

SECTION 264313 – TRANSIENT VOLTAGE SURGE SUPPRESSOR/SURGE PROTECTION DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes transient voltage surge suppressors for low-voltage (600Volts and below) power equipment
- B. Related Sections include the following:
  - 1. Division 26 Section "Wiring Devices" transient voltage surge suppressors.
  - 2. Division 26 Section "Panelboards"
  - 3. Division 26 Section "Switchboards"
  - 4. Division 26 Section "Lightning Protection"

1.3 SUBMITTALS

- A. Must have ten day prior approval to submit on project.
- B. Request for submittals must be in writing and attached with independent documentation of the following items.
- C. Drawings: Electrical and mechanical drawings shall be provided by the manufacturer which show unit dimensions, weights, mounting provisions, connection notes, wire size and wiring diagram.
- D. Equipment Manual: The manufacturer shall furnish an installation manual with installation notes, start-up and operating instructions for the specified system. Installation instructions shall clearly state whether the system requires an external overcurrent device to maintain the system's UL 1449 listing. SPD requiring external overcurrent devices are not acceptable.
- E. Verification that all SPD are UL 1449 3<sup>rd</sup> Edition (VZCA) listed and rated with a 20kA (In) nominal discharge rating for compliance to UL96A Lightning Protection Master Label and NFPA 780. Also provide UL 1449 3<sup>rd</sup> Edition VPR showing the following maximum VPR (clamping voltage) as follows:
  - 1. 120Vsystem 1500V (L-N) on Distribution/Branch Panels and 800V (L-N) at Service Entrance
  - 2. 277Vsystem 1800V (L-N)
- F. SPD manufacturer shall provide UL 3<sup>rd</sup> Edition documentation as part of submittal.

- G. Manufacturer's Warranty Statement, showing a 10 year replacement warranty for modules or unit are damaged by transient voltages

#### 1.4 STANDARDS

- A. Underwriters Laboratories 1449 - (UL 1449 3<sup>rd</sup> edition safety standard for surge protection devices – 2009)
- B. NEC article 285. National Electrical Code 2008 SPD shall be labeled with a minimum 200kAIC rating.
- C. NFPA 780 Standard for the installation of lightning protection systems
- D. UL96A - Lightning Protection System Master Label
- E. IEEE (Institute of Electrical and Electronic Engineering Inc.) C62.41.1 and C62.41.2 – 2002, IEEE C62.45 – 2002, IEEE C62.33 & C62.35
- F. All manufacturers must comply with above listed standards and any additions current revisions of industry standards. All products that do not comply with current industry standards will not be accepted.

#### 1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain suppression devices and accessories through one source from a single manufacturer.

#### 1.6 PROJECT CONDITIONS

- A. Placing into Service: Do not energize or connect service entrance equipment, panel boards, control terminals, or data terminals to their sources until the surge protective devices are installed and connected.
- B. Service Conditions: Rate surge protective devices for continuous operation under the following conditions, unless otherwise indicated:
  - 1. Maximum Continuous Operating Voltage (MCOV): Not less than 115 percent
  - 2. Operating Temperature: 30 to 120 deg F (0 to 50 deg C).
  - 3. Humidity: 0 to 85 percent, non-condensing.
  - 4. Altitude: Less than 20,000 feet (6000 m) above sea level.

#### 1.7 COORDINATION

- A. Coordinate location of field-mounted surge suppressors to allow adequate clearances for maintenance.
- B. Coordinate surge protective devices with Division 26 Section "Electrical Power Monitoring and Control."

#### 1.8 WARRANTY

- A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Manufacturer shall provide a product warranty for a period of not less than ten (10) years from date of installation. Warranty shall cover unlimited replacement of TVSS modules during the warranty period. Those firms responding to this specification shall provide proof that they have been regularly engaged in the design, manufacturing and testing of TVSS for not less than five (5) years.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. LEA International

2.2 SERVICE ENTRANCE SUPPRESSORS

<b>Panel Amperage</b>   $\geq 3,000$ Amps   2500-1600Amps   1200-400Amps
<b>Service Entrance</b>   400kA/Modular   300kA/modular   200kA/modular

- A. Provide service entrance rated, UL Type 1 SPD's as shown and indicated on contract drawings.
- B. Minimum surge current ratings per phase shown above, three phase, wye systems per phase rating shall equal L-N and L-G modes added together. No other methods are acceptable for per phase surge current rating calculations.
- C. SPD's shall be a multi-stage parallel connected device.
- D. SPD's UL 1449 3<sup>rd</sup> Edition VPR (clamping voltage) shall be a maximum rating of:
  - 1. 120Vsystem 1500V (L-N)
  - 2. 277Vsystem 1800V (L-N)
- E. SPD's shall mount external to the panel; internally mounted SPD's are not acceptable.
- F. SPD voltages shall be verified by location on drawings, one-line diagrams and equipment schedules.
- G. SPD shall be modular design with field replaceable modules per phase and per mode.
- H. SPD shall have redundant status indicators on the front of the enclosure and shall monitor and indicate whether suppression capabilities have been compromised.
- I. SPD shall contain protective components that utilize multiple thermally protected metal oxide varistors (MOV) per mode.
- J. SPD's relying upon external and/or supplementary installed safety overcurrent protection do not meet the intent of this specification.

