UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2021
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05/17

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USACE / NAVFAC / AFCEC / NASA	**UFGS-26 28 21.00 40 (May 2017)**

Preparing Activity: NASA	**Superseding**
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SECTION 26 28 21.00 40

AUTOMATIC TRANSFER SWITCHES
05/17

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

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(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

Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM applies to work specified in this section.

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 Reference Identifier (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 are automatically 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	(2018) Enclosures for Electrical Equipment (1000 Volts Maximum)
NEMA ICS 10 Part 2	(2020) Industrial Control and Systems, Part 2: Static AC Transfer Equipment

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2020; ERTA 20-1 2020; ERTA 20-2 2020; TIA 20-1; TIA 20-2; TIA 20-3; TIA 20-4) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 508	(2018) UL Standard for Safety Industrial Control Equipment
UL 1008	(2014) Transfer Switch 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, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item if the submittal is sufficiently important or complex in context of the project.

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 Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters 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.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

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" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification 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

Connection Diagrams; G[, [____]]

Fabrication Drawings; G[, [____]]

Installation Drawings; G[, [____]]

SD-03 Product Data

Equipment and Performance Data; G[, [____]]

Contacts; G[, [____]]

Indicating Lights; G[, [____]]

Terminal Board; G[, [____]]

Enclosures; G[, [____]]

SD-06 Test Reports

Qualification Testing; G[, [____]]

Operation Tests; G[, [____]]

SD-07 Certificates

Listing of Product Installations; G[, [____]]

SD-08 Manufacturer's Instructions

Manufacturer's Instructions

1.3 QUALITY CONTROL

1.3.1 Product Installations

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. Include on the list, purchaser, address of installation, service organization, and date of installation.

1.3.2 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 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 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 the RCBEA GUIDE to ensure building equipment and systems have been installed properly and contain no identifiable defects that shorten the design life of a system or its components. Satisfactory completion of all acceptance requirements is necessary to obtain Government approval and acceptance of the Contractor's work.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

Provide an automatic transfer switch with a time-delay feature that is field-adjustable from 2 to 30 minutes. The switch delays the 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, bypass the time-delay circuitry, and transfer the load immediately back to the normal source. Provide the capability for manual transfer in either direction. Operate sensing

relays without contact chatter or false response during voltage variations between dropout and pickup.

Submit connection diagrams showing the relations and connections of contacts, indicating lights, and terminal board by showing the general physical layout of all controls and the interconnection of one system (or portion of system) with another.

Submit fabrication drawings for contacts, indicating lights, terminal board enclosures, and accessories, consisting of fabrication and assembly details to be performed in the factory.

Submit installation drawings for automatic transfer equipment in accordance with paragraph INSTALLATION.

Submit equipment and performance data for automatic transfer equipment including useful life, test, system functional flows, safety features, and mechanical automated details.

2.1.1 Performance Requirements

2.1.1.1 Application

Provide an automatic transfer switch 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 the switch where indicated. Provide a switch that is 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. Ensure that the control and protective devices associated with automatic transfer switches are 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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Provide an automatic transfer switch of 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 the normal source to the emergency source.][Provide an additional switched neutral pole.]

Ensure that the automatic transfer switch is 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: have the switch withstand symmetrical three-phased short circuits of [_____] amperes for a period of [_____] seconds without damage.

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2.1.1.2 Operation

Monitor the normal source voltage across phase lines by sensing devices. If the normal source voltage in phase drops to 90 percent or less for a timed period, ensure that the automatic transfer switch starts the emergency source and transfers the load to the emergency source when voltage and frequency reach rated values; or, if the emergency source is on, verify the voltage and frequency of the alternate source and transfer the load to the alternate source. Field-adjust this time period from 1 to 30 seconds. Provide a voltage and frequency sensor relay to monitor the 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 a 65- to 70-percent drop and a 92- to 95-percent voltage pickup rating.

2.1.1.3 Self-Test Capability

Provide an automatic transfer switch with a control-circuit self-test feature capable of verifying the proper operation of the switch control circuit without moving the main contactor or causing discontinuity of service to the load. Include the following characteristics in the self-test circuit:

a. [A key-operated test switch that includes an auto, off, no-load engine test and a load test position. Include a white light to indicate that the switch is in the off position.][Ensure that the transfer switch controller includes a programmable engine exerciser with the following selections: Disabled; 7-, 14- and 28-day intervals; and 15 minutes fixed time, load or no load with Failsafe.] Design the key-operated switch to prevent removal of the key while the switch is in the self-test mode.

   OR

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

2.2 COMPONENTS

2.2.1 Contacts

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

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

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

c. An automatic transfer switch with a switched neutral. Ensure that the switched neutral has: normal position contacts that are normally

closed when the switch is in the normal position and opens when the switch is in the emergency position. Ensure that the neutral pole is fully rated and part of the main pole assembly, so that it is switched simultaneously with the main bus contacts.

Use two-pole auxiliary contacts.

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NOTE: Describe the 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 for operation at [_____] [10] amperes.

Provide an automatic transfer switch with overlapping neutral transfer contacts in addition to the two- or three-pole main bus contacts. Ensure that normal and emergency neutral contacts are connected together only during the transfer and retransfer operation. Ensure contacts remain connected only until the power source contacts close/open to transfer from one source to the other. Ensure that the connection time of the overlapping neutral transfer contacts does not exceed 100 milliseconds.

2.2.2 Indicating Lights

Furnish an automatic transfer switch with two indicating lamps: one light to indicate that the switch is operating on normal power, and the other light to indicate that the switch is operating on emergency power. Fuse each indicating circuit.

2.2.3 Terminal Board

Provide a contactor automatic transfer switch terminal board for internally wired control devices, indicating lights, auxiliary contacts, and internal control devices or auxiliary switches to a common output terminal board. Wire the internal functions to facilitate remote connections or monitoring.

[2.2.4 Microprocessor Control Panel

Provide a control panel to direct the operation of the transfer switch. Connect the panel to the transfer switch with an interconnecting wiring harness. Include with the harness a disconnect plug for transfer switch routine maintenance.

Enclose the control panel with a protective cover and mount separately from the transfer switch. Provide plug-in type interfacing relays.

]2.2.5 Enclosures

Provide an automatic transfer switch enclosure with solid, code-gage, 14-gage, minimum sheet metal, NEMA 250, Type 1, with the manufacturer's standard finish.

2.3 TESTS, INSPECTIONS, AND VERIFICATIONS

2.3.1 Qualification Testing

Provide test data for the furnished unit or an identical unit. Ensure tests meet the general use requirements of UL 508. Subject the complete automatic transfer switch to a test as outlined in NEMA ICS 10 Part 2. One cycle of operation tests under the UL 508 test requirements consists of a transfer of load from the normal source to the emergency source and retransfer to the normal source. Test the switch operating time and the sense relay pickup and dropout times.

PART 3 EXECUTION

3.1 INSTALLATION

Install automatic transfer switches as indicated, and in accordance with the manufacturer's instructions. Fully align and install wall-mounted enclosures at the indicated mounting height[using a minimum of six M10 3/8-inch bolts]. Do not use sheet metal screws or small machine screws.

3.2 FIELD QUALITY CONTROL

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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.

Demonstrate the automatic transfer switch operates in accordance with the specification requirements in conjunction with the normal and emergency power sources.

-- End of Section --