SECTION 264313 - SURGE PROTECTION FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS

Revise this Section by deleting and inserting text to meet Project-specific requirements.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

1. GENERAL
	* + 1. RELATED DOCUMENTS
			2. SUMMARY
				1. Section includes:

Type 1 surge protective devices.

Type 2 surge protective devices.

Enclosures.

Conductors and cables.

* + - * 1. Related Requirements:

Retain subparagraphs below to cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections.

Section 262413 "Switchboards" for integral SPDs installed by switchboard manufacturer.

Section 262416 "Panelboards" for integral SPDs installed by panelboard manufacturer.

Section 262726 "Wiring Devices" for integral SPDs installed by receptacle manufacturer.

* + - 1. DEFINITIONS

Retain terms that remain after this Section has been edited for a project. See the Evaluations, particularly the "UL 1449 Requirements" Article, for expanded details of definitions below.

* + - * 1. Inominal: Nominal discharge current.
				2. MCOV: Maximum continuous operating voltage.
				3. Mode(s), also Modes of Protection: air of electrical connections where the VPR applies.
				4. MOV: Metal-oxide varistor; an electronic component with a significant non-ohmic current-voltage characteristic.
				5. NRTL: Nationally recognized testing laboratory.
				6. OCPD: Overcurrent protective device.
				7. SCCR: Short-circuit current rating.
				8. SPD: Surge protective device.
				9. Type 1 SPDs: Permanently connected SPDs intended for installation between the secondary of the service transformer and the line side of the service disconnect overcurrent device.
				10. Type 2 SPDs: Permanently connected SPDs intended for installation on the load side of the service disconnect overcurrent device, including SPDs located at the branch panel.
				11. Type 3 SPDs: Point of utilization SPDs.
				12. Type 4 SPDs: Component SPDs, including discrete components, as well as assemblies.
				13. Type 5 SPDs: Discrete component surge suppressors, such as MOVs that may be mounted on a printed wiring board, connected by its leads or provided within an enclosure with mounting means and wiring terminations.
				14. VPR: Voltage protection rating.
			1. SUBMITTALS
				1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
				2. Manufacturer’s installation instructions shall be provided along with product data.
				3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
				4. Product Data: For each type of product.

Include electrical characteristics, specialties, and accessories for SPDs.

See "UL 1449 Requirements" Article in the Evaluations for explanation of terms used in subparagraph below.

NRTL certification of compliance with UL 1449.

Tested values for VPRs.

Inominal ratings.

MCOV, type designations.

OCPD requirements.

Manufacturer's model number.

System voltage.

Modes of protection.

* + - * 1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
				2. Field quality-control reports.
				3. Sample Warranty: For manufacturer's special warranty.
			1. CLOSEOUT SUBMITTALS
				1. Maintenance Data: For SPDs to include in maintenance manuals.
			2. WARRANTY

When warranties are required, verify with Director’s Representative that warranties stated in this article are not less than remedies available to Director’s Representative under prevailing local laws. Most manufacturers offer 10-year extended warranties on their equipment. Verify available warranties and warranty periods.

* + - * 1. Manufacturer's Warranty: Manufacturer agrees to repair or replace SPDs that fail in materials or workmanship within [**five**] [**10**] <**Insert number**> years from date of Substantial Completion.
			1. Quality Control Submittals:
				1. List of Completed Installations: If brand names other than those specified are proposed for use, furnish the name, address, and telephone number of at least 5 comparable installations that can prove the proposed products have operated satisfactorily for one year.
				2. Company Field Advisor Data: Include:

Name, business address and telephone number of Company Field Advisor secured for the required services.

Certified statement from the Company listing the qualifications of the Company Field Advisor.

Services and each product for which authorization is given by the Company listed specifically for this project.

1. PRODUCTS

Manufacturers and products listed in SpecAgent and MasterWorks Paragraph Builder are neither recommended nor endorsed by the AIA or Deltek. Before inserting names, verify that manufacturers and products listed there comply with requirements retained or revised in descriptions and are both available and suitable for the intended applications.

* + - 1. TYPE 1 SURGE PROTECTIVE DEVICES (SPDs)

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=2236) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Eaton](http://www.specagent.com/Lookup?uid=123457151019).

[Schneider Electric USA, Inc](http://www.specagent.com/Lookup?uid=123457151024).

[Siemens Industry, Inc., Energy Management Division](http://www.specagent.com/Lookup?uid=123457151015).

Or equal.

* + - * 1. Source Limitations: Obtain devices from single source from single manufacturer.

