

SECTION XX XX XX –SURGE PROTECTION DEVICES FOR TYPE 1 AND TYPE 2 LOW-VOLTAGE (LESS THAN 1000 VOLTS AC) ELECTRICAL POWER CIRCUITS

1.0 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

This Section covers Surge Protective Device(s) Type 1 (formally known as Secondary Surge Arrestor(s)) and Type 2 Surge Protective Device(s) (formally known as Transient Voltage Surge Suppressors or TVSS) for low-voltage power, control, and communication equipment and shall provide effective protection against transient surges induced on to power or control lines by lightning, utility load switching and/or downstream equipment contamination. All Type 1 and Type 2 SPDs shall be listed for purpose to *ANSI/UL Standard 1449 Third Edition* and shall be in compliance with *Article 285 of the NEC*. Device modes of protection are to be in compliance with the recommendations of *IEEE Std C62.72TM-2007 IEEE Guide for the Application of Surge-Protective Devices for Low-Voltage (1000 V or Less) AC Power Circuits*.

1.3 DEFINITIONS

- A. ATS: Acceptance Testing Specifications
- B. I_n : Repetitive Discharge Ratings
- C. MCOV: Maximum Continuous Operating Voltage
- D. NEC: National Electric Code
- E. NRTL: Nationally Recognized Testing Laboratory
- F. OSHA: Occupational Safety and Health Organization
- G. SPD: Surge Protection Device
- H. TOV: Temporary Over Voltage
- I. VPR: Voltage Protection Rating

1.4 SUBMITTALS

A. Product Data: For each type of product indicated, include rated capacities, operating and physical characteristics, standard features and available accessories and/or options. Include listed documents:

1. VPR Ratings
2. Symmetrical fault current ratings
3. I_n Ratings
4. NRTL Authorization to Produce Documents in order to Confirm Product Listing and Rating Claims

B. Product Certifications: For SPDs listed by NRTL agencies certifying compliance with industry requirement to the following standards:

1. UL 1283
2. UL 1449 Third Edition (effective September 2009)
3. IEEE C62 Guidelines

C. Qualification Data: OSHA approved NRTL.

D. Field quality-control test reports, including the following:

1. Test procedures used. Include single impulse testing data that matches label rating(s).
2. Test results that comply with requirements.

E. Operational and Maintenance Data: include operational and maintenance manuals and emergency procedures for SPDs.

F. Warranties: As specified in Section 1.8.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent testing agency, with the experience and capability to conduct the testing indicated, that is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

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

- C. Product Options:** Drawings indicate size, dimensional requirements and electrical performance of SPDs and are based on specific system indicated. Refer to Division 01 Section “Product requirements.”
- D. Electrical Components, Devices and Accessories:** Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- E. Comply with:** IEEE C62.41, “IEEE Guide for Surge Voltages in Low Voltage AC Power Circuits,” and test devices according to IEEE C62.45, “IEEE Guide on Surge Testing for Equipment Connected to Low-Voltage AC Power Circuits.”
- F. Comply with:** UL 1283, “Electromagnetic Interference Filters.”
- G. Comply with:** UL 1449 3rd Edition, “Surge Protective Devices” and Listed as a SPD device.
- H. Tested and Listed by:** a NRTL as a complete assembly to a symmetrical fault current rating equal to or greater than the fault current rating of the connected panel, in accordance with NEC Article 285.

1.6 PROJECT CONDITIONS

- A. Existing Utilities:** Do not interrupt service to facilities occupied by Owner or other unless permitted under the following conditions and then only after arranging to provide temporary utility services according to the requirements indicated:
1. Notify owner not less than two (2) days in advance of proposed utility interruptions.
 2. Do not proceed with utility interruptions without owner’s written permission.
- B. Service Conditions:** Rate SPD devices for continuous operation under the following conditions, unless otherwise indicated:
1. Maximum Continuous Operating Voltage: Not less than 125 percent of nominal system operating voltage for 120Volt systems and not less than 115 percent for 277Volt or 480Volt systems.
 3. Operating Temperature: -40 to +185 degrees F (-40 to +85 degrees C).
 4. Humidity: 0 to 95 percent, non-condensing.

