

Specification

SURGE PROTECTIVE DEVICES

CSI Format: Post-2004
CSI Format: Pre-2004

Specification Section 26 43 13
Specification Section 16289

Part 1 - GENERAL

1.01 SCOPE:

Section describes the materials and installation requirements for Surge Protective Devices (SPDs), formerly TVSS, for the protection of low-voltage (<1000 V) power distribution and control equipment.

1.02 REFERENCE STANDARDS - Most Recent Editions of:

- A. Underwriters Laboratories (UL): ANSI/UL 1449
- B. Canadian Standards Association (CSA): C22.2 No. 269.1-14
- C. ANSI/IEEE C62.41.1-2002, C62.41.2-2002, C62.45-2002
- D. National Electrical Code (NEC® 2020): Articles 230.67, 285, 620, 645, 670, 695 and 700
- E. Underwriters Laboratories (UL): UL 96A

1.03 LISTING REQUIREMENTS:

The SPD industry revised UL 1449 to revision Fourth Edition, 2020 NEC Article 230.67 and others, and various other surge standards. UL 1449 Fourth Edition, effective August 20, 2014, includes extensive independent performance testing. This guide specification references UL 1449 Fourth Edition certification to ensure comparable test evaluations and accessibility of UL's website to verify specification compliance.

- A. All SPD's shall bear the UL Mark and shall be Listed to the most recent standard editions of UL 1449. "Manufactured in accordance with" is not equivalent to UL listing and does not meet the intent of this specification. UL always marks listed Surge Protection products with their UL hologram label saying SPD.
- B. SPD products and performance parameters shall be posted at www.UL.com under Category Code: VZCA. Products or parameters without posting at UL.com shall not be approved. (To access UL Category Code VZCA click on Certifications in the left menu bar of UL's home page. Type VZCA into the Category Code search box and click Search)

1.04 SUBMITTAL REQUIREMENTS:

- A. Submittals shall include UL 1449 listing documentation verifying:
 - 1. Model number
 - 2. Type 1 Device Listing

3. Nominal Voltage and System Configuration
4. Surge Capacity per phase
5. Short Circuit Current Rating (SCCR)
6. Nominal Discharge Current Rating (I_n)
7. Maximum Continuous Operating Voltage (MCOV)
8. Voltage Protection Ratings (VPRs)

VPR, MCOV, I_n , SCCR, and SPD Type 1 information is posted at www.UL.com, under Certifications, searching using UL Category Code: VZCA.

UL data and visual inspection takes precedence over manufacturer's published documentation.

- B. Submittals shall include shop drawings complete with manufacturer's installation instruction manual, wiring diagrams, unit dimensions, weight and warranty.
- C. Upon request, an un-encapsulated but complete SPD shall be presented for visual inspection; proprietary technology included. MOV type & quantity shall reflect kA ratings on cut-sheets, verification of diagnostic monitoring, thermal & overcurrent protection, etc.
- D. Any product submittals containing Asbestos or Selenium are to be accompanied by proof of insurance to indemnify and hold harmless the engineer, contractor, and the end use facility owner and operator.
- E. Minimum of (10) ten year warranty on defective material and workmanship

Part 2 – PRODUCTS

2.01 SERVICE ENTRANCE AND PANELBOARD SURGE PROTECTIVE DEVICES

A. MANUFACTURERS:

Subject to compliance, the following manufacturers are acceptable:

1. Mersen or approved equal

Application	Recommended Mersen Model Series
Service Entrance or Transfer Switch	STZ
Distribution Panelboard or Motor Control Center	STZ, STXT
Branch Panelboards	STXT, STXP, STXR

B. ELECTRICAL REQUIRMENTS:

1. SPD shall be UL labeled with at 200kA Short Circuit Current Rating (SCCR). Fuse ratings shall not be considered in lieu of demonstrated withstand testing of SPD, per NEC 285.6.
2. SPD shall be UL labeled as Type 1 (verifiable at UL.com), intended for use without the need for external or supplemental overcurrent devices. **Every** suppression component of every mode, including N-G, shall be protected by internal overcurrent and thermal over-temperature controls. SPDs relying upon external or supplementary installed safety disconnectors do not meet the intent of this specification.

