

263600 TRANSFER SWITCHES

Part 1 – GENERAL

1.1 Description

A. This section details the guidelines and expectations for the design and install of transfer switches rated 600V and less on Johns Hopkins University Homewood Campus. Project conditions and requirements vary, thus precluding the absolute adherence to the items identified herein in all cases. However, unless there is adequate written justification and approval from the JHFRE Engineering and Energy Department, it is expected that these guidelines will govern the design and specifications.

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 materials lists for each switch specified.

1. Dimensioned Outline Drawings of Equipment Unit: identify center of gravity and locate and describe mounting and anchorage provisions.

2. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Field quality-control test reports.

D. Operation and Maintenance Data: for each type of product to include in emergency, operation, and maintenance manuals.

1.3 Quality Assurance

A. All work must meet NEC standards and materials must be UL Listed.

B. 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.

C. Source Limitations: obtain all equipment through one source from a single manufacturer.

D. Electrical Components, Devices, and Accessories: listed and labeled as defined in NFPA 70 Article 100 by testing agency acceptable to authorities having jurisdiction and marked for intended use.

Part 2 – PRODUCTS

2.1 Preferred Manufacturers: Manufacturers are subject to compliance with requirements. Provide products that are compatible with the diesel generator manufacturer.

- A. Asco
- B. Square D/Schneider Electric
- C. General Electric
- D. Eaton/Cutler-Hammer
- E. Siemens

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% 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.

C. Solid-State Controls: Repetitive accuracy of all settings shall be plus or minus 2% or better over an operating temperature range of -5°F to 160°F.

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. Conventional automatic transfer-switch units, rated 225A and higher, shall have separate arcing contacts.

G. Neutral Switching: where four-pole switches are indicated, provide neutral pole switched simultaneously with phase poles.

H. 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.

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.

I. 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 1 equipment according to NFPA 110.

B. 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.

C. Manual Switch Operation: Unloaded. Control circuit automatically disconnects from electrical operator during manual operation.

D. Digital Communication Interface: Matched to capability of remote annunciator or annunciator and control panel.

E. Automatic Transfer-Switch Features:

1. Under-voltage 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% of nominal, and dropout voltage is adjustable from 75 to 98% of pickup value. Factory set for pickup at 90% and dropout at 85%.

2. Adjustable Time Delay: For override of normal-source voltage sensing to delay transfer and engine start signals. Adjustable from 0 to 6 seconds, and factory set for 1 second.

3. Voltage/Frequency Lockout Relay: Prevent premature transfer to generator. Pickup voltage shall be adjustable from 85 to 100% of nominal. Factory set for pickup at 90%. Pickup frequency shall be adjustable from 90 to 100% of nominal. Factory set for pickup at 95%.

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 under-voltage to 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.

8. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."

9. Emergency Power Supervision: Red light with name plate engraved "Emergency Source Available."

10. Unassigned Auxiliary Contacts: Two normally open, single-pole, double throw contacts for each switch position, rated 10A at 240V.

11. 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.

12. Engine Starting Contacts: One isolated and normally closed, and one isolated and normally open; rated 10A at 32V minimum.

13. Engine Shutdown Contacts: Time delay adjustable from 0 to 5 minutes, and factory set for 5 minutes. Contacts shall initiate shutdown at remote engine-generator controls after retransfer of load to normal source.

14. 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.

Part 3 – EXECUTION

3.1 Demonstration

A. A factory-authorized service representative shall train JHFRE shop personnel to adjust, operate, and maintain transfer switches and related equipment as specified below.

B. For installations where the automatic transfer switch is located less than 100' from the generator set, the battery charger will be housed in the ATS.

3.2 Switchgear must be installed level and plumb. Switchgear must tilt less than 1.5° while energized.

3.3 Maintain minimum clearances and workspace at equipment in accordance with manufacturer's written instructions and NFPA 70.

3.4 Terminate all grounding and bonding conductors on a common equipment grounding terminal on the switchgear enclosure. Install supplemental terminal bars, lugs, and bonding jumpers as required to accommodate the number of conductors for termination.

A. Complete switchgear grounding and lightning arrester connections prior to making any other electrical connections.