

SECTION 26 4313 – SURGE PROTECTIVE DEVICES FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes field-mounted SPD for installation on new and existing low-voltage (120 to 480 V) power distribution equipment.
- B. Related Sections:
 - 1. Division 26 Section "Low Voltage Electrical Power Conductors and Cables".
 - 2. Division 26 Section "Grounding and Bonding for Electrical Systems".

1.3 DEFINITIONS

- A. ATS: Acceptance Testing Specifications.
- B. SPD: Surge Protective Device(s), both singular and plural.
- C. SVR: Suppressed voltage rating.
- D. TVSS: Transient voltage surge suppressor(s), both singular and plural; also, transient voltage surge suppression.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating weights, electrical characteristics, furnished specialties, and accessories.
- B. Verification that all SPD are UL tested and labeled with 20kA (In) nominal discharge rating for compliance to UL96A Lightning Protection Master Label and NFPA 780.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For SPD devices, from manufacturer.
- B. Field quality-control reports.
- C. Warranties: Sample of special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For SPD devices to include in emergency, operation, and maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Replaceable Protection Modules: One for each SPD provided.

1.8 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by UL and marked for intended location and application.
- B. Comply with IEEE C62.41.2 and test devices according to IEEE C62.45.
- C. Comply with NFPA 780.
- D. Comply with NEMA LS 1.
- E. Comply with UL 1449 and UL 1283 (Type 2 only).
- F. Comply with NFPA 70.
- G. Comply with FM Global requirements.
- H. Comply with most current edition of the Northwestern University Design Standards.

1.9 PROJECT CONDITIONS

- A. ***(Delete This Paragraph If Not Required)*** [Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by the University or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:

1. **Notify the University's Chief Electrician no fewer than ten (10) business days in advance of proposed electrical service interruptions.**
2. **Indicate method of providing temporary utilities.**
3. **Do not proceed with interruption of electrical service without the University's Chief Electrician's written permission.**
4. **The University Lock-out/Tag-out procedures shall be used with Contractor controlled locks and tags.**
5. **Comply with NFPA 70E.]**

- B. Service Conditions: Rate SPD devices for continuous operation under the following conditions unless otherwise indicated:

1. Maximum Continuous Operating Voltage: Not less than 115 percent of nominal system operating voltage.

2. Operating Temperature: 30 to 120 deg F (0 to 50 deg C).
3. Humidity: 0 to 85 percent, non-condensing.

1.10 COORDINATION

- A. Coordinate location of field-mounted SPD devices to allow adequate clearances for maintenance, minimum 36" in front and 12" from centerline.

1.11 WARRANTY

- A. Comply with Division 1 requirements.
- B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of surge suppressors that fail in materials or workmanship within specified warranty period.
 1. Warranty Period: Ten years from date of Beneficial Occupancy.

PART 2 - PRODUCTS

2.1 SERVICE ENTRANCE and TRANSFER SWITCH SUPPRESSORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Current Technology Inc.; Danaher Power Solutions.
 2. Eaton Electrical Inc.
 - 3.
 4. Siemens Industry Inc.
- B. Surge Protection Devices Installed in Existing Service Entrance Substations:
 1. Type 1, Complying with UL 1449, 3rd edition, with UL card.
 2. SPD relying upon external or supplementary installed safety overcurrent protection do not meet the intent of this specification.
 3. Fabrication using bolted compression lugs for internal wiring.
 4. Arrangement with copper bus bars and for bolted connections to phase buses, neutral bus, and ground bus.
 5. Provide a three pole circuit breaker as a dedicated disconnecting means.
 6. LED indicator lights for power and protection status.
 7. Audible alarm, with silencing switch, to indicate when protection has failed.
 8. Form-C contacts rated at 5 Amp and 250-VAC, one normally open and one normally closed. Contacts shall reverse on failure of any surge diversion module or on opening of any current-limiting device.
 9. Six-digit transient-event counter set to totalize transient surges.
- C. Surge Protection Devices Installed in new Service Entrance Substations:
 1. Type 1, Complying with UL 1449, 3rd edition, with UL card.
 2. SPD relying upon external or supplementary installed safety overcurrent protection do not meet the intent of this specification.

3. Arranged for copper bus bar connections to phase buses, neutral bus, and ground bus.
4. A three pole circuit breaker for dedicated disconnecting means shall be provided in the switchgear.
5. LED indicator lights for power and protection status.
6. Audible alarm, with silencing switch, to indicate when protection has failed.
7. Form-C contacts rated at 5 Amp and 250-VAC, one normally open and one normally closed. Contacts shall reverse on failure of any surge diversion module or on opening of any current-limiting device.
8. Six-digit transient-event counter set to totalize transient surges.

D. Comply with UL 1283.

E. Minimum Surge Current Capacity Rating: 300 kA per phase.

F. Nominal discharge current (In): 20 kA.

G. Short circuit current rating (SCCR): 200 kA.

H. Maximum Continuous Operating Voltage (MCOV):

1. 480/277 V: 320 V.
2. 208/120 V: 150 V.

