**SECTION 26 43 13**

**SURGE PROTECTIVE DEVICES FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS**

**BASED ON DFD MASTER ELECTRICAL SPEC DATED 03/01/21**

This section has been written to cover most (but not all) situations that you will encounter. Depending on the requirements of your specific project, you may have to add material, delete items, or modify what is currently written. The Division of Facilities Development expects changes and comments from you.

***Surge Protective Devices (SPDs) shall be designed into all new or remodeling projects that involve secondary electrical service equipment.***

***In general, a single Surge Protective Device (SPD) shall be installed on the load side of a building’s main service disconnect, typically at the service entrance switchboard or main distribution panel. Second-tier SPDs at branch panelboard locations are typically not specified for State projects. Consider the use of second-tier devices only when necessary, and after consulting with DFD. All SPDs required in a project shall be indicated on the drawings, preferably in the one-line diagram.***

**PART 1 - GENERAL**

# SCOPE

The work under this section includes Surge Protective Devices (SPDs) as indicated on the project drawings and electrical diagrams. Included are the following topics:

PART 1 - GENERAL

 Scope

 Related Work

 Reference Standards

 Quality Assurance

 Warranty

 Submittals

 Operation and Maintenance Data

PART 2 - PRODUCTS

 Surge Protective Devices

PART 3 - EXECUTION

 Installation

 Construction Verification Items

 Agency Training

RELATED WORK

Applicable provisions of Division 1 govern work under this Section.

Section 26 08 00 - Commissioning of Electrical.

Section 01 91 01 or 01 91 02 – Commissioning Process

**REFERENCE STANDARDS**

ANSI/UL 1449, Fourth Edition – Standard For Surge Protective Devices.

ANSI/IEEE C62.41.1 Guide on the Surge Environment in Low-Voltage AC Power Circuits.

ANSI/IEEE C62.41.2 Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.

ANSI/IEEE C62.45 Recommended Practice on Surge Testing for Equipment Connected to Low Voltage AC Power Circuits.

IEEE C62.62 Standard Test Specification for Surge Protective Devices For Low-Voltage AC Power Circuits.

NFPA 70, NEC Article 285

**QUALITY ASSURANCE**

The manufacturer shall have been in the Surge Protective Device industry for a minimum of 5 years.

**WARRANTY**

The manufacturer shall provide a minimum 5 year warranty from the date of shipment of the SPD.

**SUBMITTALS**

Include all SPD data necessary to show device is in compliance with all product specifications. Include product data sheets showing the device performance, dimensions, weight, connections, and mounting requirements, along with installation instructions.

# OPERATION AND MAINTENANCE DATA

All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

**PART 2 - PRODUCTS**

**SURGE PROTECTIVE DEVICES**

The SPD shall be Listed in accordance with UL 1449, Fourth Edition. The product and ratings shall be included in the database of the UL.com web site.

The surge protective device (SPD) shall be designated a location Type 1 or Type 2 device intended for installation on the load side of the service equipment overcurrent device, including SPDs located at the branch panel.

The SPD shall be connected in parallel with the facility’s electrical system.

The SPD shall be made up of metal oxide varistors (MOV's), or a combination of MOV’s with selenium cells or silicon avalanche diodes, ensuring that all of the performance requirements are met. Gas tubes shall not be used.

The entire SPD shall be enclosed in a metal or ABS enclosure, NEMA rated for the location. SPDs at main service equipment shall be mounted outside the switchboard or panelboard (not integral to, or installed within the switchboard or panelboard). SPDs for branch panelboard (2nd tier) locations may be mounted outside of, or integral to, the branch panelboard. SPDs installed internal to the distribution equipment shall be of the same manufacturer as the equipment.

The SPD shall have a maximum continuous operating voltage (MCOV) rating not less than 115% of nominal voltage of the system it is protecting.

Protection Modes:

The SPD shall have line to neutral (L-N), line to ground (L-G), line to line (L-L) and neutral to ground (N-G) protection modes for three-phase grounded wye configured systems. For a three-phase delta configured system, the device shall have line to line (L-L) and line to ground (L-G) protection modes.

Voltage Protection Rating (VPR):

The UL 1449 Voltage Protection Rating (VPR) for the device shall not exceed the following:

208Y/120 volt applications: 800V L-N, L-G, N-G; 1200V L-L

480Y/277 volt applications: 1200V L-N, L-G, N-G; 2000V L-L

480 volt delta applications: 2000V L-G, 2000V L-L

Nominal Discharge Current (In):

The UL 1449 Nominal Discharge Current Rating (In) shall not be less than the following:

20kA for service entrance, switchboard, and main distribution panel locations

10kA for branch panelboard (2nd tier) locations

Short Circuit Current Rating (SCCR):

The SPD shall have a UL 1449 Short Circuit Current Rating (SCCR) of not less than 200kA.

Surge Current Rating:

The single-pulse (8 X 20 microsecond waveform as specified in ANSI/IEEE Standard C62.41) surge current capacity shall not be less than the following:

100kA per mode (200kA per phase) for service entrance, switchboard, and main distribution panel locations

50kA per mode (100kA per phase) for branch panelboard (2nd tier) locations

Each SPD shall include externally-mounted LED visual status indicators that indicate the on-line status of the unit, for each phase.

At service entrance, switchboard, and main distribution panel locations each SPD shall include the following features:

* audible diagnostic monitoring by way of an audible alarm function
* one set of NO/NC dry contracts for alarm conditions

**PART 3 - EXECUTION**

**INSTALLATION**

Install SPD units in accordance with manufacturer's written instructions, applicable requirements of NEC and NEMA standards, and recognized industry practices.

The SPD units shall be installed at the locations shown on the drawings, or as indicated in the one-line diagram. They shall be parallel-connected to, and located adjacent to the switchboard or panelboard being protected. Locate as close as practical to the bus, keeping lead length as short as possible (less than 3 feet preferred to ensure optimum performance).

SPDs shall be connected through a multi-pole circuit breaker or fused disconnect switch, not into main lugs. Circuit breaker or fused disconnect switch shall be 60A for main service device, 30A for branch panelboard device or as recommended by the manufacturer.

Use schedule 40 PVC conduit or metallic conduit between the SPD and the switchboard or panelboard as recommended by the manufacturer. Avoid sharp bends, excess length, and splices in the wires. Where possible, use a close-nippled connection with wires going directly to a circuit breaker within the switchboard or panelboard.

Setup and test per the manufacturer's recommendations.

**CONSTRUCTION VERIFICATION**

Contractor is responsible for utilizing the construction verification checklists supplied under specification Section 26 08 00 in accordance with the procedures defined for construction verification in Section 01 91 01 or 01 91 02.

# AGENCY TRAINING

All training provided for agency shall comply with the format, general content requirements and submission guidelines specified under Section 01 91 01 or 01 91 02.

END OF SECTION