

SECTION 26 36 00 – TRANSFER SWITCHES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following equipment rated 600 volt and less:

1. Automatic transfer switches (ATS).
2. Nonautomatic transfer switches (MTS).
3. Quick connect panels with breakers.

B. Provide interconnections as listed in part 2.

C. Provide product demonstration as listed in part 3.

1.2 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. Manufacturer's certification of switch testing.

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 1 Section "Operation and Maintenance Data," include the following:

1. Features and operating sequences, both automatic and manual.
2. List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Maintain a service center capable of providing training, parts, and emergency maintenance repairs within a response period of less than eight hours from time of notification.

B. Testing Agency Qualifications: Factory tested by an independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

C. 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 as automatic transfer switch.

D. Comply with NEMA ICS 1.

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- E. Comply with NFPA 70.
- F. Comply with NFPA 110.
- G. Comply with UL 1008 unless requirements of these Specifications are stricter.

1.4 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of transfer switch or transfer switch components that fail in materials or workmanship within a twenty-four (24) month period from Substantial Completion.
- B. While the transfer switch is not from the same manufacturer as the generator, the generator vendor agrees to address all warranty claims made to the transfer switch within the generator maintenance agreement time period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. ASCO Power Technologies
    - a. Series 4000 ATS
      - 1) Life Safety ATS: Open transition with solid neutral.
      - 2) Non-Life Safety ATS(s): Delayed transition with solid neutral.
    - b. Temporary Generator Connections
      - 1) Series 300 MTS, open transition.
      - 2) Series 3QC quick connect input power panels with integrated breakers.
  - 2. Russelectric, Inc. equivalent.
  - 3. No other manufacturer will be accepted.

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.
- 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.

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- 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 non-fused, 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. Contactor-style automatic transfer-switch units, rated 600 A and higher, shall have separate arcing contacts.
  - 4. Conductor Connectors: Suitable for use with conductor material and sizes.
- G. Neutral Terminal: Solid and fully rated, unless otherwise indicated.
- H. Heater: Equip switches exposed to outdoor temperatures and humidity, and other units indicated, with an internal heater. Provide thermostat within enclosure to control heater. Provide all necessary wiring, fusing and control power transformers to power from connected load.
- I. Annunciation, Control, and Programming Interface Components: Devices at transfer switches for communicating with remote programming devices, annunciators, or annunciator and control panels shall have communication capability matched with remote device. Provide when remote devices are indicated on drawings or herewith in specification.
- J. Factory Wiring: Train and bundle factory wiring and label, consistent with Shop Drawings, either by color-code or by numbered or lettered wire and cable tape markers at terminations. Color-coding and wire and cable tape markers are specified in Division 26 "Electrical Identification."
  - 1. Designated Terminals: Pressure type, suitable for types and sizes of field wiring indicated.
  - 2. Power-Terminal Arrangement and Field-Wiring Space: Suitable for top, side, or bottom entrance of feeder conductors as indicated.
  - 3. Control Wiring: Equipped with lugs suitable for connection to terminal strips.
- K. Enclosures: General-purpose NEMA 250, Type 1 for interior use and Type 3R for exterior use, complying with NEMA ICS 6 and UL 508, unless otherwise indicated.
- L. Switch construction shall be Heavy duty rated.

2.3 AUTOMATIC TRANSFER SWITCHES

- A. Comply with Level 1 equipment according to NFPA 110.
- B. Switching Arrangement: Double-throw type, incapable of pauses or intermediate position stops during normal functioning, unless otherwise indicated.
- C. Manual Switch Operation: Under load, with door closed and with either or both sources energized. Transfer time is same as for electrical operation. Control circuit automatically disconnects from electrical operator during manual operation.