I. UL 1449 VPR for grounded wye circuits with [480Y/277 V] [208Y/120 V], 3-phase, 4-wire circuits shall be as follows:

1. Line to Neutral: [1200 V for 480Y/277 V] [700 V for 208Y/120 V].
2. Line to Ground: [1200 V for 480Y/277 V] [700 V for 208Y/120 V].
3. Neutral to Ground: [1200 V for 480Y/277 V] [700 V for 208Y/120 V].
4. Line to Line: [2000 V for 480/277 V] [1200 V for 208/120 V].

2.2 DISTRIBUTION SWITCHBOARDS and PANELBOARD SUPPRESSORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Current Technology Inc.
2. Eaton Electrical Inc.
3. Siemens Industry Inc.

B. Products shall be installed external to new or existing distribution and branch panel equipment. SPD must have the same or greater AIC, Interrupting, or Fault rating of the equipment the SPD is protecting.

C. Surge Protection Devices:

1. Type 2, Comply with UL 1449, 3rd edition with UL card.
2. Externally mounted.
3. Short-circuit current rating complying with UL 1449, and matching or exceeding the equipment short-circuit rating and redundant suppression circuits; with individually fused metal-oxide varistors.
4. SPD relying upon external or supplementary installed safety overcurrent protection do not meet the intent of this specification.
5. Fabrication using bolted compression lugs for internal wiring.

6. An integral safety interlocked disconnect switch with an externally mounted manual operator.
 7. Arrangement with wire connections to phase buses, neutral bus, and ground bus.
 8. LED indicator lights for power and protection status.
 9. Audible alarm, with silencing switch, to indicate when protection has failed.
 10. Form-C contacts rated at 5 Amp and 250-VAC, one normally open and one normally closed. Contacts shall reverse on failure of any surge diversion module or on opening of any current-limiting device.
 11. Six-digit transient-event counter set to totalize transient surges.
- D. Comply with UL 1283.
- E. Minimum Surge Current Capacity Rating:
1. LV switchgear, Switchboards, Distribution panels: minimum 200 kA.
 2. Branch Circuit Panelboards: minimum 100 kA.
- F. Nominal discharge current (In): 20 kA.
- G. Short circuit current rating (SCCR): 200 kA
- H. Maximum Continuous Operating Voltage (MCOV):
1. 480/277 V: 320 V.
 2. 208/120 V: 150 V.
- I. UL 1449 VPR for grounded wye circuits with [480Y/277 V] [208Y/120 V], 3-phase, 4-wire circuits shall be as follows :
1. Line to Neutral: [1200 V for 480Y/277 V] [700 V for 208Y/120 V].
 2. Line to Ground: [1200 V for 480Y/277 V] [700 V for 208Y/120 V].
 3. Neutral to Ground: [1200 V for 480Y/277 V] [700 V for 208Y/120 V].
 4. Line to Line: [2000 V for 480/277 V] [1200 V for 208/120 V].

2.3 ENCLOSURES

- A. Indoor Enclosures: NEMA 250, Type 1.
- B. Outdoor Enclosures: NEMA 250, Type 3R.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Type 1 SPD devices at service entrance Secondary Unit Substations shall be installed on the line side with ground lead bonded to service entrance ground.
- B. Install Type 2 SPD devices for new or existing distribution switchgear, switchboards and panelboards externally with conductors or buses between suppressor and points of attachment as short and straight as possible. Do not exceed manufacturer's recommended lead length. Do not bond neutral and ground.

1. Provide a three pole circuit breaker as a dedicated disconnecting means for each SPD unless otherwise indicated. Disconnecting means shall occupy the first three spaces in existing equipment; adjust circuit-breaker positions to achieve shortest and straightest leads.
 2. Use crimped connectors and splices only. Wire nuts are unacceptable.
- C. Provide all communications wiring between remote alarm contacts and the University's SCADA system.

3.2 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Tests and Inspections:
1. Perform each visual and mechanical inspection and electrical test stated in NETA ATS, "Surge Arresters, Low-Voltage Surge Protection Devices" Section. Certify compliance with test parameters.
 2. After installing SPD devices but before electrical circuitry has been energized, test for compliance with requirements.
 3. Complete startup checks according to manufacturer's written instructions.
- C. SPD device will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports, submit to NU Electric Shop.

3.3 STARTUP SERVICE

- A. Do not energize or connect service entrance equipment, distribution equipment, or panelboards to their sources until SPD devices are installed and connected.
- B. Do not perform insulation resistance tests of the distribution wiring equipment with the SPD installed. Disconnect before conducting insulation resistance tests, and reconnect immediately after the testing is over.

3.4 DEMONSTRATION

- A. Train the University's maintenance personnel to maintain SPD devices.

END OF SECTION 26 4313