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USACE / NAVFAC / AFCEC / NASA UFGS-26 18 23.00 40 (August 2016)  
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Preparing Activity: NASA Superseding  
UFGS-26 18 23.00 40 (August 2013)

## UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated October 2017

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08/16

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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

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NOTE: If Section 26 00 00.00 20 BASIC ELECTRICAL MATERIALS AND METHODS is not included in the project specification, insert applicable requirements therefore and delete the following paragraph.

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Section 26 00 00.00 20 BASIC ELECTRICAL MATERIALS AND METHODS 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.

ASTM INTERNATIONAL (ASTM)

ASTM A123/A123M (2015) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

ASTM A153/A153M (2016) 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 C62.11 (2012) 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 (2017; ERTA 1-2 2017; TIA 17-1; TIA 17-2; TIA 17-3) 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 to reflect only the submittals required for the project.

The Guide Specification technical editors have designated 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 submittals requiring Government approval on Army projects, use a code of up to three characters within the submittal tags 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.

Use the "S" Classification only in SD-11 Closeout Submittals. An "S" following a submittal item indicates that the submittal is required for the Sustainability eNotebook to fulfill federally mandated sustainable requirements in accordance with Section 01 33 29 SUSTAINABILITY REPORTING.

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 reviews the submittal for the Government.] Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Fabrication Drawings; G[, [\_\_\_\_]]

Installation Drawings; G[, [\_\_\_\_]]

SD-03 Product Data

Equipment and Performance Data; G[, [\_\_\_\_]]

Mounting Brackets; G[, [\_\_\_\_]]

SD-08 Manufacturer's Instructions

Installation Instructions

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals

1.3 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 mechanical automated details.

Submit fabrication drawings that show assembly and fabrication details performed in the factory.

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 arresters that utilize metal oxide varistor and gapped arrester technologies.

Provide arresters that are contained within a polymer housing. Ensure arrester is designed as non-fragmenting. 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].]

Provide an arrester housing molded of EPDM insulating rubber in an insulated, fully shielded, submersible, dead-front device that conforms to IEEE 386.

#### 2.1.1 Surge Arresters

##### 2.1.1.1 Distribution

Provide combination spark gap and metal oxide varistor type distribution arresters. Provide corrosion resistant mounting hardware.

###### a. Distribution - Riser-Pole Class

Provide combination spark gap and metal oxide varistor type riser-pole class.

###### b. Distribution - Underground

Provide arresters that are combination spark gap and metal oxide varistor type technology in a premolded rubber elbow.

##### 2.1.1.2 Intermediate

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

##### 2.1.1.3 Station

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

#### 2.1.2 Surge Protection for Rotating AC Machines

Provide arresters for rotating alternating current equipment that are the type and rating as recommended by the equipment manufacturer.

#### 2.1.3 Mounting Brackets

Provide arresters equipped with suitable mounting brackets for the applicable method of mounting.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

Submit installation drawings for surge arrestors.

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.

### 3.1.1 Installation Instructions, Surge Arresters

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.

### 3.1.2 Arresters

#### 3.1.2.1 Distribution Type

Install distribution class arresters on all overhead lines, pad mounted transformers and on distribution load break switches, sectionalizers and fault interrupters. Install riser-pole class arresters on all riser poles.

#### 3.1.2.2 Intermediate Type

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NOTE: Where additional protection is necessary, install intermediate class arresters. Make the utilization of intermediate class arresters take into consideration the increased size, weight and mounting constraints. Typical areas of consideration are unit substations, primary switches and switching stations.

Install intermediate type arresters on grounded support brackets/structures suitable to adequately support the weight of the arrestor.

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Install intermediate type arresters on grounded support brackets and structures suitable to adequately support the weight of the arrestor.

#### 3.1.2.3 Station Type

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NOTE: Where maximum protection is required utilize the station class arrester. Use these arresters where switching surge durability is required. A typical area of utilization is utility substations where the medium voltage distribution system interfaces to the high voltage commercial power provider. Make utilization of station class arresters take into consideration the increased size, weight and mounting constraints.

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Install station type arresters on grounded structures suitable to

adequately support the weight of the arrestor.

### 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.

-- End of Section --