

**POWER SURGE PROTECTORS**

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**1. GENERAL**

**1.1 Related Work**

- .1 Section 16010 – General Electrical Requirements
- .2 Section 16471 – Panelboards - Breaker Type

**1.2 System Description**

- .1 A transient voltage surge suppressor for the protection of downstream electronic equipment connected to the building power supply. The specified unit shall be compatible with non-linear loads and shall provide effective high-energy transient voltage suppression, surge current diversion and high-frequency electrical noise filtering while connected in parallel with a facility's distribution system. The filtering unit shall utilize non-linear voltage dependent metal oxide varistors or selenium cells. The suppression system's components shall not utilize gas tubes, spark gaps, or silicon avalanche diodes. The device shall be referred to as a TVSS filter for the purpose of this document and drawings.

**2. PRODUCT**

**2.1 Operation and Environment**

- .1 Voltage: The TVSS devices shall be suitable for the voltage and systems configuration as indicated on the single line diagram(s).
- .2 Maximum Continuous Operating Voltage (MCOV): The MCOV of the suppressor unit shall be greater than 125% for 120/208 V systems and 115% for 347/600 V systems.
- .3 Protection Modes: Transient voltage surge suppression paths shall be provided for all possible common and normal modes (between each line and ground, neutral and ground, line to line and each line and neutral). The primary suppression path shall not be to ground.

**2.2 Suppression Component**

.1	Peak surge Current per Phase	240,000 Amps	347/600V Panelboards
		120,000 Amps	120/208V Panelboards
		30,000 Amps	(Plug-in / Cord -- connected individual equipment protection)
.2	Let Through Voltage (L-N)	120 V (individual equipment units)	330 V
		208 V Units	500 V
		600 V Units	1200 V

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- .3 TVSS clamping components response time < 1 nanosecond

### **2.3 Filtering**

- .1 TVSS shall contain a high frequency extended range tracking filter.
- .2 Noise attenuation  $\geq 45$  dB @ 100 kHz.
- .3 Main entrance panel application effective filtering bandwidth - 180 Hz to 50 Mhz. Branch panel application effective filtering bandwidth - 1 kHz to 50 Mhz. Plug-in/Cord - Connected Individual Equipment application effective filtering bandwidth - 100 kHz to 100 Mhz.

### **2.4 Panelboard Component (Integrated TVSS Panel)**

- .1 Main Bus: The device shall have a copper, tin plated main bus.
- .2 Circuit Breakers: Are to be of the over center toggle mechanism type which use bolt-on connectors to line side panelboard connectors.
- .3 Panelboard Enclosure: The panelboard shall be provided in an EEMAC 1 enclosure. The TVSS/filter status indicators shall be visible without the need to open the panelboard door. A lockable door shall be provided to limit access to authorized personnel only. Trim assembly shall be tamper proof. The trim (doors) shall be finished in grey ASA61 paint.
- .4 Neutral Bus: The unit shall be equipped with a copper 100% rated neutral bus, which shall include a sufficient quantity of solderless type lugs to service the total unit circuit capacity.
- .5 Wiring Gutters: The integrated TVSS filtering panel shall be equipped with a complete perimeter wiring gutter with a cross-sectional dimensions of not less than 12,200 mm<sup>2</sup>.
- .6 Safety and Insulated/Isolated Ground Bus: The integrated filter panel shall have a safety and insulated/isolated ground bus equipped with solderless type lugs of quantity to sufficiently service the circuit loads.

### **2.5 General Features**

- .1 The integrated TVSS panel shall be factory installed and connected to the bus bar.
- .2 Connectors: Terminals shall be provided for all the necessary input and output power and ground connections on the TVSS.
- .3 Enclosure: The specified system shall be provided in a heavy duty NEMA 12 dust tight enclosure with no ventilation openings for maintenance and branch panel applications. Indication of surge current module status shall be visible without opening the door.
- .4 Internal Connections: All surge current diversion connections shall be by way of low impedance wiring. Surge current diversion components shall be wired for reliable low

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impedance connections. No plug-in component modules, quick disconnect terminals or printed circuit boards shall be used in surge suppression paths.

- .5 Unit Status Indicators: Red status indicators shall be provided on the hinged front cover to indicate unit phase status. The absence of the red light shall reliably indicate that one or more surge current diversion phases have failed and that service is needed to restore full operation.
- .6 Fuses: The unit shall utilize internal fuses rated with a minimum interrupting capability of 200,000 A or greater.
- .7 Identification: The unit shall include manufacturer's nameplate, UL rating, and a CSA approval on the exterior enclosure.
- .8 Testing: Testing at each unit shall include assurance checks, "Hi-Pot" test at two times rated voltage plus 1000 V per UL requirements, and operation and calibration tests.

### 2.6 Approved Manufacturers

- .1 Current Technologies  
-- Integrated TVSS panel Model EGP
- .2 Liebert Corporation  
-- Integrated TVSS panel Model LPG
- .3 Square D  
-- Integrated TVSS panel board
- .4 Cutler - Hammer  
-- Integrated TVSS panel board Clipper Power System  
-- Visor Series

## 3. EXECUTION

### 3.1 Installation

- .1 Install with Manufacturer's recommended conductors tapped from the electrical service switchboard conductor system. Conductors are to be as short and straight as possible. Input conductors to the TVSS shall be twisted together to reduce impedance during high frequency filtering.
- .2 An appropriately sized manual safety disconnect shall be supplied and installed before and in line with the TVSS from the electrical service for the purpose of electrically isolating the

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device from the system should service be required without interrupting the main service. Coordinate required disconnect ampacity with TVSS manufacturer.

- .3 The TVSS should be following the Manufacturer's recommended practices as outlined in the manufacturer's installation and Maintenance Manual and in compliance with all applicable electrical codes.

**END OF SECTION**