

SECTION 26 36 23.00 20

AUTOMATIC TRANSFER SWITCHES

04/06

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)

**NETA ATS** (2009) Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

**NFPA 70** (2011; Errata 2 2012) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

**UL 1008** (2011) Transfer Switch Equipment

**UL 508** (1999; Reprint Apr 2010) Industrial Control Equipment

1.2 RELATED REQUIREMENTS

Section 26 00 00.00 20 BASIC ELECTRICAL MATERIALS AND METHODS, and Section 26 08 00 APPARATUS INSPECTION AND TESTING, apply to this section, with the additions and modifications specified herein.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

**SD-02 Shop Drawings**

Automatic Transfer Switch Drawings; G, A/E

**SD-03 Product Data**

Automatic Transfer Switches; G, A/E

**SD-06 Test Reports**

Acceptance Checks and Tests; G, A/E

Functional Acceptance Tests; G, A/E

SD-07 Certificates

Proof of Listing; G, A/E

SD-10 Operation and Maintenance Data

Automatic Transfer Switches, Data Package 5; G, A/E

Submit in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA.

1.4 QUALITY ASSURANCE

1.4.1 Proof of Listing

Submit proof of listing by UL 1008.

1.4.2 Automatic Transfer Switch Drawings

Drawings shall include outline, arrangement, and detail drawings. Detail drawings shall include manufacturer's name and catalog number, electrical ratings, total system transfer statement, reduced normal supply voltage at which transfer to the alternate supply is initiated, transfer delay times, short-circuit current rating, wiring diagram, description of interconnections, testing instructions, acceptable conductor type for terminals, tightening torque for each wire connector, and other required UL 1008 markings.

PART 2 PRODUCTS

2.1 AUTOMATIC TRANSFER SWITCHES

Provide four-pole, automatic transfer switches for use in emergency systems in accordance with UL 1008. Each automatic transfer switch shall be rated for total system transfer and have the current and voltage ratings as indicated. The rating of the switch shall be adequate for withstanding the effects of the indicated RMS symmetrical fault current when protected by the indicated overcurrent device without contact welding. The switch operating mechanism shall be electrically operated from the source to which it is transferring, shall have quick-make, quick-break, load break contacts, and shall be mechanically held in both positions. Switches utilizing circuit breakers are not acceptable. Non-fire pump service transfer switches shall have manual operating means provided for maintenance and servicing accessible only by opening the enclosure. The manual operating means shall affect the opening and closing of the switch contacts at the same rate of speed as that caused by the automatic operation of the switch. Automatic transfer switches provided with by-pass/isolation switches shall be mounted on a drawout mechanism so that the automatic transfer switch can be removed from the enclosure. The switch enclosure shall comply with UL 508, NEMA Type 3R, and shall be equipped with an equipment ground lug.

2.1.1 By-Pass/Isolation Switches

Include by-pass/isolation switches for the indicated automatic transfer switches. Provide by-pass/isolation switches in accordance with UL 1008 that can be used to manually select an available power source to feed load

circuits and to permit total isolation of the automatic transfer switch. The by-pass/isolation switch shall be rated for total system transfer and have the same current rating, voltage rating, number of poles, and withstand and closing rating as the associated automatic transfer switch.

#### 2.1.2 Automatic Transfer Switch Controls

##### 2.1.2.1 Controls for Utility-Generator Automatic Transfer Switch

Provide all necessary controls to start the generator set upon loss of the normal (utility) source, transfer the load to the generator set upon reaching rated voltage and frequency, re-transfer the load when the normal (utility) source returns, and stop the generator set.

The switch shall include the following control features.

- a. Three-phase normal source voltage sensing circuit with adjustable dropout, 75-93 percent of nominal, and pickup, 85-100 percent of nominal.
- b. Engine starting control contacts with adjustable commit-to-start delay circuit, 0.5-6.0 seconds.
- c. Voltage/frequency sensing circuit, set for 80 percent of nominal, for enabling load transfer to emergency source.
- d. Transfer to emergency source time delay for transfer switches as indicated, adjustable 0-5 minutes. [See Section 26 32 13.00 20 for proposed loads and steps.](#) [Coordinate with Process vendor.](#)
- e. Re-transfer to normal source time delay, adjustable 1-30 minutes.
- f. Programmable exerciser to allow automatic starting of the generator set and subsequent load transfer. Exercise periods shall be selectable for 1 to 24 hours per day for 0 to 7 days a week.
- g. Adjustable time delay transition or in-phase monitor feature for indicated transfer switches to allow safe transfer of highly inductive loads between two non-synchronized sources.

