

SECTION 16281  
TRANSIENT VOLTAGE SURGE SUPPRESSION (TVSS)

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

- A. The general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 General Requirements apply to work specified in this Section.
- B. Requirements of Section 16050, "Basic Electrical Materials and Methods," apply to this Section.

1.02 SUMMARY

- A. This section specifies transient voltage surge suppression (TVSS) devices. The parallel design TVSS shall utilize multiple protection modules to suppress and divert transient voltages and surge currents. Exposure level of the devices are indicated on the drawings. Furnish and install TVSS devices complete with enclosures, offset nipples, fasteners and accessories.
- B. Related Work Specified in Other Sections:
  - 1. Conductors: Section 16120.
  - 2. Panelboards: Section 16441.

1.03 REFERENCED STANDARDS

- A. American National Standards Institute/Institute of Electrical and Electronic Engineers: ANSI/IEEE C62.41, "Guidelines for Surge Voltages in Low Voltage AC Power Circuits" and C62.45, "Guidelines on Surge Testing for Equipment Connected to Low Voltage AC Power."
- B. National Electrical Code, National Fire Protection Association publication NFPA-70.
- C. Military Standard 220A (MIL-STD-220A), Method of Insertion Loss Measurement.
- D. Underwriters Laboratories: UL 1449 Second Edition , Transient Voltage Surge Suppressors.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's catalog cuts and supplementary information for each type of TVSS device specified in this section. Data sheets shall demonstrate conformance to device characteristics defined in this specification.
- B. Submit Underwriter's Laboratories U.L. 1449 file including clamping voltage ratings, and independent test laboratory reports indicating compliance with both ANSI/IEEE C62.41 and ANSI/IEEE C62.45.

1.05 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with a minimum of three years documented experience.

1.06 COORDINATION

- A. Coordinate voltage, current, and connection configuration of each TVSS device to confirm correct electrical ratings before procuring TVSS devices and before submitting product data.
- B. Coordinate the placement of TVSS devices with available space limitations and the work of other trades in accordance with manufacturer's installation instructions. Since the performance of the TVSS is degraded with distance from the protected conductors, the distance shall not be extended beyond recommended by the manufacturer. When available, make the TVSS part of the switchboard or panelboard.

1.07 WARRANTY

- A. Provide manufacturer's written warranty for each TVSS device, agreeing to repair or replace devices which fail to operate properly, or fail to meet specifications, or which otherwise prove defective within the warranty period.
  - 1. Warranty Period: 5-years from date of Substantial Completion, non-prorated.
- B. This warranty shall be in addition to and not in lieu of other warranties in these Contract Documents and other rights and remedies available to the Owner under these Contract Documents or under law.

PART 2 - MATERIALS

2.01 MANUFACTURER

- A. Furnish transient voltage surge suppression devices manufactured by one of the following:
  - 1. Current Technology
  - 2. General Electric
  - 3. LEA Dynatech, Inc.
  - 4. Cutler-Hammer.

2.02 TVSS DEVICES, GENERAL

- A. Type and Listing/Labeling: Furnish parallel connected type TVSS devices, which are listed under UL 1449 and bear UL label and CSA certification label.
- B. Connections: Surge current diversion connections shall be by way of low impedance wiring.
- C. Enclosure for external unit: NEMA Type 1, unless another NEMA type is indicated on the drawings. The cabinet shall be sized in accordance with the abnormal overvoltage test of UL1449.

- D. Status Indicators: Provide indicator lamps to identify a status of the MOV's fuses in L-N and L-G modes. Failure of the module ( blown MOV fuse ) shall be designated by the absence of the status light. These lamps shall be visible without opening the enclosure.
- E. Alarm: Audible alarm with silencer, and Form C dry contacts shall be provided for remote monitoring of TVSS.
- F. Fuses and Safety Disconnect Switch: TVSS that contains more than two MOVs per module shall be fused per UL 1449. Fuses shall be sized such that TVSS surge handling capability shall not be limited below the device single impulse rating. Provide integral safety interlocked fused disconnect switch rated 60 amp, 200,000 Amp interrupting capacity.
- G. Provide a diagnostic test point for TVSS device.

#### 2.03 TVSS DEVICES, PERFORMANCE

- A. Furnish devices intended for main distribution switchboards or panelboards as indicated. Device shall be suited for operation on a system with voltage, phase, and wiring configurations specified on the drawings or in the specifications. TVSS components shall be constructed in accordance with UL 1449 ( 10,000 AIC rated for 400 amp panelboards or less, and 25,000 AIC rating for the switchboards and panelboards 600 amp and higher.).
  1. Operating Temperature: -30° C to 60°C
  2. Operating Relative Humidity: 0% to 95% R.H. non-condensing.
  3. Operation without appreciable magnetic fields generated by the device.
  4. Protection modes: line- line, line-neutral, line-ground, and neutral-ground for a WYE connected system, and line-line and line-ground for a delta connected system.
  5. Furnish solid-state high-performance device which utilizes non-linear voltage dependent metal oxide varistors (MOV's).
  6. Maximum continuous operating voltage (MCOV): At least equal to the maximum voltage available between any two service conductors per UL 1449.
  7. Maximum Peak Surge Current: Rating shall be based on testing of a complete TVSS unit. For medium-to-low exposure level – 120,000 surge Amps per phase for all protection modes. For medium- to-high exposure level at the service switchboard – 240,000 surge Amps per phase.
  8. Suppression voltage rating for 120/208 Volt System: 400 Volt for L-N, L-G and N-G protection modes, and 800 Volt for L-L Mode.
  9. Suppression voltage rating for 277/480 Volt System: 800 Volt for L-N, L-G and N-G protection modes, and 1500 Volt for L-L Mode.

#### 2.04 FILTERING

- A. Filtering Capability: TVSS shall be provided with a noise filtering capable of managing noise produced by EMI and RFI with amplitudes under the MOV's maximum operating continuous voltage level. The filter shall be capable of a minimum of 50 dB attenuation at 100 KHz.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- A. Install TVSS devices in conformance with the manufacturer's printed installation instructions, approved shop drawings, and the requirements of the referenced Electrical Code.
- B. Employ installation practices which maximize the effectiveness of the TVSS and filtering devices. Make bus connection leads as straight as possible with no sharp bends, to minimize lengths and high frequency impedance.

#### 3.02 FIELD QUALITY ASSURANCE

- A. Provide services of TVSS manufacturer's authorized service representative to supervise TVSS devices installation, electrical connections and testing.

END OF SECTION 16281