5. Altitude: Less than 20,000 feet (6090 meters) above sea level.

C. Internally-Generated Environmental Influence:

1. Audible Noise: No audible noise under normal operating conditions
2. Surface Temperature: Less than 131 degrees F (55 degrees C).

1.7 COORDINATION

A. Coordinate locations: of the field mounted SPDs so as to allow for adequate clearances for maintenance.

B. Coordinate SPDs with: “Electrical Power Monitoring and Control.”

1.8 WARRANTY

Special Warranties for Wall Mounted SPDs: Manufacturer’s standard form in which manufacturer agrees to repair or replace components of SPD that fail in material or workmanship within ten (10) years from date of Substantial Completion.

2.0 PRODUCTS

2.1 MANUFACTURES

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

1. Meter-Treater, Inc.
2. Approved Equivalent

2.2 SERVICE ENTRANCE TYPE 1 and 2 SPDs MPT SERIES (MODULAR)

A. Surge Protection Device Description: A Modular (per phase) design with field-replaceable modules. SPDs are to be available with the following features, accessories and options:

1. SPD tested to 100 thousand amperes available symmetrical fault.
2. Fabrication using bolted compression lugs for interface wiring to service phase(s), neutral and ground connections.
3. Multiple suppression circuits with current sharing.
4. Field replaceable surge protection modules.
5. Utilize internal copper bus bars (plated) for bolted connections to phase buses.
6. Module LED indicator lights for power and protection status per module including neutral-to-ground.

7. Front Panel monitoring system capable of indicating the number of transients.
 8. Front Panel LED indicator lights for power and protection status per phase plus neutral-to-ground status.
 9. Audible alarm, with silencing switch, to indicate when protection has failed.
 10. A set of form C dry contacts for remote monitoring of protection status.
 11. Total in-field serviceability for all replaceable components including the complete diagnostic system.
- B. Per Module Surge Current Rating:** [300] [200] [100]kA per phase. For all wye systems an additional 50kA per module is provided for the neutral-to-ground mode.
1. Protection modes and UL1449 VPR ratings for grounded wye circuits with voltages of [480Y/277] [208Y/120], 3-phase, 4-wire circuits plus ground shall be as follows:
 - a. Line-to-Neutral: [1000V for 480Y/277] [700V for 208Y/120].
 - b. Line-to-Ground: [1000V for 480Y/277] [700V for 208Y/120].
 - c. Neutral-to-Gnd: [1000V for 480Y/277] [700V for 208Y/120].
 - d. Line-to-Line: [2000V for 480Y/277] [1500V for 208Y/120].
 2. Protection modes and UL1449 VPR for 240/120-V, single-phase, 3-wire circuits plus ground shall be as follows:
 - a. Line-to-Neutral: 700V.
 - b. Line-to-Ground: 700V.
 - c. Neutral-to-Ground: 700V.
 - d. Line-to-Line: 1500V
 3. Protection modes and UL1449 VPR for 240/120-V, 3-phase, 4-wire circuits with high leg shall be as follows:
 - a. Line-to-Neutral: 700V, 1000V from high leg.
 - b. Line-to-Ground: 700V/1000V from high leg.
 - c. Neutral-to-Ground: 700.
 - d. Line-to-Line: 1500/1800V from high leg

4. Protection modes and UL1449 VPR for voltages of 240 or 480 3-phase, 3-wire, delta circuits shall be as follows:
 - a. Line to Line: **[2000V for 240V] [4000V for 480V]**.
 - b. Line to Ground: **[1000V for 240V] [1800V for 480V]**.

