

SECTION 16170
TRANSIENT VOLTAGE SURGE SUPPRESSION (TVSS)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawing and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. All materials, labor and auxiliaries required to furnish complete surge suppression for the protection of building electrical systems from the effects of line and electromagnetic induced transient voltage surges and coupled lightning discharged transients as indicated on drawings and/or as specified in this section.
- B. Related Sections
 - 1. Section 16050, Basic Materials and Methods
 - 2. Section 16196, Electrical Identification
 - 3. Section 16450, Grounding

1.3 REFERENCES

- A. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - 1. ANSI/IEEE C62.41 – “Recommended Practice for Low Voltage AC Surge Protective Devices (1000 volts or less)”
- B. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA LS-1, Specification Format for Low Voltage AC Surge Protective Devices (1000 volts or less).
- C. Underwriters Laboratories, Inc. (UL):
 - 1. UL 1449- "Second Edition (1998) Standard for Safety for Transient Voltage Surge Suppressors.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's product data showing material proposed. Product data shall include, but shall not be limited to, the following:
 - 1. Dimensions.
 - 2. Voltage (shall be 480volt).
 - 3. Phase (shall be three phase).
 - 4. Description of protection devices with circuit diagram of protection scheme.
 - 5. Description of system status capabilities, alarm and failure display units.
- B. Shop Drawings: Submit complete shop drawings as required to determine acceptability. Shop drawings shall include, but shall not be limited to, the following:
 - 1. Connection points in the power distribution system.
- C. Operating and Maintenance Manuals: Prepare and deliver five complete operating and maintenance manuals. Provide information pertinent to the equipment for preventive maintenance

and for replacement of expendable components. Provide complete and explicit instructions for start-up, operating, and stopping. Manuals shall include the items listed below and other information recommended by the manufacturer:

1. Manufacturer's published information.
2. Set of shop drawings.
3. Wiring diagrams of electrical components.
4. Electrical characteristics and ratings components.
5. Recommended spare parts list.

1.5 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms shall be engaged in the manufacture of transient voltage surge suppressors of the types and sizes required, and whose products have been in satisfactory use in similar service for not less than five years.
 1. The TVSS with all accessories and features shall be assembled and tested by the manufacturer in his factory.
- B. Compliance: Comply with applicable requirements of IEEE, NEMA, and UL standards referenced in Article 1.3 - References, and the NEC. Manufacturer shall provide third party nationally recognized testing laboratory verification of performance data including maximum surge current testing.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and handle TVSS units carefully to avoid damage to materials and components.

1.7 WARRANTY

- A. The manufacturer shall provide a ten year warranty for quality of materials and workmanship for all TVSS units.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All TVSS units shall be designed for the specific type and voltage of the electrical service as indicated in drawings, and provide suppression for both normal mode (L-N) and common mode (L+N-G) protection.
- B. All TVSS units shall be of a parallel-operated hybrid circuit design and include full cycle tracking clamping capability.
- C. All TVSS units shall be designed to withstand a maximum continuous operating voltage (MCOV) rating of not less than 115% of the system rms line voltage.
- D. All TVSS units shall provide minimum -30dB noise attenuation across 5k-100MHz.
- E. All TVSS units shall contain internal safety fusing to disconnect surge protective components from the electrical source of supply in the event of TVSS unit failure in order to prevent catastrophic failure mode.
- F. All TVSS units shall not allow follow-current or "crow-bar" components which may disconnect power to connected equipment during surge diversion.

- G. All TVSS units shall have operating temperature range of -10 to +60 degrees C.
- H. Loss of Protection Diagnostic lights for each phase shall be provided. In addition, separate visual and audible fault indication shall be provided. Provision for remote monitoring shall be provided via a dry contact.

2.2 PERFORMANCE

- A. Main Switchgear: TVSS unit shall provide replaceable modules for the purpose of in-service replacement for each phase. The TVSS unit shall provide redundancy in the event of primary phase-module failure.
 - 1. Ratings:
 - a. Maximum Surge Current (8x20 us waveform): 200kA (L-N), 200kA (L-G), 100kA (N-G)
 - b. UL 1449 SVR: 800 pk (277v).
- B. Distribution Panel Locations: TVSS unit shall provide replaceable modules for the purpose of in-service replacement for each phase.
 - 1. Ratings:
 - a. Maximum Surge Current (8x20 us waveform): 100kA (L-N), 50kA (N-G) UL
 - b. UL 1449 SVR: 800v pk (277v).

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Surge Protectors shall be installed as close as practical to the electrical panel to be protected. The TVSS unit shall be close nipped to the switchgear equipment in a position near the neutral bus bar or positioned so that the overall lead length be minimal.
- B. The TVSS unit shall be installed in a manner consistent with proper and acceptable industry wiring practice. Connection leads shall be as short and straight as possible while avoiding sharp bends.
- C. TVSS units provided with terminals shall be wired with largest stranded conductor permitted within rating of lugs. At least 10 AWG conductor shall be used.
- D. The TVSS units shall be installed with a means for disconnecting the device for servicing via an integral disconnect switch or a dedicated three-pole 15 amp minimum circuit breaker.
- E. Surge Protective Devices shall be provided at the following locations as per drawings.
 - 1. Main Electrical Service Entrance Switchgear.
 - 2. Distribution Circuit Panels.

3.2 TRAINING

- A. Instruct the owner's personnel in the operation, startup and maintenance of all units provided.

END OF SECTION 16170