

Section [26 43 13] [16476]
SURGE PROTECTION FOR LOW VOLTAGE ELECTRICAL POWER CIRCUITS

Square D™ by Schneider Electric
SurgeLogic™ Low Voltage Surge Protection

PART 1 GENERAL

1.1 SUMMARY

- A. Scope: Provide labor, material, equipment, related services, and supervision required, including, but not limited to, manufacturing, fabrication, erection, and installation for surge protection for low voltage electrical power circuits as required for the complete performance of the work, and as shown on the Drawings and as herein specified.
- B. Section Includes: The work specified in this Section includes, but shall not be limited to, the following:
 - 1. Requirements for both field-mounted SPDs (externally mounted), and integrated SPDs (installed from the factory) for low voltage power distribution and control equipment.

1.2 REFERENCES

- A. General: The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only. The edition/revision of the referenced publications shall be the latest date as of the date of the Contract Documents, unless otherwise specified.
- B. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - 1. ANSI/IEEE C62.41.1, "Guide on the Surges Environment in Low Voltage (1000 V and Less) AC Power Circuits."
 - 2. ANSI/IEEE C62.41.2, "Recommended Practice on Characterization of Surges in Low Voltage (1000 V and Less) AC Power Circuits."
 - 3. ANSI/IEEE C62.45, "Guide on Surge Testing for Equipment Connected to Low Voltage AC Power Circuits."
- C. International Organization for Standardization (ISO):
 - 1. ISO 9001, "Quality Management Systems - Requirements."
- D. National Fire Protection Association (NFPA):
 - 1. NFPA 70, "National Electrical Code," hereinafter referred to as NEC.

- E. Underwriters Laboratories, Inc. (UL):
 - 1. UL 67, "Standard for Panelboards."
 - 2. UL 96A, "Standard for Installation Requirements for Lightning Protection Systems."
 - 3. UL 845, "Motor Control Centers."
 - 4. UL 857, "Busways."
 - 5. UL 891, "Switchboards."
 - 6. UL 1283, "Standard for Safety for Electromagnetic Interference Filters."
 - 7. UL 1449, "Standard for Surge Protective Devices."
 - 8. UL 1558, "Standard for Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear."

1.3 DEFINITIONS

- A. $I_{(n)}$: Nominal discharge current rating.
- B. MCOV: Maximum continuous operating voltage.
- C. Protection Modes: The pair of electrical connections where the VPR applies.
- D. MOV: Metal oxide varistor; an electronic component with a significant non-ohmic current voltage characteristic.
- E. OCPD: Overcurrent protective device.
- F. SCCR: Short circuit current rating.
- G. SPD: Surge protective device.
- H. VPR: Voltage protection rating.

1.4 SYSTEM DESCRIPTION

A. General SPD Requirements:

1. SPD with accessories shall be listed and labeled as defined in NEC, by UL, and marked for intended location and application.
2. Comply with UL 1449.
3. Comply with UL 1283 (applies to Type 2 SPDs).
4. Design in accordance with ANSI/IEEE C62.41.1, ANSI/IEEE C62.41.2, and ANSI/IEEE C62.45.
5. SPDs manufacturer shall be ISO 9001 certified.
6. MCOV of the SPD shall not be less than 115 percent for 480Y/277V and 125 percent for 208Y/120V nominal RMS system voltages.
7. SPDs installed internal to the distribution equipment shall be of the same manufacturer as the equipment. The equipment shall be fully tested and certified to the following UL standards:
 - a. Panelboards: UL 67.
 - b. Motor Control Centers: UL 845.
 - c. Busway: UL 857.
 - d. Switchboards: UL 891.
 - e. Switchgear: UL 1558.

1.5 SUBMITTALS

- A. General: See [Section 01 33 00 - Submittal Procedures] [Section 01300 - Submittals].
- B. Product Data: Submit product data showing material proposed. Submit sufficient information to determine compliance with the Drawings and Specifications.
 1. For each type of product indicated include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
 2. Provide verification the SPD is listed or recognized through UL to the latest safety standard, UL 1449.
- C. Shop Drawings: Submit shop drawings for each product and accessory required. Include information not fully detailed in manufacturer's standard product data.
- D. Operation and Maintenance Data: Submit operation and maintenance data for surge protection for low voltage electrical power circuits to include in operation and maintenance manuals.

