

SECTION 26 36 00 AUTOMATIC TRANSFER SWITCH

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes an automatic transfer switch rated 600 V and less, including the following:
  - 1. Automatic transfer switches.
  - 2. For Middle Creek ATS only: Integral Load Side Circuit Breaker
- B. Related Requirements
  - 1. Section 269999 "Supervisory Control and Data Acquisition Systems" for monitoring and controlling remote systems and components, including transfer switch.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, weights, operating characteristics, furnished specialties, and accessories.
- B. Shop Drawings: Dimensioned plans, elevations, sections, and details showing minimum clearances, conductor entry provisions, gutter space, installed features and devices, and material lists for each switch specified.
- C. Field quality-control test reports.
- D. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
  - 1. Features and operating sequences, for both automatic and manual operation.
  - 2. List of all final settings of relays and delays.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain transfer switches through one source from a single manufacturer.

- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NEMA ICS 1.
- D. Comply with NFPA 70.
- E. Comply with UL 1008 unless requirements of these Specifications are stricter.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include only the following:
  - 1. Basis of Design: ASCO 7000 Series.
  - 2. Contactor Transfer Switches:
    - a. Emerson; ASCO Power Technologies, LP.
    - b. Caterpillar.
    - c. Cummins.
    - d. Kohler.
    - e. Generac.

### 2.2 GENERAL TRANSFER-SWITCH PRODUCT REQUIREMENTS

- A. Indicated Current Ratings: Apply as defined in UL 1008 for continuous loading and total system transfer, including tungsten filament lamp loads not exceeding 30 percent of switch ampere rating, unless otherwise indicated.
- B. Tested Fault-Current Closing and Withstand Ratings: Adequate for duty imposed by protective devices at installation locations in Project under the fault conditions indicated, based on testing according to UL 1008.
  - 1. Where transfer switch includes internal fault-current protection, rating of switch and trip unit combination shall exceed indicated fault-current value at installation location.
  - 2. Transfer switches 100A and up shall either be 3-cycle fully rated to or have a specific coordinated breaker withstand rating of 42,000 A (RMS symmetrical), unless rating indicated is higher.
- C. Solid-State Controls: Repetitive accuracy of all settings shall be plus or minus 2 percent or better over an operating temperature range of minus 20 to plus 70 deg C.
- D. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.41. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1.

- E. Electrical Operation: Accomplish by a nonfused, momentarily energized solenoid or electric-motor-operated mechanism, mechanically and electrically interlocked in both directions.
- F. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.
  - 1. Limitation: Switches using molded-case switches or circuit breakers or insulated-case circuit-breaker components are not acceptable.
  - 2. Switch Action: Double throw; mechanically held in both directions.
  - 3. Contacts: Silver composition or silver alloy for load-current switching. Conventional automatic transfer-switch units, rated 225 A and higher, shall have separate arcing contacts.
- G. Neutral Switching. Where four-pole switches are indicated, provide neutral pole either switched simultaneously with phase poles or with overlapping neutral contacts.
- H. Enclosures: General-purpose NEMA 250, Type 1, complying with NEMA ICS 6 and UL 508, unless otherwise indicated.

### 2.3 AUTOMATIC TRANSFER SWITCHES

- A. Comply with Level 2 equipment according to NFPA 110.
- B. Configuration: Open Transition.
- C. Switching Arrangement: Double-throw type, incapable of pauses or intermediate position stops during normal functioning, unless otherwise indicated.
- D. Manual Switch Operation: Unloaded. Control circuit automatically disconnects from electrical operator during manual operation.
- E. In-Phase Monitor: Factory-wired, internal relay controls transfer so it occurs only when the two sources are synchronized in phase. Relay compares phase relationship and frequency difference between normal and emergency sources and initiates transfer when both sources are within 15 electrical degrees, and only if transfer can be completed within 60 electrical degrees. Transfer is initiated only if both sources are within 2 Hz of nominal frequency and 70 percent or more of nominal voltage.
- F. Undervoltage Sensing for Each Phase of Normal Source: Sense low phase-to-ground voltage on each phase. Pickup voltage shall be adjustable from 85 to 100 percent of nominal, and dropout voltage is adjustable from 75 to 98 percent of pickup value. Factory set for pickup at 90 percent and dropout at 85 percent.
- G. Switch-Position Pilot Lights: Indicate source to which load is connected.
- H. Source-Available Indicating Lights: Supervise sources via transfer-switch normal- and emergency-source sensing circuits.

