from one source to the other. The isolation switch shall provide a redundant back-up to the transfer switch. Regenerative voltage from the load shall be prevented from feeding back into the transfer switch during the source to source manual transfer.
- .14 The isolation switch shall be integrated with the transfer switch and shall be a draw out type. Power connections and disconnections shall be accomplished with draw out type contacts similar to those used in draw out circuit breakers. Correct

GENERATOR REPLACEMENT

- alignment in positive connection and disconnect shall be accomplished through the operation of the isolation handle. All power connection shall be made with silver plated copper. Means shall be provided to padlock the isolation handle in the open position.
- .15 The functions of by-pass and isolation shall be performed manually by means of two handles.
 - .16 The by-pass handle shall permit load by-pass to either source without any interruption of the power to the load. There shall be three positions: automatic, by-pass to normal, and by-pass to emergency.
 - .17 The isolation handle shall be interlocked with the by-pass function and shall be capable of being operated only when the by-pass handle is in the by-pass position. The isolation handle shall have three positions as follows:
 - .1 **Closed** - the automatic transfer switch shall be connected to both power sources and the load in the normal operating mode.
 - .2 **Test** - in this position the automatic transfer switch shall be withdrawn from the load circuits. However, both sources shall still be connected to allow electrical functional testing without disturbing the load which has been by-passed directly to a source.
 - .3 **Open** - all power to the transfer switch shall be disconnected and it shall be completely isolated for maintenance. The transfer switch may be removed through the draw out mechanism.
 - .18 Both handles shall be accessible from the exterior of the switchgear. Handle positions and operating instructions shall be clearly indicated. Provide indicator showing:
 - .1 Utility source available
 - .2 Emergency source available
 - .3 By-pass to emergency
 - .4 By-pass to Utility
 - .5 Transfer switch closed on Utility
 - .6 Transfer switch closed on emergency
 - .19 Transfer switches shall be manufactured and assembled by Asco.
 - .20 The manufacturer shall be brought in to provide commissioning of the transfer switch prior to it being energized and ensure that it is safe to be commissioned with source voltages present. They shall also be used to commission the switch and provide commissioning reports.

2.3 ACCESSORIES

- .1 Pilot lights to indicate power availability normal and standby, switch position, green for normal, red for standby, mounted in panel.
- .2 Provide the following relays and modules for each transfer switch.
 - .1 Relay to signal start-up of diesel generator.
 - .2 Relay to signal elevators of an emergency power operation.
 - .3 Time delay relay to signal engine when cool-down period has occurred.
 - .4 Position sensing contacts for Emergency power Position, Normal Power position, Bypass - Emergency power Position, Bypass - Normal Power position.

- .5 Remote Test Input.
- .6 Adjustable Pre-transfer contacts
- .7 ATS Position pilot lights
- .8 Source Availability contacts
- .9 3 phase under/over voltage – Emergency and Utility
- .10 Phase Rotation Monitor
- .11 3 Phase kilowatt Paladin #256TWNU (4-20 mA) watt transducers on load side of all transfer switches

2.4 EQUIPMENT IDENTIFICATION

- .1 Provide equipment identification in accordance with Section 26 05 01 - Common Work Results – Electrical.
- .2 Control panel:
 - .1 For selector switch and manual switch: size 4 nameplates.
 - .2 For meters, indicating lights, minor controls: size 2 nameplates.

2.5 SOURCE QUALITY CONTROL

- .1 Complete equipment, including transfer mechanism, controls, relays and accessories factory assembled and tested in presence of Consultant.
- .2 Tests:
 - .1 Operate equipment both mechanically and electrically to ensure proper performance.
 - .2 Check selector switch, in modes of operation Test, Auto, Manual, Engine Start and record results.
 - .3 Check voltage sensing and time delay relay settings.
 - .4 Check:
 - 1 Automatic starting and transfer of load on failure of normal power.
 - 2 Retransfer of load when normal power supply resumed.
 - 3 Automatic shutdown.

PART 3 Execution

3.1 INSTALLATION

- .1 Locate, install and connect transfer equipment.
- .2 Check time settings and adjust as required.
- .3 Install and connect remote alarms.
- .4 The ground bus shall be connected to the ground network. Refer to specifications and the drawings for full grounding requirements.
- .5 After completion of the installation, but before unit is put permanently into service, an acceptance test shall be conducted in the presence of, and to the satisfaction of, the Consultant.
- .6 The Owner's operating and maintenance personnel shall be instructed in the operation and maintenance of the switches for a minimum period of two (2) hours for each of two (2) trips to site.

END OF SECTION