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   UFGS-26 28 21.00 40 (November 2008)

## UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated October 2010

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### SECTION 26 28 21.00 40

#### AUTOMATIC TRANSFER SWITCHES

08/10

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NOTE: This guide specification covers the requirements for automatic transfer switches for use with engine-generator sets for standby power.

Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable items(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).

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## PART 1    GENERAL

### 1.1    REFERENCES

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NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a RID outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

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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.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

RCBEA GUIDE (2004) NASA Reliability Centered Building and Equipment Acceptance Guide

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250 (2008) Enclosures for Electrical Equipment (1000 Volts Maximum)

NEMA ICS 1 (2000; R 2005; R 2008) Standard for Industrial Control and Systems: General Requirements

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2011) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 1008 (1996; R thru 2008) Transfer Switch Equipment

UL 508 (1999; R 1999 - R 2010) Industrial Control Equipment

1.2 SUBMITTALS

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NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Keep submittals to the minimum required for adequate quality control.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for

Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

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

#### SD-02 Shop Drawings

Submit connection diagrams showing the relations and connections of the following items by showing the general physical layout of all controls, the interconnection of one system (or portion of system) with another, and internal tubing, wiring, and other devices.

Contacts

Indicating Lights

Terminal Board

Submit fabrication drawings for the following items consisting of fabrication and assembly details to be performed in the factory.

Contacts

Indicating Lights

Terminal Board

Enclosures

Accessories

Submit installation drawings for automatic transfer equipment in accordance with the paragraph entitled, "Installation," of this section.

#### SD-03 Product Data

Submit [Equipment and Performance Data](#) for automatic transfer equipment in accordance with paragraph entitled, "General Requirements," of this section.

Submit manufacturer's catalog data for the following items:

Contacts

Indicating Lights

Terminal Board

Enclosures

Accessories

#### SD-06 Test Reports

Submit test reports for [Operation Tests](#) on the automatic transfer switch in accordance with the paragraph entitled, "Field Testing," of this section.

#### SD-07 Certificates

Submit [Listing of Product Installations](#) for automatic transfer switches in accordance with paragraph entitled, "Installation," of this section.

#### SD-08 Manufacturer's Instructions

Manufacturer's instructions shall include special provisions required to install equipment components and system packages for [Automatic Transfer Switch](#). Special notices shall detail impedances, hazards and safety precautions.

### 1.3 GENERAL REQUIREMENTS

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NOTE: If Section 26 00 00.00 20 BASIC ELECTRICAL MATERIALS AND METHODS is not included in the project specification, applicable requirements therefrom should be inserted and the following paragraph deleted.  
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Section 26 00 00.00 20 BASIC ELECTRICAL MATERIALS AND METHODS applies to work specified in this section.

Submit [Equipment and Performance Data](#) for automatic transfer equipment including life, test, system functional flows, safety features, and mechanical automated details.

### 1.4 PREDICTIVE TESTING AND INSPECTION TECHNOLOGY REQUIREMENTS

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NOTE: The Predictive Testing and Inspection (PT&I) tests prescribed in section 01 86 26.07 40 RELIABILITY CENTERED ACCEPTANCE FOR ELECTRICAL SYSTEMS are MANDATORY for all [NASA] [\_\_\_\_\_] assets and systems identified as Critical, Configured, or Mission Essential. If the system is non-critical, non-configured, and not mission essential, use sound engineering discretion to assess the value of adding these additional test and acceptance requirements. See Section 01 86 26.07 40 RELIABILITY CENTERED ACCEPTANCE FOR ELECTRICAL SYSTEMS for additional information regarding cost feasibility of PT&I.  
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This section contains systems and/or equipment components regulated by NASA's Reliability Centered Building and Equipment Acceptance Program. This program requires the use of Predictive Testing and Inspection (PT&I) technologies in conformance with RCBEA GUIDE to ensure building equipment and systems installed by the Contractor have been installed properly and contain no identifiable defects that shorten the design life of a system and/or its components. Satisfactory completion of all acceptance requirements is required to obtain Government approval and acceptance of the Contractor's work.