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- D. Digital Communication Interface: Matched to capability of remote annunciator or annunciator and control panel, when annunciator is specified.
- 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. Motor Disconnect and Timing Relay: Controls designate starters so they disconnect motors before transfer and reconnect them selectively at an adjustable time interval after transfer. Control connection to motor starters is through wiring external to automatic transfer switch. Time delay for reconnecting individual motor loads is adjustable between 1 and 60 seconds, and settings are as indicated. Relay contacts handling motor-control circuit inrush and seal currents are rated for actual currents to be encountered.
- G. Programmed Neutral Switch Position (Delayed Transition only): Switch operator has a programmed neutral position arranged to provide a midpoint between the two working switch positions, with an intentional, time-controlled pause at midpoint during transfer. Pause is adjustable from 0.5 to 30 seconds minimum and factory set for 0.5 second, unless otherwise indicated. Time delay occurs for both transfer directions. Pause is disabled unless both sources are live.
- H. Automatic Transfer-Switch Features:
  - 1. 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.
  - 2. Adjustable Time Delay: For override of normal-source voltage sensing to delay transfer and engine start signals. Adjustable from zero to six seconds, and factory set for one second.
  - 3. Voltage/Frequency Lockout Relay: Prevent premature transfer to generator. Pickup voltage shall be adjustable from 85 to 100 percent of nominal. Factory set for pickup at 90 percent. Pickup frequency shall be adjustable from 90 to 100 percent of nominal. Factory set for pickup at 95 percent.
  - 4. Time Delay for Retransfer to Normal Source: Adjustable from 0 to 30 minutes, and factory set for 10 minutes to automatically defeat delay on loss of voltage or sustained undervoltage of emergency source, provided normal supply has been restored.
  - 5. Test Switch: Simulate normal-source failure.
  - 6. Switch-Position Pilot Lights: Indicate source to which load is connected.
  - 7. 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."
  - 8. Unassigned Auxiliary Contacts: Two normally open, single-pole, double-throw contacts for each switch position, rated 10 A at 240-V ac.
  - 9. 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.
  - 10. Engine Starting Contacts: One isolated and normally closed, and one isolated and normally open; rated 10 A at 32-V dc minimum.

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11. Engine Shutdown Contacts: Time delay adjustable from zero to five minutes, and factory set for five minutes. Contacts shall initiate shutdown at remote engine-generator controls after retransfer of load to normal source.
12. Engine-Generator Exerciser: Solid-state, programmable-time switch starts engine generator and transfers load to it from normal source for a preset time, then retransfers and shuts down engine after a preset cool-down period. Initiates exercise cycle at preset intervals adjustable from 7 to 30 days. Running periods are adjustable from 10 to 30 minutes. Factory settings are for 7-day exercise cycle, 20-minute running period, and 5-minute cool-down period. Exerciser features include the following:
  - a. Exerciser Transfer Selector Switch: Permits selection of exercise with and without load transfer.
  - b. Push-button programming control with digital display of settings.
  - c. Integral battery operation of time switch when normal control power is not available.

2.4 NONAUTOMATIC TRANSFER SWITCHES

- A. The transfer switch shall be arranged for manually actuated manual operation.
- B. The manual transfer shall be actuated via a mechanical operating mechanism.
- C. The manual operating handle shall be capable of external operation without opening the enclosure door.
- D. It shall have the same contact to contact speed as automatic operation.
- E. There shall be three positions for manual operation:
  1. Connected to Source 1 (preferred)
  2. Connected to Source 2 (alternate)
  3. Connected to center off (disconnected position)
- F. Switch position when connected to Source 1, or Source 2 shall be pad – lockable.
- G. Additional features:
  1. Mechanical position indicators (yellow) visible to the operator shall be included for Source 1 (preferred), Source 2, (alternate), and Center Off (disconnected).
  2. Optional LED indicators shall be provided for Source 1 (preferred), and Source 2 (alternate).
  3. Auxiliary position indicating contacts, rated 10 amps, 250 Vac shall be provided consisting of one closed when the MTS is connected to Source 1 (preferred), and one contact closed when the MTS is connected to Source 2 (alternate).
  4. A form A contact shall be provided to indicate switch is in the Center Off (disconnected) position.
- H. The manual transfer switch shall be used to allow temporary connection of a temporary generator while the primary generator is undergoing maintenance.

2.5 QUICK CONNECT PANELS

- A. Quick connect input power panels shall provide a convenient and reliable way to connect temporary emergency power when serving the permanent emergency power source. The quick connect power panel shall be provided with integrated breakers, and be UL 891 listed.