See "SPD Types" Article in the Evaluations for discussion of applying Type 1 and Type 2 devices at service entrance locations.

* + - * 1. Standards:

Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 1449, Type 1.

* + - * 1. Product Options:

Retain first subparagraph below when specifying Type 1 SPD to be installed ahead of the service disconnect, when this disconnect is installed to facilitate maintenance.

Include integral disconnect switch.

Retain first subparagraph below to disconnect the SPD when low-current, high-impedance faults occur.

Include internal thermal protection that disconnects the SPD before damaging internal suppressor components.

Include indicator light display for protection status.

Include audible alarm.

Insert other contact forms and ratings when required by building power monitoring and control system. See "SPD Options" Article in the Evaluations for additional guidance.

Include NEMA ICS 5, dry Form C contacts rated at [**2 A and 24 V ac**] <**Insert values**> for remote monitoring of protection status.

Include surge counter.

* + - * 1. Performance Criteria:

See "Surge Protection Fundamentals" Article in the Evaluations for discussion of nominal system voltage.

MCOV: Not less than 125 percent of nominal system voltage for 208Y/120 V and 120/240 V power systems, and not less than 115 percent of nominal system voltage for 480Y/277 V power systems.

See "UL 1449 Requirements" Article in the Evaluations for guidance before retaining one of four options in "Peak Surge Current Rating" subparagraph below.

Peak Surge Current Rating: Minimum single-pulse surge current withstand rating per phase must not be less than [**160**] [**200**] [**240**] [**320**] <**Insert value**> kA. Peak surge current rating must be arithmetic sum of the ratings of individual MOVs in a given mode.

Retain one of first two subparagraphs below. Verify compatibility of peak surge current rating and VPR.

Protection modes and UL 1449 VPR for grounded wye circuits with [**480Y/277 V**] [**208Y/120 V**], three-phase, four-wire circuits must not exceed the following:

Line to Neutral: [**1200 V for 480Y/277 V**] [**700 V for 208Y/120 V**].

Line to Line: [**2000 V for 480Y/277 V**] [**1200 V for 208Y/120 V**].

Protection modes and UL 1449 VPR for 240/120 V, single-phase, three-wire circuits must not exceed the following:

Line to Neutral: 700 V.

Line to Line: 1200 V.

See "UL 1449 Requirements" Article in the Evaluations for discussion on SCCR selection in "SCCR" subparagraph below.

SCCR: Not less than [**100**] [**200**] <**Insert value**> kA.

See "UL 1449 Requirements" Article in the Evaluations for discussion on Inominal selection in "Inominal Rating" subparagraph below.

Inominal Rating: 20 kA.

* + - 1. TYPE 2 SURGE PROTECTIVE DEVICES (SPDs)

Retain this article for SPDs other than those installed before the service entrance OCPD. SPDs described in this article are required by NFPA 70 to be installed with OCPD and means of disconnect. The type and size of OCPD depends on the UL listing requirements. See "SPD Types" Article in the Evaluations.

See "SPD Types" Article in the Evaluations for discussion of applying Type 2 devices at load side of service entrance OCPD.

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=2238) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Eaton](http://www.specagent.com/Lookup?uid=123457151040).

[Schneider Electric USA, Inc](http://www.specagent.com/Lookup?uid=123457151045).

[Siemens Industry, Inc., Energy Management Division](http://www.specagent.com/Lookup?uid=123457151036).

Or equal.

* + - * 1. Source Limitations: Obtain devices from single source from single manufacturer.

See "SPD Types" Article in the Evaluations for discussion of applying Type 2 devices at service entrance requiring an OCPD.

* + - * 1. Standards:

Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 1449, Type 2.

Retain subparagraph below to require Type 2 SPDs to be co-listed as electromagnetic interference and radio-frequency interference filters. See the Evaluations for explanation of combining SPD and power-line noise filters.

Comply with UL 1283.

* + - * 1. Product Options:

Include LED indicator lights for power and protection status.

Retain first subparagraph below to disconnect the SPD when low-current, high-impedance faults occur.

Include internal thermal protection that disconnects the SPD before damaging internal suppressor components.

Include NEMA ICS 5, dry Form C contacts rated at [**2 A and 24 V ac**] <**Insert values**> for remote monitoring of protection status.

Include surge counter.

* + - * 1. Performance Criteria:

See "Surge Protection Fundamentals" Article in the Evaluations for discussion of nominal system voltage.