- a. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."
  - b. Emergency Power Supervision: Red light with nameplate engraved "Emergency Source Available."
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- I. Digital Display: The digital display shall be accessible without opening the enclosure door and shall be provided with a 4 line by 20 character LCD display screen with touch pad function and display menus. The control panel shall be provided with menu driven display screens for transfer switch monitoring, control and field changeable functions and settings.
  - J. Test Switch: Simulate normal-source failure.
  - K. Transfer Override Switch: Overrides automatic retransfer control so automatic transfer switch will remain connected to emergency power source regardless of condition of normal source. Pilot light indicates override status.
  - L. Engine Starting Contacts: One isolated and normally closed, and one isolated and normally open; rated 10 A at 32-V dc minimum.
  - M. Unassigned Auxiliary Contacts: Two normally open, single-pole, double-throw contacts for switch in normal position. Two normally open, single-pole, double-throw contacts for switch in emergency position. See SCADA requirements for status of ATS.
  - N. Remote Transfer Inhibit: Overrides automatic transfer control so automatic transfer switch will remain connected to normal power source regardless of condition of normal source. Switch shall monitor a remote dry contact and shall inhibit transfer to emergency or shall retransfer to normal source depending on contact state and current status. Pilot light indicates override status. See SCADA requirements for remote ATS Inhibit controls.
  - O. Engine Start Time Delay: For override of normal-source voltage sensing to delay transfer and engine start signals. Adjustable from zero to ten seconds, and factory set for three seconds.
  - P. Transfer Normal to Emergency Time Delay: For staggered transfer of loads in multiple transfer switch systems. Adjustable from 0 to 300 seconds.
  - Q. Retransfer Emergency to Normal Source Time Delay: To allow the utility to stabilize before transfer of load and prevent power interruptions if return of normal source is temporary. Adjustable from 0 to 30 minutes.
  - R. Engine Shutdown Time Delay: Adjustable from zero to thirty minutes.
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- 2.4 (ATS LOAD-SIDE) INTEGRAL OVERCURRENT PROTECTIVE DEVICE
- A. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with full interrupting capacity to meet available fault currents.
    - 1. Electronic Trip Circuit Breakers: Electronic trip circuit breakers with RMS sensing; field-replaceable rating plug or field-replicable electronic trip and individually field-adjustable long time, short time, and instantaneous trip pickup level settings. Trip unit shall also have adjustable long time and short time delay settings. Provide trip unit power

supply for 0-100% current indication. Provide for all switchboard circuit-breaker frame sizes.

- a. Ground Fault Protection: Any 1000A-rated circuit breaker or larger, above 150V L-G, shall have ground fault pickup and time delay settings in addition to overcurrent trip settings indicated above, or where indicated.
  - b. Energy Reducing Maintenance Switching with local status indication: All circuit breakers rated 1200A and larger shall have reduced energy let-through switch protection in addition to overcurrent trip settings indicated above.
2. Breakers Serving Transfer Switches: Type and Frame size as required to meet "Specific Coordinated Molded Case Breaker" as required by automatic transfer switch for a minimum 42,000 A withstand rating.
  3. Molded-Case Circuit-Breaker (MCCB) Features:
    - a. Standard frame sizes, trip ratings, and number of poles.
    - b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor material.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install surface-mounted enclosures on 12 gauge formed steel channel having a cross-sectional dimension of at least 1-1/2" x 1-1/2". The channel and fittings shall have hot-dipped galvanized finish. Channels may be installed vertically or horizontally.
- B. Identify components according to Division 26 Section "Identification for Electrical Systems."
- C. Install transfer switch control wiring to controls for generators. Control conductors installed between the transfer equipment and the emergency generator(s) shall be kept entirely independent of all other wiring and shall meet the conditions of NEC 700.
- D. Set field-adjustable intervals and delays.
  1. Engine Start Time Delay: Set for 3 seconds.
  2. Transfer Normal to Emergency Time Delay:
    - a. Emergency ATS: Set for 0 seconds.
    - b. Stand-by ATS: Set for 10 seconds.
  3. Retransfer Emergency to Normal Source Time Delay: Set for 5 minutes.
  4. Engine Shutdown Time Delay: Set for 5 minutes.

#### 3.2 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
  1. After installing equipment and after electrical circuitry has been energized, test for compliance with requirements.

B. Testing Technician

1. The testing technicians shall be trained in all the methods of correctly and safely conducting the required test. The technician shall have regular experience conducting the required tests and they must have the knowledge to determine the serviceability of a specific piece of equipment.

C. Physical Inspection and Testing

1. Verify equipment rating correspond to drawings and specifications.
2. Inspect the physical and mechanical condition and verify that it complies with manufacturer's standards.
3. Verify equipment is properly secured and aligned and grounded as specified in the drawings and specifications.
4. Verify the equipment is clean.
5. For all moving electrical parts verify that proper lubrication has been applied so that they can be operated in a smooth motion.
6. Verify that equipment warnings and labels are clearly identified.
7. Confirm bolted electrical connections are low impedance using one of the following means:
  - a. Measure the resistance with a low-resistance ohmmeter. Bolted electrical connection resistances shall be compared to resistances measured on similar connections. Any similar resistance values that deviate more than 50 percent should be investigated.
  - b. Inspect the bolted connection and verify that it is at the manufacturer's rated torque using a calibrated torque wrench. If manufacturer's data is not available verify the torque meets the requirements of Table 100.12 in the ANSI/NETA ATS-2009.

D. Electrical Inspection and Testing

1. Test the resistance across the switching device including the contacts and poles. Gathered data shall not exceed manufacturer's recommended values for normal operation if the manufacturer does not provide recommended values all switches that vary more than 50 percent of the lowest value should be investigated.
2. Verify controller is functioning according to manufacturer's recommendations as well as the requirements of the drawings and specifications.
3. Simulate the following power states in order to test automatic transfer switch operation.
  - a. A loss of normal power.
  - b. Re-energize normal power.
  - c. A loss of emergency power.
4. Test the following automatic transfer switch features or devices.
  - a. The normal and emergency source sensing capabilities.
  - b. Sequence of operations upon engine start-up.
  - c. Verify the time delay prior to transition.
  - d. Automatic transfer.
  - e. Sequence of operations upon engine shut-down.

5. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.
  - a. Check for electrical continuity of circuits and for short circuits.
  - b. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.
  - c. Verify that manual transfer warnings are properly placed.
  - d. Perform manual transfer operation.
- E. Remove and replace units that do not pass tests and inspections and retest as specified above.
- F. Test Reports: Prepare a written report to record the following:
  1. Test procedures used.
  2. Test results that comply with requirements.
  3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

### 3.3 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain transfer switches and related equipment.

END OF SECTION 26 36 00