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B. Mechanical:

1. All quick connect power panels shall be Type 3R compliant and constructed of **Stainless Steel**. The Type 3R rating shall be maintained with the temporary cables installed.
2. All quick connect power panels shall be provided with a single, secure, hinged, outer, pad-lockable door to prevent unintended access to the breaker and camlock connections for safety and security.
3. All quick connect power panels shall be provided with a provision for Trapped Key Interlocks.
4. Cables shall enter and exit the wiring chamber via access holes specifically designed for conductors and shall be provided with a bushing or shall be formed so that there are no sharp edges with which conductor insulation may come in contact.
5. Connections shall be arranged so that cables drape downward when connected.
6. The quick connect panel shall have an enclosure manufactured of 316 stainless steel.
7. The quick connect panel shall include two (2) integral mounting tabs for wall mounting, with three mounting holes.
8. Access to electrical parts shall be prevented by a deadfront panel as required by UL 891.
9. A barrier with slots to allow cables into the panel shall be provided to restrict access to cabling while connected, reducing the possibility of unintended access.

C. Electrical:

1. Quick Connections:
  - a. The quick connect panel shall have input or output connections rated up to 600 VAC.
  - b. All quick connections shall be cam type single pole Series 1016 connectors and shall be available color coded as per industry standard practice. Coordinate voltage system with connected voltage.
2. Terminations:
  - a. Permanent Conductors: the upper termination chamber shall be provided with lug terminals for the permanently installed conductors.
  - b. Temporary Conductors: the lower chamber shall have the cam type single pole connectors as required or the amp rating.
3. Overcurrent Protection:
  - a. Provide thermal-magnetic circuit breaker for overcurrent protection from the alternate source. Breaker size shall be as indicated, or same as breaker on the generator being provided as part of the project where size is not indicated.
4. Ground: minimum 25% rated ground.
5. Neutral: 100% solid neutral.

2.6 SOURCE QUALITY CONTROL

- A. Factory test and inspect components, assembled switches, and associated equipment. Ensure proper operation. Check transfer time and voltage, frequency, and time-delay settings for compliance with specified requirements. Perform dielectric strength test complying with NEMA ICS 1.

## 2.7 REMOTE ANNUNCIATION

- A. Provide multi-channel remote annunciator to indicate transfer switch positions as follows:
  - 1. Provide sufficient channels to indicate each automatic and manual transfer switch, including fire pump transfer switch when applicable.
  - 2. Each transfer switch shall provide indication of the position of the transfer switch, source availability, and if the switch is in alarm.
  - 3. Label each transfer switch on the panel ("LS", "NLS", "FP", "Temp"). Ensure the actual transfer switches are also labeled with self-adhesive labels meeting these specifications.
  - 4. Remote annunciator shall be recessed in new walls, and surface in existing walls.
- B. Locate remote annunciator adjacent to remote generator annunciator.
- C. Provide all wiring, connections and programming as required to install a fully functional remote annunciation system.

## 2.8 INTERCONNECTION WITH OTHER SYSTEMS

- A. Provide connection to the lighting control system from the life safety ATS.
- B. Provide connection to the HVAC system from the ATS feeding mechanical equipment. Connection shall be via dry-contacts in the transfer switch (ensure transfer switch is provided with appropriate contacts) to provide indication that power has been interrupted to the building, and transfer switch is in the emergency position. Contractor shall provide wiring to HVAC Contractor designated location for connection.
- C. When a fire pump is part of the project, provide connections from the mechanical ATS to the fire pump controller. The fire pump shall be wired to the ATS so that when the fire pump is required to run with the building is on emergency power, the mechanical ATS shall switch to the normal position; therefore, relieving its load from the generator.

## 2.9 ACCESSORIES

- A. Provide additional auxiliary relays as required to achieve interconnections and control requirements as outlined on drawings and as outlined within these specifications.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Identify components according to Division 26 "Electrical Identification."
- B. Set field-adjustable intervals and delays, relays, and engine exerciser clock.
- C. Field mark the short-circuit current rating of the transfer equipment, based on the specific overcurrent protection device type and setting per NEC 700.

### 3.2 CONNECTIONS

- A. Wiring to Remote Components: Match type and number of cables and conductors to control and communication requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to Owner if necessary to accommodate required wiring.
- B. Ground equipment according to Division 26 "Grounding and Bonding."

### 3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.
- B. Coordinate tests with tests of generator and run them concurrently.
- C. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.
- D. Remove and replace malfunctioning units and retest as specified above.
- E. 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.

### 3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain transfer switches and related equipment.
- B. Coordinate this training with that for generator equipment.

END OF SECTION 26 36 00