Change History

Date	Description of Change	Pages / Sections Modified	Change Approver Initials
2/21/20	Update: must include BPS for all installations. Added clarification on 3 and 4 pole switches. Updated CT requirements.	Section B(3) Section F(1) Section F(11)	JR
8/1/17	Update List of acceptable manufacturers; Section on Equipment	2 - E. #1 4>5 - F. #10 through #13	SO
6/15/16	Updated division section from 16415 to 26 24 02, removed references to other section	-	mgl44
10/17/14	Add Eaton/ Cutler-Hammer to the list of acceptable Manufacturers.	7 - 16415, E. #1 (Transfer Switches; Manufacturers)	SO
10/17/14	Add paragraph 10 at the end of section F.	9 - 16415, F. #10 (Transfer Switches; Equipment)	SO

A. Summary

This section contains design criteria for automatic transfer switches and manual bypass or isolation switches.

B. System Design and Performance Requirements

1. Select three-cycle, short circuit closing and withstand ratings of transfer switches, including bypass/isolation switches, in accordance with a short circuit analysis that takes into account all current sources and all impedances between the sources and the switch.
2. Specify the automatic transfer sequence as follows:
   a. If the building has an emergency generator and when the normal source voltage drops below 80 percent on any phase (after a time delay adjustable up to six seconds to allow for momentary dips), the engine starting contacts shall close to start the generator.
   b. If the building has no emergency generator, the transfer switch shall transfer to an alternate source when the alternate source has reached or maintained 90 percent of rated voltage and frequency or better, with open transition and with no time delay for life safety loads and a 3- to 5-second delay for other loads.

c. After restoration of the normal source on all phases to 90 percent of rated voltage, a time delay adjustable up to 30 minutes shall delay re-transfer to allow stabilization of the normal source. If the alternate source should fail during this time delay period, the switch shall immediately return to the normal source.

d. The transfer switch shall be equipped with a programmable logic controller (PLC) based sensing operation, the logic must have a self-diagnosis capability to detect power or logic failure.

e. For switches controlling engine-generator sets, the engines shall be allowed to operate at no load for a fixed, five-minute period after re-transfer to the normal source.

3. Specify an Automatic Transfer Switch (ATS) with an integral Bypass/Isolation Switch (BPS) ~~where the transfer switch serves critical loads that cannot be interrupted at any time for testing and maintenance~~.

4. The nameplate ampacity of switches must be a minimum of 140 percent of the connected load at nominal system voltage.

C. Submittals

Submit the following design and construction documentation.

1. Designer Submittals

Submit switch size calculations.

2. Construction Documents

a. *Product Data*

- Shop drawings and product data
- Parts list

b. *Operations and Maintenance Data*

Submit operation and maintenance instructions.

D. Product Standards

Ensure that all products conform to UL 1008, Automatic Transfer Switches standards.

E. Manufacturers

1. Subject to compliance with the design requirements, provide products by one of the following manufacturers:
   - Automatic Switch Co. (PREFERRED)
   - Russelectric
   - Zenith
2. Both the ATS and BPS must be supplied by the same manufacturer. The manufacturer must verify that the design has been in continuous production for not less than five years, with at least ten similar installations operating continuously and successfully for that period of time.

F. Equipment

1. The ATS must have three poles and solid neutral, with all poles mounted on a common shaft. In cases where the alternate and normal power source are separately derived systems, then the ATS must have four poles with a switched neutral. (refer to building/substation grounding single line diagram to determine if the neutral-to-ground connection for each source has an independent earth ground connection) The ATS must be double-throw, actuated by a single electrical operator, momentarily energized, and connected to the electrical operator with a simple over-center type linkage. The total transfer time must not exceed one-half second. The transfer switch must be capable of transferring successfully in either direction with 70 percent of rated voltage applied to the switch terminals.
2. The normal and emergency contacts must be positively interlocked mechanically and electrically to prevent simultaneous closure. The main contacts must be mechanically locked in both the normal and emergency positions, without the use of hooks, latches, magnets or springs, and must be provided on all transfer switches. Interlocked, molded-case circuit breakers or contactors are not acceptable.
3. The ATS must be equipped with a safe manual operator, attached permanently to the motor operator and designed to prevent injury to operating personnel. The manual operator must provide the same contact-to-contact transfer speed as the electrical operator to prevent flashover from switching the main contacts slowly.
4. The BPS must provide a safe and convenient means for manually bypassing and isolating the ATS, regardless of the condition or position of the ATS. The BPS

must also be able to be used as an emergency back-up system in the event of ATS failure. Operation of the BPS must be assured, regardless of the position of the ATS. In addition, the BPS must be used to facilitate maintenance and repair of the ATS. The ATS must be completely isolated from the BPS by means of insulating barriers and separate access doors to positively prevent a hazard to operating personnel while servicing the ATS.

