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Preparing Activity: NASA Superseding
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UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated April 2011

SECTION TABLE OF CONTENTS

DIVISION 26 - ELECTRICAL

SECTION 26 18 23.00 40

MEDIUM-VOLTAGE SURGE ARRESTERS

08/10

PART 1 GENERAL

- 1.1 REFERENCES
- 1.2 GENERAL REQUIREMENTS
- 1.3 SUBMITTALS
- 1.4 PREDICTIVE TESTING AND INSPECTION TECHNOLOGY REQUIREMENTS

PART 2 PRODUCTS

- 2.1 EQUIPMENT
- 2.2 FABRICATION DRAWINGS
- 2.3 SURGE ARRESTERS
 - 2.3.1 O & M Manuals, Surge Arresters
 - 2.3.2 Distribution
 - 2.3.2.1 Distribution - Riser-Pole Class
 - 2.3.2.2 Distribution - Underground
 - 2.3.3 Intermediate
 - 2.3.4 Station
- 2.4 SURGE PROTECTION FOR ROTATING AC MACHINES
- 2.5 MOUNTING BRACKETS

PART 3 EXECUTION

- 3.1 INSTALLATION
 - 3.1.1 Installation Instructions, Surge Arresters
 - 3.1.2 Installation Drawings
- 3.2 ARRESTERS
 - 3.2.1 Distribution Type
 - 3.2.1.1 Distribution - Riser-Pole Class
 - 3.2.2 Intermediate Type
 - 3.2.3 Station Type

-- End of Section Table of Contents --

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MEDIUM-VOLTAGE SURGE ARRESTERS 08/10

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 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).

PART 1 GENERAL

1.1 REFERENCES

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 are automatically deleted from this section of the project specification when you choose to reconcile references in the publish print process.

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 (2009) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

ASTM A153/A153M (2009) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 386 (2006) Standard for Separable Insulated Connector Systems for Power Distribution Systems Above 600V

IEEE C62.11 (2005; Amd 1 2008) 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 ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA LA 1 (2009) Standard for Surge Arresters

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2011) National Electrical Code

1.2 GENERAL REQUIREMENTS

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.

Section 26 00 00.00 20 BASIC ELECTRICAL MATERIALS AND METHODS applies to work specified in this section.

Submit [Equipment and Performance Data](#) for surge arresters including life, test, system functional flows, safety features, and mechanical automated

details.

1.3 SUBMITTALS

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, 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.

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

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.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Provide the following shop drawings according to requirements set forth in this section:

Fabrication Drawings

Installation Drawings

SD-03 Product Data

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

Submit Manufacturer's product data for the following items:

Surge Arresters

Mounting Brackets

SD-08 Manufacturer's Instructions

Installation Instructions

Surge Arresters

SD-10 Operation and Maintenance Data

O & M Manuals

Surge Arresters

1.4 PREDICTIVE TESTING AND INSPECTION TECHNOLOGY REQUIREMENTS

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.

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.

PART 2 PRODUCTS

2.1 EQUIPMENT

Provide design, fabrication, testing, and performance of arresters that complies with IEEE C62.11, NEMA LA 1.

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.

Provide arresters that utilize metal oxide varistor and gapped arrester technologies.

Provide arresters that are contained within a polymer housing. Provide arrester that is designed to be non-fragmenting to provide extra safety to personnel and equipment. For arresters utilizing a hanger frame type mounting bracket, provide a frame that is non-corrosive track resistant glass filled polyester or other suitable non-corrosive/non-conductive material providing high mechanical strength. Provide arrester mounting hardware that is designed for installation in severe salt-spray atmosphere and that is of a corrosion-resistant metal or zinc-coated in accordance with [ASTM A123/A123M] [ASTM A153/A153M].

The arrester housing is molded of EPDM insulating rubber which provides deadfront safety and overvoltage system protection in an insulated, fully shielded, submersible, deadfront device that conforms to IEEE 386.

2.2 FABRICATION DRAWINGS

Submit fabrication drawings in accordance with paragraph entitled, "Equipment," of this section. Provide drawings that show assembly and fabrication details performed in the factory.

2.3 SURGE ARRESTERS

2.3.1 O & M Manuals, Surge Arresters

Provide O & M Manuals for surge arresters specified within these plans and specifications.

2.3.2 Distribution

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

2.3.2.1 Distribution - Riser-Pole Class

Distribution - Provide combination spark gap and metal oxide varistor type riser-pole class. Provide corrosion resistant mounting hardware.

2.3.2.2 Distribution - Underground

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

2.3.3 Intermediate

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

2.3.4 Station

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

2.4 SURGE PROTECTION FOR ROTATING AC MACHINES

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

2.5 MOUNTING BRACKETS

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

PART 3 EXECUTION

3.1 INSTALLATION

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.

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

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 designed to be compatible to the type of conductor material being used, i.e. aluminum or copper.

3.1.1 Installation Instructions, Surge Arresters

Submit Manufacturer's 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 Installation Drawings

Submit installation drawings in accordance with paragraph entitled, "Installation," of this section.

3.2 ARRESTERS

3.2.1 Distribution Type

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

3.2.1.1 Distribution - Riser-Pole Class

Distribution - Install riser-pole class arrestors on all riser poles.

3.2.2 Intermediate Type

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 arrestors on grounded support brackets/structures suitable to adequately support the weight of the arrestor.

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

3.2.3 Station Type

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.

Install station type arrestors on grounded structures suitable to adequately support the weight of the arrestor.

-- End of Section --