
Part 1 General

1.1 RELATED SECTIONS

- .1 Section 26 05 00 - Common Work Results for Electrical.

1.2 REFERENCES

- .1 CSA International.
 - .1 CSA C22.2 No.178-1978(c2006)-2012, Automatic Transfer Switches.
 - .2 CSA C22.2 No.178.1-2007, Requirements for Automatic Transfer Switches.
 - .3 CAN/CSA C60044-1-07, Instrument Transformers.
- .2 National Electrical Manufacturers Association (NEMA).
 - .1 NEMA ICS 2-1996(R2009), Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC, Part 8: Disconnect Devices for Use in Industrial Control Equipment.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for transfer switches and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Quebec, Canada.
 - .1 Indicate on drawings:
 - .1 Make, model and type.
 - .2 Load classification:
 - .1 Tungsten lamp load: in kW.
 - .2 Ballast lamp load: in kW.
 - .3 Motor load: in kW.
 - .4 Restricted use: resistance and general loads, 0.8 pf or higher in kW.
 - .3 Single line diagram showing controls and relays.
 - .4 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.

1.4 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for transfer switches for incorporation into manual.
- .3 Detailed instructions to permit effective operation, maintenance and repair.
- .4 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.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store, and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground, indoors, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect transfer switches from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

1.6 ACCEPTABLE PRODUCTS AND MATERIALS

- .1 Where a particular brand name is stipulated, see Instructions to Bidders for procedure for requesting approval of substitute materials and products.

Part 2 Products

2.1 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 Special requirements - Load shedding of non-life safety emergency load:
 - .1 Automatic transfer switch for emergency load (non-life safety) to be prohibited from transferring load to emergency side if fire pump is running.
 - .2 If automatic transfer switch for emergency load (non-life safety) is on emergency side, the switch shall be disconnected instantaneously from emergency side upon fire pump start-up.

2.2 MATERIALS

- .1 Instrument transformers: to CAN/CSA C60044-1.
- .2 Contactors: to NEMA ICS2.

2.3 CONTACTOR TYPE TRANSFER EQUIPMENT

- .1 Contact Type Transfer Equipment: to CSA C22.2 No.178.1.
- .2 Two-3 pole contactors mounted on common frame, in double throw arrangement, mechanically and electrically interlocked, with CSA type 1 enclosure, solenoid operated.
 - .1 Switch to be locked and unaffected by transient outages, so that the contact pressure is maintained at a constant value and the contact temperature rise is minimized for maximum reliability and optimization of the useful life.
- .3 Rated: 600 V, 60 Hz, 100 A or 225 A as indicated, 4 wire, solid neutral.
- .4 Main contacts: silver surfaced, protected by arc disruption means.
 - .1 Make and break capacity: 20 times and 6 times the rated current respectively.
- .5 Switch 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.
- .6 Auxiliary contact: silver plated, to initiate emergency generator start-up on failure of normal power.
- .7 Fault withstand rating: 35 kA symmetrical for 3 cycles with maximum peak value of 50 kA.
- .8 Lever to operate switch manually when switch is isolated.
- .9 Neutral bar, solid, same ampacity as phase bars.

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 driven.

- .2 Power interconnections shall be silver-plated copper bus bar.
- .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.
- .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.
- .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.

2.5 CONTROLS

- .1 Selector Switch - 4 Positions "Test", "Auto", "Manual", "Engine start".
 - .1 Test position - normal power failure simulated. Engine starts and transfer takes place. Return switch to "Auto" to stop engine.
 - .2 Auto position - normal operation of transfer switch on failure of normal power; retransfers on return of normal voltage and shuts down engine.
 - .3 Manual position - transfer switch may be operated by manual handle but transfer switch will not operate automatically and engine will not start.
 - .4 Engine start position - engine starts but unit will not transfer unless normal power supply fails. Switch must be returned to "Auto" to stop engine.
- .2 Control Transformers: dry type with 120 V secondary to isolate control circuits from:
 - .1 Normal power supply.
 - .2 Emergency power supply.
- .3 Relays: continuous duty, industrial control type, with wiping action contacts rated 10 A minimum:
 - .1 Voltage sensing: 3 phase for normal power and on one phase only for emergency, solid state type, adjustable drop out and pick up, close differential, 2 V minimum under voltage and over voltage protection.
 - .2 Time delay: normal power to standby, adjustable solid state, 0 to 60 s delay.