- K. SPD's that are limited to being connected to breaker whether or not an integral disconnect switch is supplied do not meet the intent of this specification.
- L. SPD's shall have an UL "In" rating (nominal discharge) of 20kA.
- M. SPD shall have dry contacts for remote monitoring capabilities.
- N. Service Entrance SPD's shall have audible alarms and surge counters.
- O. SPD's shall have a metal, NEMA 4 rated enclosure.
- P. SPD shall be designed and equipped with integral disconnecting means if no circuit breaker is shown supplied.
- Q. Protection modes: The SPD shall provide Line to Neutral (L-N) (Wye), Line to Ground (L-G) (Wye or Delta), Line to Line (L-L) (Delta) and Neutral to Ground (N-G) (Wye) protection.
- R. Provide Top Switchboard Mounting Kit by manufacturer of SPD if SPD is shown located in this manner.

2.3 DISTRIBUTION, BRANCH PANEL AND/OR AUXILLARY PANELS

<b>Panel Amperage</b>	<b>1200-800A</b>	<b>600A</b>	<b>400-100A</b>
<b>Distribution</b>	200kA	200kA	200kA
<b>Branch Panels</b>		100kA	100kA

- A. Provide UL Type 2 SPD's as shown and indicated on contract drawings.
- B. SPD's minimum surge current ratings per phase shown above, three phase, wye systems per phase rating shall equal L-N and L-G modes added together. No other methods are acceptable for per phase surge current rating calculations.
- C. SPD's shall be a multi-stage parallel connected device.
- D. SPD's shall mount external to the panel; internally mounted SPD's are not acceptable.
- E. SPD voltages shall be verified by location on drawings, one-line diagrams and equipment schedules.
- F. SPD shall be a compact, non-modular design
- G. SPD shall have per phase status indicators on the front of the enclosure and shall monitor and indicate whether suppression capabilities have been compromised.
- H. SPD shall contain protective components that utilize multiple thermally protected metal oxide varistors (MOV) per mode.
- I. SPD's relying upon external and/or supplementary installed safety overcurrent protection do not meet the intent of this specification.
- J. SPD's shall have an UL "In" rating (nominal discharge) of 20kA.
- K. SPD shall have dry contacts for remote monitoring capabilities.

- L. SPD's shall have a metal, NEMA 4 rated enclosure
- M. Protection modes: The SPD shall provide Line to Neutral (L-N) (Wye), Line to Ground (L-G) (Wye or Delta), Line to Line (L-L) (Delta) and Neutral to Ground (N-G) (Wye) protection.
- N. Provide Optional Side Mount Brackets for panels with SPD mounted on the side.

PART 3 - EXECUTION

3.1 INSTALLATION OF SURGE PROTECTIVE DEVICES

- A Review all installation information in manufacturer's installation manual prior to installing SPD's.
- B Verify all voltages before connecting to avoid injury and damage to equipment.
- C The SPD's shall be installed external to switchboard, distribution and panelboard.
- D Internally mounted SPD's will not be accepted.
- E The service entrance/switchboard/switchgear SPD's shall be installed with the shortest lead length possible and shall avoid any unnecessary or sharp bends. Where the SPD's are connected to breakers utilize a 60 amp, 3 pole breaker for connection means. If no circuit breaker is available, utilize SPD's integral disconnecting means as described under 2.2.P.
- F The distribution, panelboard and auxiliary SPD's shall be installed with the shortest lead length possible from the panel it is protecting and shall avoid any unnecessary or sharp bends. Utilize a 30 amp, 3 pole breaker for connection means. If no circuit breaker is available, utilize SPD as described under 2.2.P with integral disconnect means.
- G Ground resistance shall be 25 Ohms or less per NEC Article 250.56
- H Refer to manufacturer's installation manual for further installation details.

3.2 FIELD QUALITY CONTROL

- A INSTALLATION
  - 1. After installing surge protective devices, but before electrical circuitry has been energized, test for compliance with manufacturers' installation instruction requirements and recommendations.
- B MANUFACTURERS FIELD SERVICE
  - 1. Engage a factory authorized service representative to inspect equipment installation. Report results in writing
  - 2. Verify that electrical wiring installation complies with manufacturer's installation requirements.

END OF SECTION 264313