3. SPD shall be UL labeled with 20kA Nominal Discharge Current Rating (I_n) (verifiable at UL.com) for compliance to UL 96A Lightning Protection Master Label and NFPA 780.
4. Suppression components shall be heavy duty "large block" 40 mm² 50kA or higher surge-rated thermally protected Metal Oxide Varistor's (TPMOV[®] technology). The system shall not utilize silicon avalanche diodes, selenium cells, air gaps, or other components that may crowbar the system voltage leading to system upset or create any environmental hazards. End-of-life mode to be open circuit. Units with end-of-life short-circuit mode are not acceptable.
5. Surge Current Capability (single pulse rated, 8/20 μ s) per phase shall be:

Application	Surge Current Capability per phase (kA)
Service Entrance or Transfer Switch	200, 300, or 450
Distribution Panelboard or Motor Control Center	100, 150 or 200
Branch Panelboards	50, 100 or 200

For high-exposure areas/regions, critical equipment, and human safety/evacuation applications it is recommended to select higher kA rated devices

6. SPD shall provide surge current paths for all modes of protection:

Configuration	Protection Modes			
	L-N	L-G	L-L	N-G
Split Phase	•	•	•	•
Wye	•	•	•	•
Delta	N/A	•	•	N/A

For corner grounded delta and impedance grounded wye systems protection modes are equivalent to Delta configuration. For high-leg delta systems protection modes are equivalent to Wye

7. UL 1449 Listed Voltage Protection Ratings (VPRs) shall not exceed the following:

System Voltage	L-N	L-G	L-L	N-G
240/120V Split	700V	700V	1200V	700V
208Y/120 Wye	700V	700V	1200V	700V
480Y/277 Wye	1200V	1200V	2000V	1200V
240V Delta	•	1200V	2000V	•
480V Delta	•	1800V	3000V	•

(Mode VPRs must be verifiable at UL.com. Numerically lower is allowed/preferred; old-style Suppressed Voltage Ratings (SVRs) shall not be submitted, nor evaluated due to outdated testing)

8. Maximum Continuous Operating Voltage (MCOV)

System Voltage	Allowable System Voltage Fluctuation (L-N)	MCOV (L-N)
240/120V Split	25%	150V
208Y/120 Wye	25%	150V
480Y/277 Wye	15%	320V

System Voltage	Allowable System Voltage Fluctuation (L-G)	MCOV (L-G)
240V Delta	15%	275V
480V Delta	15%	550V

9. Visual LED Diagnostics including a minimum of one LED indicator per phase monitoring all TP MOVs and phase loss indicator
 10. All field applied devices require the UL Listing with the UL holographic label stating SPD Type 1
- C. OPTIONS (select as appropriate per project):
1. One set of NO/NC dry contacts for external notification monitoring **all** TP MOVs
 2. Audible alarm with integral silence switch monitoring **all** TP MOVs
 3. Visual LED diagnostics including a minimum of one LED indicator per phase monitoring all TP MOVs, service LED, and phase loss indicator. Also, Tri-colored LED life status indicators (Green = 67 to 100% life, Amber = 34 to 66%, Red = 0 to 33%)
 4. NEMA enclosure options: NEMA 1/12/3R/4 or NEMA 4X
 5. Integral Listed UL 98 Disconnect Switch
 6. EMI/RFI filtering up to -50dB from 10Khz to 100MHz
 7. Surge Counter with reset and indefinite memory retention upon power loss
 8. Serviceable, replaceable module
 9. Extended (15) year warranty on defective material and workmanship

Part 3 – EXECUTION

3.01 EXTERNALLY MOUNTED:

- A. At Service Entrance or Transfer Switch, a UL approved disconnect switch shall be provided as a means of servicing if not connected to at least a 60A breaker.
- B. At Distribution, MCC and Branch, SPD shall have an independent means of servicing disconnect such that the protected panel remains energized. A 30A breaker (or larger) may serve this function.
- C. SPD shall be installed per manufacturer’s installation instructions with lead lengths as short (less than 24”) and straight as possible. Twist the conductors together.
- D. Installer may rearrange breaker locations to ensure shortest and straightest possible leads to SPDs.
- E. SPD shall be installed on the line or load side of the main service disconnect.
- F. Before energizing, installer shall verify service and separately derived system Neutral to Ground bonding jumpers per NEC.

3.02 INTERNALLY MOUNTED:

- A. Breaker or disconnect shall be provided to de-energize the SPD and its enclosure preventing arc flash hazard exposure during replacement or maintenance without shutting down the switchboard or panelboard.
- B. Ground connection to SPD shall be twisted together with line and neutral wire connections to minimize impedance when length of ground wire is in excess of 2 feet.
- C. SPD shall be installed on the line or load side of the main service disconnect.
- D. Before energizing, installer shall verify service and separately derived system Neutral to Ground bonding jumpers per NEC.

END OF SECTION