B. EMI-RFI noise rejection or attenuation: -50dB @ 100kHz (Mil Std. 220A)

C. Connection Means: Permanently connected.

2.3 SERVICE ENTRANCE AND BRANCH PANEL TYPE 1 and 2 SPDs *BPT* *SERIES* (NON-MODULAR)

A. Surge Protection Device Description: A Non-modular design that is both field-replaceable and upgradeable. SPDs are to be available with the following features, accessories and options:

1. SPD tested to 100 thousand amperes available fault current.
2. Fabrication using terminal block screw lugs for interface wiring to service phase(s), neutral and ground connections.
3. Multiple suppression circuits with current sharing.
4. Field replaceable surge protection assembly.
5. Front Panel monitoring system capable of indicating the number of transients.
6. Front Panel LED indicator lights for power and protection status per phase plus neutral-to-ground status.
7. Audible alarm, with silencing switch, to indicate when protection has failed.
8. A set of form C dry contacts for remote monitoring of protection status.
9. Total in-field serviceability for all replaceable components including the complete diagnostic system.

B. Per Phase Surge Current Rating: **[200] [100]**kA per phase.

1. Protection modes and UL1449 VPR ratings for grounded wye circuits with voltages of **[480Y/277] [208Y/120]**, 3-phase, 4-wire circuits plus ground shall be as follows:
 - a. Line-to-Neutral: **[1000V for 480Y/277] [600V for 208Y/120]**.
 - b. Line-to-Ground: **[1000V for 480Y/277] [600V for 208Y/120]**.
 - c. Neutral-to-Gnd: **[1000V for 480Y/277] [600V for 208Y/120]**.

- d. Line-to-Line: [2000V for 480Y/277] [1200V for 208Y/120].
- 2. Protection modes and UL1449 VPR for 240/120-V, single-phase, 3-wire circuits plus ground shall be as follows:
 - a. Line-to-Neutral: 600V.
 - b. Line-to-Ground: 600V.
 - c. Neutral-to-Ground: 600V.
 - d. Line-to-Line: 1200V
- 3. Protection modes and UL1449 VPR for 240/120-V, 3-phase, 4-wire circuits with high leg shall be as follows:
 - a. Line-to-Neutral: 600V, 1000V from high leg.
 - b. Line-to-Ground: 600V/1000V from high leg.
 - c. Neutral-to-Ground: 600V.
 - d. Line-to-Line: 1200/1800V from high leg
- 4. Protection modes and UL1449 VPR for voltages of 240 or 480 3-phase, 3-wire, delta circuits shall be as follows:
 - a. Line to Line: [2000V for 240V] [4000V for 480V].
 - b. Line to Ground: [1000V for 240V] [1800V for 480V].

C. EMI-RFI noise rejection or attenuation: -50dB @ 100kHz (Mil Std. 220A)

D. Connection Means: Permanently connected.

2.4 SERVICE AND/OR EQUIPMENT PANEL TYPE 1 & 2 SPDs MST SERIES (MODULAR)

A. Surge Protection Device Description: A Modular design with a single multi-phase field-replaceable module. SPDs are to be available with the following features, accessories and options:

- 1. SPD tested to 100 thousand amperes available symmetrical fault.
- 2. Fabrication using bolted compression lugs for interface wiring to service phase(s), neutral and ground connections.
- 3. Field replaceable (single or polyphase) surge protection module.
- 4 Diagnostic/Status LED indicator lights are incorporated into the protection module.

