

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 in the text by the basic designation only.

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA ICS 1	(1993) Industrial Control and Systems
NEMA ICS 2	(1993) Industrial Control and Systems Controllers, Contactors and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC
NEMA ICS 4	(1993) Terminal Blocks
NEMA ICS 6	(1993) Industrial Control and Systems Enclosures

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(1999) National Electrical Code
NFPA 70B	(1994) Electrical Equipment Maintenance

INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)

NETA ATS	(1991) Electrical Power Distribution Equipment and Systems
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UNDERWRITERS LABORATORIES INC. (UL)

UL 1008	(1989; Bul. 1993 and 1994, R 1993) Automatic Transfer Switches
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1.2 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

1.2.1 SD-04, Drawings

- a. General use automatic transfer switch

Include certified outline, electrical ratings, general arrangement, and detail drawings.

1.2.2 SD-10, Test Reports

- a. Withstand and closing tests
- b. Dielectric withstand test

- c. Test for non-welding of contacts

1.2.2.1 ATS Tests

Submit for each rating of ATS, the reports of tests required by UL 1008 on dielectric withstand test, non-welding of contacts, and withstand and closing tests. Proof of listing by UL shall be submitted and will be acceptable evidence that the ATS conforms to UL requirements.

1.2.3 SD-12, Field Test Reports

- a. Acceptance checks and tests

1.2.3.1 Acceptance Checks and Tests

- a. Submit report of results specified by paragraph entitled "Field Quality Control"

1.2.4 SD-19, Operation and Maintenance Manuals

- a. General use automatic transfer switch.
- b. Bypass/isolation switch.

Submit operation and maintenance data in accordance with Section 01781, "Operation and Maintenance Data."

1.3 SERVICE CONDITIONS

ATS shall be suitable for performance under the following service conditions:

- a. Altitude: 3,320 feet above mean sea level.
- b. Temperature: 10 degrees F to 105 degrees F.
- d. Seismic Zone: 1

PART 2 PRODUCTS

2.1 GENERAL USE AUTOMATIC TRANSFER SWITCH (ATS)

Provide automatic transfer switch with the number of poles, amperage, voltage, and withstand ratings as indicated. Transfer switch shall conform to UL 1008 as a recognized component for emergency systems, rated for all classes of loads when installed in an unventilated enclosure. Electrical operation shall be accomplished by a nonfused momentarily energized solenoid direct operating or electric motor operated mechanism or stored energy operator. Provide mechanical locking in each direction. Operation shall be double throw switching where normal and emergency contacts operate with no intentional delay in mid position.

Switch shall be UL listed for use in standby systems described in NFPA 70 and shall conform to applicable requirements of UL 1008, NEMA ICS 1 and NEMA ICS 2. ATS shall be the doublethrow type, and be incapable of stops in intermediate positions during normal functioning of the ATS. The ATS shall be electrically operated but mechanically held in both positions, with the operator momentarily receiving power from the source to which the load is to be transferred. ATS constructed with either automatic or

nonautomatic circuit breakers are unacceptable. ATS equipped with protective devices to interrupt fault currents are also unacceptable. ATS shall be rated for continuous duty at the continuous current rating specified. Switches shall be adequately rated for the application indicated, and shall have the following characteristics:

- a. Voltage: 480 volts a.c.
- b. Number of phases: Three
- c. Number of wires: Four
- d. Frequency: 60 HZ
- e. Number of switched poles: Three
- f. Type of load: Total system load shown.
- g. Continuous current rating: Equal to or exceed the rating shown but, in no case, less than 125 percent of the full load rating of the emergency power source.
- h. ATS withstand and closing rating: Rated to withstand and close in on an available fault or short circuit current of 22,000 amperes, RMS symmetrical, at a maximum voltage of 480 Volts.
- i. Overload rating: Six times ATS rated current.
- j. Nonwelding of contacts: Rated for nonwelding of contacts when used with the feeder overcurrent devices indicated and with the available fault current specified herein.
- k. Main contacts: Constructed of silver composition.

2.1.1 Accessories

2.1.1.1 Override Time Delay

Time delay to override monitored source deviation shall be adjustable from 0.5 to 90 seconds and factory set at 2 seconds. Device shall detect and respond to a sustained voltage drop of 30 percent of nominal voltage between any two of the normal supply conductors and initiate transfer action to the emergency source and start the engine-driven generator set after the set time period. Pickup voltage shall be adjustable between 85 and 100 percent of nominal and factory set at 90 percent. Dropout voltage shall be adjustable from 75 to 98 percent of the pickup value, and factory set at 75 percent of nominal voltage.

2.1.1.2 Transfer Time Delay

Time delay before transfer to the emergency power source shall be adjustable from 0 to 120 seconds and factory set at 5 seconds. Device shall monitor the frequency and voltage of the emergency power source and transfer when frequency and voltage is stabilized at or above 90 percent of rated values. Pickup voltage shall be adjustable from 85 to 100 percent of nominal, and factory set at 90 percent. Pickup frequency shall be adjustable from 90 to 100 percent of nominal and factory set at 90 percent.

2.1.1.3 Return Time Delay

Time delay before return transfer to the normal power source shall be adjustable from 0 to 30 minutes and factory set at 30 minutes. Time delay shall be automatically defeated upon loss or sustained undervoltage of the emergency power source, provided that the normal supply has been restored.

2.1.1.4 Engine Shutdown Time Delay

Time delay shall be adjustable from 0 to 5 minutes and shall be factory set at 5 minutes.