- E. Warranty Data: Submit sample of special warranties.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. **Manufacturer Qualifications:** Manufacturer shall be a firm engaged in the manufacture of surge protection for low voltage electrical power circuits of types and sizes required, and whose products have been in satisfactory use in similar service for a minimum of five years.
2. **Installer Qualifications:** Installer shall be a firm that shall have a minimum of five years of successful installation experience with projects utilizing surge protection for low voltage electrical power circuits similar in type and scope to that required for this Project and shall be approved by the manufacturer.

- B. **Regulatory Requirements:** Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and local authorities having jurisdiction. Obtain necessary approvals from such authorities.

- C. **Single Source Responsibility:** Obtain surge protection for low voltage electrical power circuits and required accessories from a single source with resources to produce products of consistent quality in appearance and physical properties without delaying the work. Any materials which are not produced by the manufacturer shall be acceptable to and approved by the manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the Project site in supplier's or manufacturer's original wrappings and containers, labeled with supplier's or manufacturer's name, material or product brand name, and lot number, if any.
- B. Store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1.8 WARRANTY

- A. **General:** See [Section 01 77 00 - Closeout Procedures] [Section 01770 - Closeout Procedures].
- B. **Special Warranty:** Submit a written warranty executed by the manufacturer, the Installer, and the Contractor, agreeing to repair or replace surge protection for low voltage electrical power circuits that fail in materials or workmanship within the specified warranty period.
 1. **Warranty Period:** Warranty period shall be 10 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. **Basis of Design:** Product specified is "Surgelogic Surge Protection" as manufactured by Square D by Schneider Electric. Items specified are to establish a standard of quality for design, function, materials, and appearance. Equivalent products by other manufacturers are acceptable. The Architect/Engineer will be the sole judge of the basis of what is equivalent.

2.2 SERVICE ENTRANCE SUPPRESSORS

- A. SPDs: Comply with UL 1449.
1. SPDs installed on the line side of the service entrance OCPD shall be Type 1 SPDs. SPDs installed on the load side of the service entrance OCPD shall be either Type 1 or Type 2 SPDs.
 2. Type 2 SPDs shall also comply with UL 1283.
- B. Features and Accessories: SPDs shall provide the following features and accessories:
1. Internal fusing design capable of disconnecting the SPD before any damaging external effects to the suppressor or surroundings occur.
 2. Indicator light(s) display for power and protection status with push-to-test capabilities.
 3. Audible alarm with silencing switch.
 4. Form C contacts; one normally open and one normally closed for remote monitoring of protection status. Contacts shall reverse on failure of any surge diversion module or on opening of any current-limiting device. Coordinate with building power monitoring and control system.
 5. Surge counter with reset switch.
 6. Optional integral disconnect switch for externally mounted SPDs. SPDs integrated into factory supplied equipment shall have an input disconnect switch or circuit breaker unless indicated on the equipment drawings/data sheets.
- C. Surge Current Rating: The surge current rating of the SPD shall be dependent of its category/location, as follows:

Category/Location	Application	Per Phase	Per Mode
C	Service Entrance	240 kA	120 kA
B	Distribution	160 kA	80 kA

D. Protection Modes:

1. UL 1449 VPR for grounded WYE configured circuits shall not exceed the following:

Modes	208Y/120	480Y/277	600Y/347
L-N; L-G; N-G	800 volts	1200 volts	1500 volts
L-L	1200 volts	2000 volts	2500 volts

2. UL 1449 VPR for Delta configured circuits shall not exceed the following:

Modes	240D	480D	600D
L-G; N-G	1200 volts	2000 volts	2500 volts

- E. SCCR: Per NEC 285.6, the short circuit current rating of the SPD shall be equal to or greater than the available short circuit current at the point on the system where installed.
- F. Nominal Discharge Current Rating: 20 kA $I_{(n)}$.
- Surge protective devices located at service entrance locations shall carry a minimum nominal discharge current rating of 20 kA to meet the requirements of UL 96A.

