

# SURGE PROTECTIVE DEVICE FOR SERVICE ENTRANCE AND BRANCH PANELS

## Part 1—General

### 1.1 Description/Scope

- A. The Surge Protective Device (SPD) covered under this section includes all service entrance type surge protective devices suitable for use as Type 1 or Type 2 devices per UL1449 4<sup>th</sup> Edition, applied to the line or load side of the utility feed inside the facility.
- B. A SPD located at Service Entrance and Distribution and Branch Panels, Switchgear, Motor Control Centers, and Switchboard assemblies (EDIT AS REQUIRED).
- C. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to finish and install surge protection devices.

### 1.2 Quality Assurance

- A. Reference Standard: Comply with the latest edition of the applicable provisions and recommendations of the following, except as otherwise stated in this document:
  - 1. UL 1449 4th Edition 2014 Revision (effective 3/26/2015).
  - 2. UL 1283.
  - 3. ANSI/IEEE C62.41, Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits.
  - 4. ANSI/IEEE C62.45, Guide for Surge Testing for equipment connected to Low-Voltage AC Power Circuits.
  - 5. UL96A
  - 6. IEEE 1100 Emerald Book.
  - 7. National Fire Protection Association (NFPA 70: National Electrical Code).

### 1.3 Submittals/Quality Assurance – Submit the following:

- A. Package must include shop drawings complete with all technical information, unit dimensions, detailed installation instructions, maintenance manual, recommended replacement parts list and wiring configuration.
- B. Copies of manufacturer's catalog data, technical information and specifications on equipment proposed for use.
- C. Copies of documentation stating that the Surge Protective Device is listed by UL to UL1449 4th Edition, category code VZCA.
- D. Copies of actual let through voltage data in the form of oscillograph results for both ANSI/IEEE C62.41 Category C3 (combination wave) and B3 (Ring wave) tested in accordance with ANSI/IEEE C6245.
- E. Copies of Noise Rejection testing as outlined in NEMA LS1-1992 (R2000) Section 3.11. Noise rejection is to be measured between 50kHz and 100MHz verifying the devices noise attenuation. Must show multiple attenuation levels over a range of frequencies.
- F. Copies of test reports from a recognized independent testing laboratory, capable of producing 200kA surge current waveforms, verifying the suppressor components can survive published surge current rating on a per mode basis using the ANSI/IEEE C62.41 impulse waveform C3 (8 x 20 microsecond, 20kV/10kA). Test data on an individual module is not acceptable.
- G. Copy of warranty statement clearly establishing the terms and conditions to the building/facility owner/operator.

## Part 2—Products

### 2.1 Approved Manufacturer:

- A. Current Technology – Panel Extension or PX3 Series **[50kA] [100kA] [150kA] [200kA]** per mode surge rating.
- B. Approved equivalent. Submission package must be received by engineer 2 weeks prior to bid date shall fully comply with all performance characteristics included in this specification.

### 2.2 Manufactured Units/Electrical Requirements

- A. Refer to drawing for operating voltage, configuration and surge current capacity per mode for each location, or you may list locations and information here.
- B. Declared Maximum Continuous Operating Voltage (MCOV) shall be greater than 115 percent of the nominal system operating voltage and in compliance with test and evaluation procedures outlined in the nominal discharge surge current test of UL1449, section 37.7.3. MCOV values claimed based on the component's value or on the 30-minute 115% operational voltage test, section 38 in UL1449 will not be accepted.
- C. Unit shall have no more than 10% deterioration or degradation of the UL1449 4th Edition Voltage Protection Rating (VPR) when exposed to a minimum of 5,000 repeated category C3 (20kV/10kA) surges. The SPD manufacturer must provide a test report validating the repetitive surge test was performed.
- D. Protection Modes UL1449 4th Edition VPR(6kV, 3kA) for grounded WYE/delta and High Leg Delta circuits with voltages of (480Y/277), (208Y/120), (600Y/347). 3-Phase, 4 wire circuits, (120/240) split phase shall be as follows and comply with test procedures outlined in UL1449 section 37.6, with the exception of 28" of lead length outside of the enclosure, instead of the standard 6". Test values submitted by other manufacturers must reflect 28" of lead length outside of the enclosure, indicative of real world installed performance values.

System Voltage	Mode	MCOV	B3 Ringwave 6kV, 500A	C3 Comb. Wave 20kV, 10kA	UL 1449 Fourth Edition VPR Rating
120/240	L-N	150	760	2020	900
120/208	L-G	150	800	1890	900
	N-G	150	930	2330	1200
	L-L	300	790	250	900
277/480	L-N	320	740	2460	1200
	L-G	320	790	2460	1500
	N-G	320	900	2640	1200
	L-L	552	870	3390	2000

- E. Electrical Noise Filter- each unit shall include a high performance EMI/RFI noise rejection filter with a maximum attenuation of 54dB per MIL-STD-220B.
  - 1. SPD shall include a EMI/RFI noise rejection filter for all L-N modes as well as a removable filter in the N-G mode.
- F. The UL1449 Voltage Protective Rating (VPR) shall be permanently affixed to the SPD unit.
- G. The UL1449 Nominal Discharge Surge Current Rating shall be 20kA
- H. The SCCR rating of the SPD shall be 200kAIC without the need for upstream over current protection.
- I. The SPD shall be listed as Type1 SPD, suitable for use in Type1 or Type2 applications.
- J. The SPD shall have the following monitoring capabilities.
  - 1. Time/Date stamp, duration and magnitude for the following power quality events (sags, swells, surges, dropouts, outages, THD, frequency, Volts RMS per phase)
  - 2. SPD monitoring shall track surge protection and display it as a percentage
  - 3. SPD shall provide a surge counter with three categories to be defined as Low Level surge (100A-500A), Medium Level surge (500A-3,000A), and High Level surge (>3,000A)
  - 4. Remote communications via ModBus or Ethernet

**Part 3—Execution/Installation**

- 3.1 The SPD shall be capable of being installed on either the top or bottom of a panel board without being internally mounted. The SPD shall have a separate hinged lid for gaining access to any serviceable components. The SPD shall have the option for flush or surface mount cover plates.
- 3.2 The SPD manufacturer’s technician shall perform a system checkout and start-up in the field to assure proper installation, operation and to initiate the warranty of the system. The technician will be required to do the following:
  - A. Verify voltage clamping levels utilizing a diagnostic test kit, comparing factory readings to installed readings.
  - B. Verify N-G connection.
  - C. Record information to a product signature card for each product installed.
- 3.2 Unit may be installed on either the line or load side of the main service disconnect. If installed on the line side unit must be installed behind a disconnect. If installed on the load side the unit shall be installed on the largest breaker size available. If installed lead length exceeds 5’ installer shall use a low impedance (HPI) cable to reduce the lead lengths effect on the installed performance of the SPD.

**Part 4— Product Warranty**

- 4.1 Warranty on defective material and workmanship shall be for 15 years.
- 4.2 Copy of warranty to be sent with submittal.