UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2021
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USACE / NAVFAC / AFCEC / NASA **UFGS-26 18 23.00 40 (August 2016)**

Preparing Activity: NASA **Superseding UFGS-26 18 23.00 40 (August 2013)**

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SECTION 26 18 23.00 40

MEDIUM-VOLTAGE SURGE ARRESTERS
08/16

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NOTE: This guide specification covers the requirements for surge and lightning arresters of the distribution, intermediate, and station types. Show type, voltage, mounting, and connection details on drawings.

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

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.

ASTM INTERNATIONAL (ASTM)

ASTM A123/A123M	(2017) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153/A153M	(2016a) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 386	(2016) Separable Insulated Connector Systems for Power Distribution Systems Rated 2.5 kV through 35 kV
IEEE C2	(2017; Errata 1-2 2017; INT 1 2017) National Electrical Safety Code
IEEE C62.11	(2020) Standard for Metal-Oxide Surge Arresters for Alternating Current Power Circuits (>1kV)

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

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

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

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.

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-03 Product Data

Surge Arrester; G[, [____]]

SD-08 Manufacturer's Instructions

Installation Instructions

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals

1.3 QUALITY CONTROL

1.3.1 Regulatory Requirements

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer. Ensure equipment, materials, installation, and workmanship are in accordance with the mandatory and advisory provisions of NFPA 70, IEEE C2 unless more stringent requirements are specified or indicated.

1.3.2 Standard Products

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Provide products which have been in satisfactory commercial or industrial use for 2 years prior to bid opening. Ensure the 2-year period includes applications of equipment and materials under similar circumstances and of similar size. Ensure the product has been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items must be products of a single manufacturer.

Products manufactured more than 3 years prior to date of delivery to site are not to be used, unless specified otherwise.

1.3.3 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 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 have been installed properly and contain no identifiable defects that shorten the design life of a system and its components. Satisfactory completion of all acceptance requirements is required to obtain Government approval and acceptance of the work.

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

PART 2 PRODUCTS

Submit surge arrester equipment and performance data including life, test, system functional flows, safety features, and fabrication drawings that show assembly and fabrication details performed in the factory.

Submit manufacturer's installation instructions for surge arresters including special provisions required to install equipment components and system packages. Provide special notices that detail impedances, hazards and safety precautions.

2.1 EQUIPMENT

Provide arresters that comply with IEEE C62.11 for design, fabrication,

testing, and performance.

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NOTE: Provide a voltage rating of arresters in accordance with manufacturer's recommendations to meet the maximum continuous line-to-ground operating voltage (MCOV). Consider system neutral, whether grounded, ungrounded, or effectively grounded for all possible conditions of operations, including Phase-to-ground faults, when selecting arrestors.
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Provide [gapped][gapless] metal oxide varistor (MOV) type, single-phase, single-pole surge arresters that comply with IEEE C62.11 for design, fabrication, testing, and performance. Ensure surge arresters are rated minimum [15][18][21][ ] kilovolts (kV) duty cycle and [12.7][15.3][17][ ] kV Maximum Continuous Operating Voltage (MCOV) with creepage distance in accordance with manufacturer's specifications for the duty cycle and specific type of arrester. Ensure arrester is designed as non-fragmenting.

Provide porcelain surge arrestors consisting of [tube][cage] style fiberglass reinforced plastic epoxy resin structural hollow core surrounding the MOV elements with [silicon rubber polymer][porcelain] housing. Ensure end fittings are attached to the structural hollow core using a pressure controlled crimping process. Seal the interface between the structural hollow core and end fittings to prevent ingress of moisture.
[

Ensure silicon rubber polymer housing is chemically bonded to the structural hollow core with bond strength greater than the tearing strength of the housing. Provide silicon polymer housing manufactured as a single, continuous part using a high temperature vulcanizing and high pressure injection molding process. Ensure the silicon polymer material is formulated such that it is hydrophobic, non-tracking, erosion resistant, and non-weathering.]

2.1.1 Distribution Class

Provide heavy duty distribution class arresters. Provide corrosion resistant mounting hardware and insulated brackets for riser-pole type arrestors. Provide arrestors installed in a pre-molded rubber elbow for underground distribution systems in accordance with IEEE 386[and 26 05 13.00 98 MEDIUM-VOLTAGE CABLES].

2.1.2 Intermediate Class

Provide arresters for cubicle, pedestal, platform, or bracket mounting as indicated.

2.1.3 Station Class

Provide single-phase, single-pole, self-supporting type arresters for pedestal, platform, or bracket mounting as indicated.

2.1.4 Mounting Brackets

Provide arresters equipped with suitable mounting brackets for the applicable method of mounting. For arresters utilizing a hanger frame type mounting bracket, provide a frame that is a non-corrosive track

resistant glass filled polyester or other suitable non-corrosive and non-conductive material that provides high mechanical strength.[Provide arrester mounting hardware designed for installation in a severe salt-spray atmosphere and is a zinc-coated or corrosion-resistant metal in accordance with [ASTM A123/A123M] [ASTM A153/A153M].]

PART 3 EXECUTION

3.1 INSTALLATION

Install and connect arresters in accordance with the manufacturer's installation instructions.

Make ground connection to a driven ground rod, counterpoise, or station grounding system and meet the intent of the National Electrical Code, NFPA 70.

Connect lightning arresters as close as practicable to the apparatus being protected. When connecting arresters to overhead conductors, use a hot line clamp. Provide a hot line clamp that is compatible with the conductor material being used, i.e. aluminum or copper.

Ensure all installations comply with the requirements and recommendations of NFPA 70 and IEEE C2.

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.
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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.

3.3 CLOSEOUT ACTIVITIES

Submit operation and maintenance manuals for the specified surge arresters.

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