2.3 DISTRIBUTION/ BRANCH PANEL SUPPRESSORS

- A. SPDs: Comply with UL 1449.
- Type 1 or Type 2 SPDs.
 - Type 2 SPDs shall also comply with UL 1283.
- B. Features and Accessories: SPDs shall provide the following features and accessories:
- Internal fusing design capable of disconnecting the SPD before any damaging external effects to the suppressor or surroundings occur.
 - Indicator light(s) display for power and protection status.
 - Audible alarm with silencing switch.
 - Form C contacts; one normally open and one normally closed for remote monitoring of protection status. Contacts shall reverse on failure of any surge diversion module or on opening of any current-limiting device. Coordinate with building power monitoring and control system.
 - Surge counter with reset switch.
 - Optional integral disconnect switch for externally mounted SPDs. SPDs integrated into factory supplied equipment shall have an input disconnect switch or circuit breaker unless indicated on the equipment drawings/data sheets.
- C. Surge Current Rating: The surge current rating of the SPD shall be dependent of its category/location, as follows:

Category/Location	Application	Per Phase	Per Mode
B	Distribution	160 kA	80 kA
B	Branch	120 kA	60 kA

- D. Protection Modes:

1. UL 1449 VPR for grounded WYE configured circuits shall not exceed the following:

Modes	208Y/120	480Y/277	600Y/347
L-N; L-G; N-G	800 volts	1200 volts	1500 volts
L-L	1200 volts	2000 volts	2500 volts

2. UL 1449 VPR for Delta configured circuits shall not exceed the following:

Modes	240D	480D	600D
L-G; N-G	1200 volts	2000 volts	2500 volts

- E. SCCR: Per NEC 285.6, the short circuit current rating of the SPD shall be equal to or greater than the available short circuit current at the point on the system where installed.
- F. Nominal Discharge Current Rating: 10 kA $I_{(n)}$.

2.4 ENCLOSURES

- A. Enclosure shall meet or exceed the ratings for the environment to be installed as indicated on drawings.
 1. Indoor Enclosures for Externally Mounted SPDs: NEMA 250, Type 3R.
 2. Outdoor Enclosures for Externally Mounted SPDs: NEMA 250, Type 3R, 4X.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine areas and conditions under which the work is to be installed, and notify the Contractor in writing, with a copy to the Owner and the Architect, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.
 1. Beginning of the work shall indicate acceptance of the areas and conditions as satisfactory by the Installer.

3.2 INSTALLATION

- A. Install surge protection for low voltage electrical power circuits in accordance with reviewed product data, final shop drawings, manufacturer's written instructions and recommendations, and as indicated on the Drawings.
- B. Install SPD devices at the service entrance in accordance with NEC. SPDs installed on the line side of the service entrance OCPD shall be Type 1 SPDs. SPDs installed on the load side of the OCPD shall be either Type 1 or Type 2 SPDs.

- C. Follow manufacturer's recommended installation practices.
 - 1. Provide a minimum 30 ampere circuit breaker as a dedicated disconnecting means for the SPD unless otherwise indicated.
 - 2. Install SPDs with properly rated conductors between suppressor and points of attachment as short and straight as possible; adjust circuit breaker positions to achieve shortest and straightest leads.
 - 3. Do not splice and extend SPD leads unless specifically permitted by manufacturer.
 - 4. Twist input conductors together to reduce the input inductance.

3.3 FIELD QUALITY CONTROL

- A. See [Section 01 45 23 - Inspecting and Testing Services] [Section 01410 - Inspecting and Testing Services].
- B. Perform the following tests and inspections.
 - 1. Compare equipment nameplate data for compliance with the Drawings and the Specifications.
 - 2. Inspect anchorage, alignment, grounding, and clearances.
 - 3. Verify that electrical wiring installation complies with manufacturer's written installation requirements.
- C. A SPD will be considered defective if it does not pass inspections.
- D. Prepare inspection reports.

3.4 DEMONSTRATION

- A. Start-Up Service:
 - 1. Complete start-up checks according to manufacturer's written instructions.
 - 2. Do not perform insulation resistance tests of the distribution wiring equipment with SPDs installed. Disconnect all wires, including, but not limited to, neutral of the SPD before conducting insulation resistance tests, and reconnect them immediately after the testing is over.
 - 3. Energize SPDs after power system has been energized, stabilized, and tested.

3.5 PROTECTION

- A. Provide final protection and maintain conditions in a manner acceptable to the Installer, that shall ensure that the surge protection for low voltage electrical power circuits shall be without damage at time of Substantial Completion.

END OF SECTION