Perform PT&I tests and provide submittals as specified in Section 01 86 26.07 40 RELIABILITY CENTERED ACCEPTANCE FOR ELECTRICAL SYSTEMS.

## 1.5 QUALIFICATION TESTING

Provide certified independent laboratory test data for the furnished unit or an identical unit. Tests shall meet the general use requirements of UL 508, Table 22.1. Complete automatic transfer switch shall be subjected to a test as outlined in NEMA ICS 1, paragraph 109.5. One cycle of operation tests under the UL 508 test requirements shall consist of a transfer of load from the normal source to the emergency source and retransfer to the normal source. After the required number of test cycles, the temperature rise of the contacts shall not exceed 65 degrees C. 149 degrees F. Test the switch operating time and sense relay pickup and dropout times.

## PART 2 PRODUCTS

### 2.1 APPLICATION

Automatic transfer switch shall be capable of transferring the load from the normal power source to emergency power source, and from an emergency source to the normal power source. Locate switch where indicated. Switch shall be solenoid-operated, mechanically held, double-throw, rated for continuous duty, capable of transferring in 100 milliseconds or less, and conforming to the applicable requirements of UL 1008 and NFPA 70, Article 700, except as herein modified. Control and protective devices associated with automatic transfer switches shall be in accordance with Section 26 05 70.00 40 HIGH VOLTAGE OVERCURRENT PROTECTIVE DEVICES and Section 26 05 71.00 40 LOW VOLTAGE OVERCURRENT PROTECTIVE DEVICES.

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**NOTE: Show required automatic transfer switch  
amperage, voltage, and frequency ratings on the  
drawings.**

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Automatic transfer switch shall be the two-pole type for single-phase application, and three-pole type for three-phase application. [Provide a solid neutral conductor connection for neutral transfer from normal source to emergency source.] [Provide an additional switched neutral pole.]

Automatic transfer switch shall be capable of being placed in either the normal or the emergency position.

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**NOTE: Add to this specification or to the drawings  
the short-circuit withstand current rating of the  
switch based on the calculated short-circuit current**

available at the switch location. Sample: the switch shall withstand symmetrical three-phased short circuits of [\_\_\_\_\_] amperes for a period of [\_\_\_\_\_] seconds without damage.

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## 2.2 CONTACTS

Main contacts shall be wiping-action silver alloy that, when rated for operation at 50 amperes or greater, shall be protected against arcing. Auxiliary contacts and control transfer relay contacts shall have a minimum continuous current rating of not less than 10-amperes inductive at 120 volts ac. Provide the following auxiliary contacts:

Generator-control contacts, normally open, that close on undervoltage or loss of normal power as specified, remaining closed until transfer back to normal power

Emergency-position contacts, normally open when the switch is in the normal position, that close when the switch is in the emergency position

Normal position contacts, normally closed when the switch is in the normal position, that open when the switch is in the emergency position

Auxiliary contacts shall be two-pole.

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NOTE: Fill in automatic transfer switch mounting location, such as: on door of enclosure, remote, or mounted externally on switchgear.

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Provide a test automatic transfer switch mounted [\_\_\_\_\_] with contacts rated 10 amperes.

Provide automatic transfer switch with overlapping neutral transfer contacts in addition to the two- or three-pole main bus contacts. Normal and emergency neutral shall be connected together only during the transfer and retransfer operation. They shall remain connected only until the power source contacts close/open to transfer from one source to the other. Overlapping neutral transfer contacts connection time shall not exceed 100 milliseconds.

## 2.3 INDICATING LIGHTS

Furnish Automatic transfer switch with two indicating lamps. One shall light to indicate that the switch is operating on normal power, and the other shall light to indicate that the switch is operating on emergency power. Fuse each indicating circuit.