2.1.1.5 Cranking Limit Time Delay

Time delay to limit cranking shall be adjustable from 0 to 5 minutes and set at 1 minute in the factory. The Contractor shall provide this time limited feature as an integral part of the engine control system if it is not provided as an accessory to the ATS assembly.

2.1.1.6 Exerciser

A system exerciser shall consist of a programmable time switch to start the engine-driven generator and to transfer the load from the normal to the emergency power source for a preset period of time at preset intervals. The design of the system exerciser shall include the following provisions:

- a. Manual or automatic start of the programmable time switch sequence.
- b. Manual reset of the ongoing exercise period. Reset provisions shall cause the ATS to return to the normal position if power is available to initiate transfer.
- c. Automatic return of the ATS to the normal position if the generator set fails during the exercise period and power is available to initiate transfer.

2.1.1.7 Auxiliary Contacts

Two normally open and two normally closed auxiliary contacts shall operate when the transfer switch is connected to the normal power source, and two normally open and two normally closed contacts shall operate when the transfer switch is connected to the emergency power source.

2.1.1.8 Supplemental Features

The ATS shall also be provided with the following:

- a. Engine start contact.
- b. Emergency power source monitor
- c. Test switch.
- d. Close differential protection.
- e. Time delay bypass switch.
- f. Manual return-to-normal switch.

2.1.1.9 Operator

Provide manual operator, conforming to the applicable provisions of UL 1008, to permit manual operation of the ATS.

2.1.1.10 Indicating Lights

- a. A green indicating light shall supervise the normal power source and shall have a nameplate engraved NORMAL.
- b. A red indicating light shall supervise the emergency power source and shall have a nameplate engraved EMERGENCY.

2.2 ENCLOSURE

Switch and accessories shall be in a wallmounted NEMA ICS 6, Type 3R smooth sheet metal enclosure constructed in accordance with UL 1008. Metal shall be not less than US Standard Gauge No. 14. Doors shall have hinges, locking handle latch, and gaskets at jamb, sill, and head. The enclosure shall be equipped with grounding lugs grounding the enclosure using No. 4 AWG copper conductors. Contractor's field wiring terminating within the enclosure shall comply with NFPA 70. If wiring is not color coded, wires shall be permanently tagged near the terminal at each end with the wire number shown on approved shop drawings. Terminal blocks shall conform to NEMA ICS 4. Terminal facilities shall be arranged for entrance of external conductors from the bottom of the enclosure. Main switch terminals shall be of the pressure type and suitable for the termination of copper conductors shown.

2.2.1 Construction

Enclosure shall be constructed for convenient removal and replacement of contacts, coils, springs and control devices from the front without the removal of main power conductors or removal of major components.

2.2.2 Cleaning and Painting

Ferrous surfaces shall be cleaned and painted. Surfaces to be painted shall be free of all oil, grease, welding slag and spatter, mill scale, deleterious corrosion, dirt, and other foreign substances. Painting shall include at least one coat of rust-inhibiting primer and one coat of finish enamel. Rust-inhibiting primer shall be applied to a clean, dry surface as soon as practicable after cleaning. Painting shall be manufacturer's standard material and process, except the total dry film thickness shall be not less than 2.5 mils. Color of the finish coat shall be the manufacturer's standard color. Finish shall be free from runs, sags, peeling or other defects.

PART 3 EXECUTION

3.1 INSTALLATION

Installation shall conform to the requirements of NFPA 70 and manufacturer's recommendations.

3.2 FIELD QUALITY CONTROL

3.2.1 Performance of Acceptance Checks and Tests

Perform in accordance with the manufacturer's recommendations NFPA 70B, NETA ATS, and referenced ANSI standards. Include the following visual and mechanical inspections and electrical tests, performed in accordance with NETA ATS.

3.2.1.1 Automatic Transfer Switches

a. Visual and Mechanical Inspection

- (1) Inspect for physical damage
- (2) Compare nameplate information and connections to drawings and specifications.
- (3) Check for proper anchorage and required area clearances
- (4) Check tightness of all control and power connections
- (5) Perform manual transfer operation
- (6) Check blade alignment
- (7) Confirm proper lubrication
- (8) Check switch to ensure positive mechanical interlock between normal and alternate sources
- (9) Ensure manual transfer warnings are attached and visible
- (10) Check that all covers, barriers, and doors are secure
- (11) Clean entire assembly using approved methods and materials

b. Electrical Tests

- (1) Perform insulation-resistance tests phase-to-phase and phase-to-ground with switch in both source positions
- (2) Perform a contact-resistance test across all main contacts and switch blades
- (3) Verify settings and operation of control devices in accordance with the specifications
- (4) Calibrate and test all relays and timers including voltage and frequency-sensing relays, in-phase monitor (synchronism check), engine start and cooldown timers, and transfer and retransfer timers
- (5) Perform automatic transfer tests:
 - (a) Simulate loss of normal power
 - (b) Return to normal power

- (c) Simulate loss of emergency power
- (d) Simulate all forms of single-phase conditions
- (6) Monitor and verify correct operation and timing of the following simulations:
 - (a) Normal voltage-sensing relays
 - (b) Time delay upon transfer
 - (c) Alternate voltage-sensing relays
 - (d) Automatic transfer operation
 - (e) Interlocks and limit switch function
 - (f) Time delay and retransfer upon normal power restoration

3.2.2 Follow-Up Verification

Upon completion of acceptance checks and tests, the Contractor shall show by demonstration in service that circuits and devices are in good operating condition and properly performing the intended function. As an exception to requirements stated elsewhere in the contract, the Contracting Officer shall be given 5 working days advance notice of the dates and times of checking and timing.

END OF SECTION