5. Inherent double-throw (break-before-make) operation of the BPS must provide positive assurance against accidentally short-circuiting the normal and alternate power sources. Arrangements using the interlocking of single-throw devices are not acceptable. The operating speed of the contacts must be independent of the speed at which the handle is moved.
6. The BPS must be fully manually operated and must not be dependent upon electrical operators, relays, or interlocks for operation.
7. Provide indicating lights to show the BPS in the bypass position, in the fully isolated position, and to indicate source availability. Include a maintained-type test switch to simulate a normal power failure. Mount two auxiliary contacts, rated at 15 amperes, 120 volts, on the main shaft, one closed on normal and one closed on emergency. Wire both contacts to a terminal strip for ease of field connections. Provide one set of relay contacts that open upon loss of the normal power supply.
8. All control wires must be 600 volt, SIS switchboard-type. Identify all control wire terminations with tubular, sleeve markers that are typed with indelible ink.
9. BPS must have mechanical separation of normal and emergency to assure against accidental connection of unsynchronized sources. Electrical interlock will not be considered acceptable.
10. Each transfer switch shall be furnished with a lockable key switch which will allow the transfer switch to be either “open” or “closed” transition.
11. Each transfer switch shall be equipped with a Schneider PowerLogic 5560 meter connected to the load side of the ATS switch and tied into the Yale data collection and storage system. See Yale University Design Standard 33 62 00 ‘Hydronic, Steam and Electrical Energy Metering’ and separate Detail for the complete specification on the PowerLogic Meter and the electrical and communications components necessary to have a complete and functional system.

    If there is enough room in the switch, this meter shall be mounted on or in the switch (preferred method). If there is not sufficient room in the switch, the

PowerLogic Meter shall be mounted in a NEMA 12 enclosure, located as close as possible to the ATS switch and wired to the components in the switch. The meter, as installed, shall be visible from the outside of either the ATS switch or the adjacent enclosure.

a. The current transformers for PowerLogic meters, size and quantities are indicated on the drawings. The current transformers with current ratio shall be the class ~~and model as follows:~~as listed below. The burden for metering CTs shall be in accordance with Table 10 of IEEE C57.13, and the burden for relaying CTs shall be in accordance with Table 13 of IEEE C57.13. Current transformer accuracy shall be 0.3% for metering and relaying functions. Accuracy classes of 0.6% and 1.2% will be accepted for instruments with higher burden, but must still be in accordance with Clause 5 of IEEE C57.13.

   100/5 ratio: ~~PowerLogic meter shall be~~ class 10 (B-0.1) current transformer ~~using an ITI model #21, #22, #115, #144, #297, #298 or #680.~~

   200/5 and 400/5 ratio: ~~PowerLogic meter shall be~~ class 20 (B-0.2) current transformer ~~using an ITI model #21, #22, #113, #114, #115, #144, #297, #298, #306, #307, #386 or #680.~~

   500/5 and 600/5 ratio: ~~PowerLogic meter shall be a~~ class 50 (B-0.5) current transformer ~~using an ITI model #115, #297, #298, #306, #307, #386, #388 or #680.~~

   800/5, 1000/5, 1200/5 and 1600/5 ratio: ~~PowerLogic meter shall be a~~ class 100 (B-1) current transformer ~~using an ITI model #115, #306, #386, #388 or #680.~~

   2000/5 and higher ratio: ~~Power Logic meter shall be a~~ class 200 (B-2) current transformer ~~using an ITI model #115, #306, #386, #388 or #680.~~

b. All wiring for CTs shall be #10 AWG stranded SIS type wire.

c. All PowerLogic meter CT wiring shall be wired to shorting blocks before being wired to the ABB test block. All wiring from the test block to the meter shall be tagged per the vendor supplied interconnection drawings. The test block shall be ABB Style FT-1 and CAT #129A514G01 with clear covers.

12. Transfer Switch shall have an engraved name plate mounted below the meter indicating the CT ratio associated with the PowerLogic meter.

13. Contractor shall install a raceway for data cable to connect this meter with the Yale data collection system via a connection point within the building to be specified by Yale.

G. Quality Control Testing

1. Factory testing must be in accordance with UL Standard 1008 for Automatic Transfer Switches and certified by a nationally-recognized testing laboratory.

   a. During the three-cycle closing and withstand tests, there must be no contact welding or damage. Perform the three-cycle tests without the use of current limiting fuses. Furnish oscillograph traces across the main contacts to verify that contact separation has not occurred, and that there is contact continuity across all phases after completion of testing.

   b. When conducting temperature rise tests, the manufacturer must include post-endurance temperature rise tests to verify the ability of the transfer switch to carry full-rated current after completing the overload and endurance tests. 2. The manufacturer must provide certified copies of factory test reports upon request.

H. Installation Guidelines

Relays, timers, control wiring, and accessories must be front-accessible.

I. Quality Control

Demonstrate proper transfer operation by opening the circuit breaker or switch in normal distribution system on the line side of the transfer switch. After an alternate source is operational, demonstrate re-transfer by closing the breaker on the normal side. Demonstrate re-transfer again by opening the breaker on the normal side. After transfer, test immediate re-transfer by closing the breaker on the normal side and opening the breaker on the alternate side during the timing period.

"END OF SECTION"