## 2.4 TERMINAL BOARD

Control devices, indicating lights, auxiliary contacts, and internal control devices or auxiliary switches, shall be internally wired to a common output terminal board. Wire the internal functions to facilitate remote connections or monitoring.

## 2.5 OPERATION

Normal source voltage across phase lines shall be monitored by sensing devices. If the normal source voltage in phase drops to 90 percent or less for a timed period, the automatic transfer switch shall start the emergency source and transfer the load to the emergency source when voltage and frequency reach rated values or, if the emergency source is on, verify voltage and frequency of the alternate source and transfer the load to the alternate source. This time period shall be field adjustable from 1 to 30 seconds. Provide a voltage and frequency sensor relay to monitor rated values on the emergency side to prohibit transfer until the emergency source voltage and frequency reach at least 95 percent of the required rating. Provide phase failure protection, with 65 to 70 percent drop and 92 to 95 percent voltage pickup ratings.

Furnish the automatic transfer switch with a time-delay feature, field adjustable from 2 to 30 minutes, that operates to delay automatic transfer back to normal power until the normal source voltage and frequency reach at least 95 percent of the rated voltage. However, if the emergency power fails, and the normal source is again available at 90 percent of the rated voltage, the time-delay circuitry shall be bypassed, and the load immediately transferred back to the normal source. Capability shall also be provided for manual transfer in either direction. Sensing relays shall operate without contact chatter or false response during voltage variations between dropout and pickup.

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NOTE: Provide schematic wiring diagrams on the  
drawings to show this feature.  
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## 2.6 SELF-TEST CAPABILITY

Automatic transfer switch shall be provided with a control-circuit self-test feature that shall be capable of verifying the proper operation of the switch control circuit without moving the main contactor or causing discontinuity of service to the load. Self-test circuit shall have the following characteristics:

A key-operated switch that disconnects the main actuator and connects in its place, an indicator light. Design the key-operated switch to prevent removal of the key while the switch is in the self-test mode.

A power-failure simulator switch that removes voltage from the voltage-sensing devices so that emergency power activates the test light.

## 2.7 ENCLOSURES

Automatic transfer switch enclosures shall be solid, unventilated, code-gage 1.9 millimeter, 14-gage, minimum sheet metal, NEMA 250, Type 1, with manufacturer's standard finish.

## 2.8 ACCESSORIES

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NOTE: To be added when the automatic transfer  
switch is part of the engine-generator set.  
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Automatic transfer switch shall incorporate a 24-volt solid-state, high-and low-rate charger complete with rheostat and ammeter, to maintain the engine-generator cranking batteries in a fully charged condition.

Automatic transfer switch shall incorporate an engine-generator exerciser timer to permit weekly programming of engine-generator set test runs under load.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

Install automatic transfer switch as indicated, and in accordance with the manufacturer's installation instructions. Wall-mounted enclosures shall be fully aligned and installed at the indicated mounting height using a minimum of six **M10 3/8-inch** bolts. Use of sheet metal screws or small machine screws is not permitted.

Submit **Listing of Product Installations** for automatic transfer switches showing the manufacturer has successfully manufactured automatic transfer switches of the size specified for a minimum period of 10 years. List shall include purchaser, address of installation, service organization, and date of installation.

#### 3.2 FIELD TESTING

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NOTE: If the specified system is identified as critical, configured, or mission essential, use Section **01 86 26.07 40 RELIABILITY CENTERED ACCEPTANCE FOR ELECTRICAL SYSTEMS** to establish predictive and acceptance testing criteria, above and beyond that listed below.  
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Perform PT&I tests and provide submittals as specified in Section **01 86 26.07 40 RELIABILITY CENTERED ACCEPTANCE FOR ELECTRICAL SYSTEMS**.

Automatic transfer switch shall be demonstrated to operate in accordance with the specification requirements in conjunction with the normal and emergency power sources.

-- End of Section --