5. Total in-field serviceability for all replaceable components including the complete diagnostic system.

B. Per Phase Surge Current Rating: [100] [50]kA per phase.

1. Protection modes and UL1449 VPR ratings for grounded wye circuits with voltages of [480Y/277] [208Y/120], 3-phase, 4-wire circuits plus ground shall be as follows:
 - a. Line-to-Neutral: [1000V for 480Y/277] [600V for 208Y/120].
 - b. Line-to-Ground: [1000V for 480Y/277] [600V for 208Y/120].
 - c. Neutral-to-Gnd: [1000V for 480Y/277] [600V for 208Y/120].
 - d. Line-to-Line: [2000V for 480Y/277] [1200V for 208Y/120].
2. Protection modes and UL1449 VPR for 240/120-V, single-phase, 3-wire circuits plus ground shall be as follows:
 - a. Line-to-Neutral: 600V.
 - b. Line-to-Ground: 600V.
 - c. Neutral-to-Ground: 600V.
 - d. Line-to-Line: 1200V
3. Protection modes and UL1449 VPR for 240/120-V, 3-phase, 4-wire circuits with high leg shall be as follows:
 - a. Line-to-Neutral: 600V, 1000V from high leg.
 - b. Line-to-Ground: 600V/1000V from high leg.
 - c. Neutral-to-Ground: 600V.
 - d. Line-to-Line: 1200/1800V from high leg
4. Protection modes and UL1449 VPR for voltages of 240 or 480 3-phase, 3-wire, delta circuits shall be as follows:
 - a. Line to Line: [2000V for 240V] [4000V for 480V].
 - b. Line to Ground: [1000V for 240V] [1800V for 480V].

C. Connection Means: Permanently connected.

2.5 SERVICE ENTRANCE, BRANCH OR EQUIPMENT TYPE 1 and 2 SPDs

RCHW SERIES (NON-MODULAR)

- A. Surge Protection Device Description:** A non-modular self-contained design with 36 inch long # 10AWG wire leads. SPDs are to be available with the following features, accessories and options:
1. SPD tested to 100 thousand amperes available fault current.
 2. Fabrication using a chase nipple lug for interface wiring to service phase(s), neutral and ground connections.
 4. Diagnostic/Status LED indicator lights are incorporated into the unit's end caps.
 5. Audible alarm to indicate when protection has failed is optional.
 6. A set of form C dry contacts for remote monitoring is optional.
 7. A flush mount kit is optional.
- B. Per Phase Surge Current Rating:** [100] [50]kA per phase.
1. Protection modes and UL1449 VPR ratings for grounded wye circuits with voltages of [480Y/277] [208Y/120], 3-phase, 4-wire circuits plus ground shall be as follows:
 - a. Line-to-Neutral: [1000V for 480Y/277] [600V for 208Y/120].
 - b. Line-to-Ground: [1000V for 480Y/277] [600V for 208Y/120].
 - c. Neutral-to-Gnd: [1000V for 480Y/277] [600V for 208Y/120].
 - d. Line-to-Line: [2000V for 480Y/277] [1200V for 208Y/120].
 2. Protection modes and UL1449 VPR for 240/120-V, single-phase, 3-wire circuits plus ground shall be as follows:
 - a. Line-to-Neutral: 600V.
 - b. Line-to-Ground: 600V.
 - c. Neutral-to-Ground: 600V.
 - d. Line-to-Line: 1200V
 3. Protection modes and UL1449 VPR for 240/120-V, 3-phase, 4-wire circuits with high leg shall be as follows:
 - a. Line-to-Neutral: 600V, 1000V from high leg.
 - b. Line-to-Ground: 600V/1000V from high leg.
 - c. Neutral-to-Ground: 600V.

- d. Line-to-Line: 1200/1800V from high leg
- 4. Protection modes and UL1449 VPR for voltages of 240 or 480 3-phase, 3-wire, delta circuits shall be as follows:
 - a. Line to Line: [**2000V for 240V**] [**4000V for 480V**].
 - b. Line to Ground: [**1000V for 240V**] [**1800V for 480V**].

C. EMI-RFI noise rejection or attenuation: -50dB @ 100kHz (Mil Std. 220A)

D. Connection Means: Permanently connected.

3.0 SPECIFICATION MODIFICATIONS

- A. These specifications are subject to change without notice, due to any of the following:
 - 1. Product innovations
 - 2. Modifications to application requirements
 - 3. Revisions of industry safety requirements