- .3 Time delay on engine starting to override momentary power outages or dips, adjustable solid state, 0 to 60 s delay.
 - .4 Time delay on retransfer from standby to normal power, adjustable 5 to 180 s.
 - .5 Time delay for engine cool-off to permit standby set to run unloaded after retransfer to normal power, adjustable solid state, 20 s intervals to 10 minutes.
 - .6 Time delay during transfer to stop transfer action in neutral position to prevent fast transfer, adjustable, 5 s intervals to 180 s.
 - .7 Frequency sensing, to prevent transfer from normal power supply until frequency of standby unit reaches preset adjustable values.
 - .8 Neutral [disconnected] position delay: allow time for motors to delay between live sources, adjustable, 0 to 5 s.
- .4 Solid state electronic in-phase monitor.
 - .5 NO dry contact input for load shedding (return to normal source).

2.6 ACCESSORIES

- .1 Ensure pilot lights indicate power availability normal and standby, switch position, green for normal, red for standby, mounted in panel.
- .2 Plant Exerciser: 168 hours timer to start standby unit once each week for selected interval but does not transfer load from normal supply. Timer adjustable 0-168 hours in 15 minute intervals.
- .3 Auxiliary contact to provide:
 - .1 4 contacts indicating switch position.
 - .2 2 contacts for bypass position.
- .4 Instruments:
 - .1 Digital true RMS, indicating type 2% accuracy, flush panel mounting:
 - .1 Voltmeter: ac.
 - .2 Ammeter: ac.
 - .3 Frequency meter.
- .5 Potential transformers - dry type for indoor use:
 - .1 Ratio: 600 to 120.
 - .2 Rating: 600 V, 60 Hz, BIL 10 kV.
 - .3 Accuracy rating: 1%.
- .6 Current transformers - dry type for indoor use:
 - .1 Ratio: 100 to 5 or 300 to 5, according to switch capacity.
 - .2 Rating: 600 V, 60 Hz, BIL 10 kV.
 - .3 Accuracy rating: 1%.
 - .4 Positive action automatic short-circuiting device in secondary terminals.

2.7 EQUIPMENT IDENTIFICATION

- .1 Identify equipment in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Control Panel:
 - .1 For selector switch and manual switch: size 4 nameplates.
 - .2 For meters, indicating lights, minor controls: use size 2 nameplates.

2.8 SOURCE QUALITY CONTROL

- .1 Complete equipment, including transfer mechanism, controls, relays and accessories factory assembled and tested.
- .2 Notify Departmental Representative 5 days minimum in advance of date of factory test.
- .3 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.
 - .4 In-phase monitor operation.

2.9 ACCEPTABLE PRODUCTS

- .1 7000 Series of ASCO.
- .2 RTS Series of Russelectric.
- .3 ZBTE Series of GE.
- .4 Replacement materials or products: approved by addendum according to Instructions to bidders.

2.10 MANUAL TRANSFER SWITCH

- .1 Manual transfer switch for connecting the emergency panel to project generator set or to a mobile generator set.
- .2 Manual transfer switch: to CSA C22.2 No. 178.1.
- .3 Ratings: three-phase switch, 4 wires, 600 V, 60 Hz, 400 A, with NEMA 1 enclosure.
- .4 Neutral bar: continuous, nominal current: 400 A.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for transfer switches installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

- .1 Locate, install and connect transfer equipment as indicated.
- .2 Connect relays to the generator set control panel to ensure the start-up and shutdown of the generator according to the required mode of operation.
- .3 Check relays and solid state monitors and adjust as required to ensure correct operation.
- .4 Install and connect remote alarms.
- .5 Connect the load shedding input of the automatic transfer switch for non-life safety loads to the load shedding contact of the fire pump control panel.

3.3 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .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 "Manual" position and check to ensure proper performance.
- .5 Set selector switch in "Engine start" position and check to ensure proper performance. Return switch to "Auto" to stop engine.
- .6 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.
- .7 Repeat, at 1 hour intervals, 2 times, complete test with selector switch in each position, for each test.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

END OF SECTION