MCOV: Not less than 125 percent of nominal system voltage for 208Y/120 V and 120/240 V power systems, and not less than 115 percent of nominal system voltage for 480Y/277 V power systems.

See "UL 1449 Requirements" Article in the Evaluations for guidance before retaining one of two options in "Peak Surge Current Rating" subparagraph below. Generally, available surge current ratings are 480, 300, 250, 200, 150, and 100 kA; exact values vary among manufacturers.

Peak Surge Current Rating: Minimum single-pulse surge current withstand rating per phase must not be less than [**100**] [**150**] <**Insert value**> kA. Peak surge current rating must be arithmetic sum of the ratings of individual MOVs in a given mode.

Retain one of first two subparagraphs below. Verify compatibility of peak surge current rating and clamping voltage.

Protection modes and UL 1449 VPR for grounded wye circuits with [**480Y/277 V**] [**208Y/120 V**], three-phase, four-wire circuits must not exceed the following:

Line to Neutral: [**1200 V for 480Y/277 V**] [**700 V for 208Y/120 V**].

Line to Ground: [**1200 V for 480Y/277 V**] [**700 V for 208Y/120 V**].

Neutral to Ground: [**1200 V for 480Y/277 V**] [**700 V for 208Y/120 V**].

Line to Line: [**2000 V for 480Y/277 V**] [**1200 V for 208Y/120 V**].

Protection modes and UL 1449 VPR for 240/120 V, single-phase, three-wire circuits must not exceed the following:

Line to Neutral: 700 V.

Line to Ground: 700 V.

Neutral to Ground: 700 V.

Line to Line: 1200 V.

See "UL 1449 Requirements" Article in the Evaluations for discussion on SCCR selection in "SCCR" subparagraph below.

SCCR: Equal or exceed [**100**] [**200**] <**Insert value**> kA.

See "UL 1449 Requirements" Article in the Evaluations for discussion on Inominal selection in "Inominal Rating" subparagraph below.

Inominal Rating: [**20**] [**10**] kA.

* + - 1. TYPE 3, TYPE 4, AND TYPE 5 SURGE PROTECTIVE DEVICES (SPDs)
				1. Type 3, Type 4, and Type 5 SPDs are not approved for field installation.[**See "Related Requirements" Paragraph in "Summary" Article for products with manufacturer-installed Type 3, Type 4, and Type 5 SPDs.**]
			2. ENCLOSURES
				1. Indoor Enclosures: NEMA 250, Type 1.
				2. Outdoor Enclosures: NEMA 250, [**Type 3R**] [**Type 4X**].
			3. CONDUCTORS AND CABLES

Retain this article when SPD listing and specific manufacturer's written instruction permit lead adjustment in the field. Control cable specifications are not included in this Section because accessories include only dry contacts for remote status indication.

* + - * 1. Power Wiring: Same size as SPD leads, complying with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
1. EXECUTION
	* + 1. INSTALLATION
				1. Comply with NECA 1.
				2. Provide OCPD and disconnect for installation of SPD in accordance with UL 1449 and manufacturer's written instructions.
				3. Install leads between disconnects and SPDs short, straight, twisted, and in accordance with manufacturer's written instructions. Comply with wiring methods in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

Do not splice and extend SPD leads unless specifically permitted by manufacturer.

Do not exceed manufacturer's recommended lead length.

Do not bond neutral and ground.

* + - * 1. Use crimped connectors and splices only. Wire nuts are unacceptable.
			1. FIELD QUALITY CONTROL

Retain first paragraph below to require Contractor to perform tests and inspections.

* + - * 1. Perform the following tests and inspections with the assistance of a Company Service Advisor:

Compare equipment nameplate data for compliance with Drawings and the Specifications.

Inspect anchorage, alignment, grounding, and clearances.

Verify that electrical wiring installation complies with manufacturer's written installation requirements.

* + - * 1. SPDs that do not pass tests and inspections will be considered defective.
				2. Prepare test and inspection reports.
			1. STARTUP SERVICE
				1. Complete startup checks in accordance with manufacturer's written instructions.
				2. Do not perform insulation-resistance tests of the distribution wiring equipment with SPDs installed. Disconnect SPDs before conducting insulation-resistance tests; reconnect them immediately after the testing is over.
				3. Energize SPDs after power system has been energized, stabilized, and tested.
			2. DEMONSTRATION
				1. [**Engage a Company Service Advisor to train**] [**Train**] Director’s Representative's maintenance personnel to operate and maintain SPDs.

END OF SECTION 264313