#### 2.1.3 Front Panel Devices

Provide devices mounted on cabinet front consisting of:

- a. Mode selector switch with the following positions and associated functions;
  1. TEST - Simulates loss of normal/preferred source system operation.
  2. NORMAL - Transfers system to normal/preferred source bypassing re-transfer time delay.
- b. Lamps for indicating connected source and normal/preferred source is available.
- c. Auxiliary contacts for indicating connected source and normal/preferred source available.
- e. Lamps for indicating that the by-pass/isolation switch is in the

"normal by-pass", "alternate by-pass", or "isolated" position.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

Installation shall conform to the requirements of [NFPA 70](#) and manufacturer's recommendation.

#### 3.2 PREREQUISITES FOR FUNCTIONAL ACCEPTANCE TESTING

Completion of the following requirements is mandatory prior to scheduling functional acceptance tests for the automatic transfer switch.

##### 3.2.1 Performance of Acceptance Checks and tests

Complete as specified in paragraph entitled "Acceptance Checks and Tests". The Acceptance Checks and Tests shall be accomplished by the Testing organization as described in Section [26 08 00 APPARATUS INSPECTION AND TESTING](#).

##### 3.2.2 Manufacturers O&M Information

The manufacturers O&M information required by the paragraph entitled "SD-10 Operation and Maintenance Data", shall have been submitted to and approved by the Contracting Officer.

##### 3.2.3 Test Equipment

All test equipment and instruments shall be on hand prior to scheduling field tests, or subject to Contracting Officer's approval, evidence shall be provided to show that arrangements have been made to have the necessary equipment and instruments on site prior to field testing.

#### 3.3 FIELD QUALITY CONTROL

Give Contracting Officer 15 days notice of dates and times scheduled for tests which require the presence of the Contracting Officer. The Contracting Officer will coordinate with the using activity and schedule a time that will eliminate or minimize interruptions and interference with the activity operations. The contractor shall be responsible for costs associated with conducting tests outside of normal working hours and with incorporating special arrangements and procedures, including temporary power conditions. The contractor shall provide labor, equipment, apparatus, including test load, and consumables required for the specified tests. Calibration of all measuring devices and indicating devices shall be certified. The test load shall be a cataloged product in accordance with Section [26 00 00.00 20 BASIC ELECTRICAL MATERIALS AND METHODS](#). Perform the following field tests in accordance with the manufacturer's recommendations and include the following visual and mechanical inspections and electrical tests, performed in accordance with [NETA ATS](#).

##### 3.3.1 Automatic Transfer Switch [Acceptance Checks and Tests](#)

###### a. Visual and Mechanical Inspection

1. Compare equipment nameplate data with specifications and approved shop drawings.

2. Inspect physical and mechanical condition.
3. Confirm correct application of manufacturer's recommended lubricants.
4. Verify that manual transfer warnings are attached and visible.
5. Verify tightness of all control connections.
6. Verify tightness of accessible bolted connections by calibrated torque-wrench method. Thermographic survey is not required.
7. Perform manual transfer operation.
8. Verify positive mechanical interlocking between normal and alternate sources.

b. Electrical Tests

1. Measure contact-resistance.
2. Perform insulation-resistance on each pole, phase-to-phase and phase-to-ground with switch closed, and across each open pole for one minute. Perform tests in both source positions.
3. Verify settings and operations of control devices.
4. Calibrate and set all relays and timers.

3.3.2 Functional Acceptance Tests

Functional Acceptance Tests shall be coordinated with Section 26 32 13.00 20 SINGLE OPERATION GENERATOR SETS and shall include simulating power failure and demonstrating the following operations for each automatic transfer switch. Contractor shall show by demonstration in service that the automatic transfer switches are in good operating condition, and function not less than five times.

- a. Perform automatic transfer tests:
  1. Simulate loss of normal/preferred power.
  2. Return to normal/preferred power.
  3. Simulate loss of emergency power.
  4. Simulate all forms of single-phase conditions.
- b. Verify correct operation and timing of the following functions:
  1. Normal source voltage-sensing relays.
  2. Engine start sequence.
  3. Time delay upon transfer.

4. Alternate source voltage-sensing relays.
5. Automatic transfer operation.
6. Interlocks and limit switch function.
7. Time delay and retransfer upon normal power restoration.

-- End of Section --