SECTION 26 43 13

SURGE PROTECTIVE DEVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Surge Protective Devices (SPDs) integrated into electrical distribution equipment.

1.2 RELATED SECTIONS

A. 26 23 00 Low Voltage Switchgear

B. 26 24 14 Low Voltage Individually Mounted Switchboards

C. 26 24 13 Low Voltage Group Mounted Switchboards

D. 26 24 16 Lighting and Appliance Panelboards

1.3 REFERENCE STANDARDS

A. The equipment and components in this specification shall be designed and manufactured according to latest revision of the following standards (unless otherwise noted).

B. ANSI/IEEE C62.41.1-2002, Guide on the Surge Environment in Low Voltage AC Power Circuits.

C. ANSI/IEEE C62.41.2-2002, Recommended Practice on Characterization of Surges in Low Voltage AC Power Circuits.

D. ANSI/IEEE C62.45-2002, Recommended Practice on Surge Testing for Equipment Connected to Low Voltage AC Power Circuits.

E. IEEE C62.62-2000, Test Specifications for Surge Protective Devices for Low Voltage AC Power Circuits.

F. Military Standard 220B, 24 January 2000 Release. Method of Insertion Loss Measurement

G. UL 1449, Third Edition – Surge Protective Devices

H. UL 1283, Electromagnetic Interference Filters

I. UL 67, Panelboards

J. UL 891, Dead-Front Switchboards

K. UL 96A Lightning Protection Systems

L. NEMA LS-1 (1992), Low Voltage Surge Protective Devices

M. NFPA 70 National Electrical Code – Article 285

1.4 SYSTEM DESCRIPTION

A. SPDs shall be applied at Service Entrance and Secondary Electrical Panels as indicated on drawings.

1.5 SUBMITTALS

A. Section 01 33 00 – Submittal Procedures: Requirements for submittals.

B. Product Data: Submit catalog data showing the following:
1. Maximum Single Impulse Surge Current Rating
2. Surge Life (Repetitive Surge) Rating
3. UL1449 Third Edition Voltage Protection Ratings (VPR)
4. UL1449 Third Edition Nominal Discharge Current (In)

C. Upon request, provide copies of third party lab test reports for Maximum Single Impulse Surge Current Rating and Surge Life Rating.

1.6 INSTALLATION, OPERATION AND MAINTENANCE DATA

A. Section 01 70 00 – Execution and Closeout Requirements: Requirements for submittals.

1.7 QUALITY ASSURANCE (QUALIFICATIONS)

A. Manufacturer shall have specialized in the manufacture and assembly of surge suppression systems for 3 years.

B. SPDs shall be listed by Underwriters Laboratories in accordance with the applicable standards found in Section 1.03 of this specification. UL Type 4 assemblies are allowed, provided they have been investigated by UL for Type 1 or Type 2 Locations and are approved as suitable for use within the specified electrical panel or gear. SPDs shall not require additional UL testing or field investigation to maintain the equipment's UL listing.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Contractor shall store, protect, and handle products in accordance with recommended practices listed in manufacturer's Installation and Maintenance Manuals.

B. Contractor shall inspect and report concealed damage to carrier within 48 hours.

C. Contractor shall store in a clean, dry space. Cover with heavy canvas or plastic to keep out dirt, water, construction debris, and traffic. Heat enclosures to prevent condensation.

D. Contractor shall handle in accordance with manufacturer's recommendations to avoid damaging equipment, installed devices, and finish.

1.9 PROJECT CONDITIONS (SITE ENVIRONMENTAL CONDITIONS)

A. Follow (standards) service conditions before, during and after switchboard installation.

B. The equipment containing SPDs shall be located in well ventilated areas, free from excess humidity, dust and dirt and away from hazardous materials. Ambient temperature of area immediately surrounding the SPD shall be between minus 40 and plus 65 degrees C. Indoor locations shall be protected to prevent moisture from entering enclosure.

C. Operating frequency: 50 or 60 Hz.

D. Humidity: 95 percent relative humidity, non-condensing

E. Operating Altitude: 0 - 12,000 ft

1.10 WARRANTY

A. Manufacturer warrants equipment to be free from defects in materials and workmanship for 5 years from date of purchase.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. General Electric Company’s protection products have been used as the basis for design. Other manufacturers' products of equivalent quality, dimensions and operating features may be acceptable, at the Engineer's discretion; if they comply with all requirements specified or indicated in these Contract documents. The SPD and Distribution Equipment shall be manufactured by the same company.

2.2 MANUFACTURED ASSEMBLIES

A. Furnish General Electric Tranquell Series SPDs as indicated in drawings.

2.3 COMPONENTS

A. Refer to Drawings:
   1. For actual layout and location of equipment and components; current ratings of devices, bus bars, and components; voltage ratings of devices, components and assemblies; and other required details.

B. Electrical Requirements
   1. Maximum Single Impulse Surge Current Rating
      a. Shall be based on the testing of a complete SPD including fuses and all components that make up the SPD assembly using an IEEE C62.41, 8x20us current wave applied at the maximum, per mode rated value of

the SPD. Devices that derive a per mode rating by adding test results of individual components are not acceptable.

2. Surge Life Rating
   a. Shall be determined by the application of an 8x20us, 10kA short circuit Category C High test waveform across the SPD as defined by ANSI/IEEE C62.41.2-2002. The test wave shall be injected at one-minute intervals until the conclusion of the test or device failure. A failure is defined as either performance degradation or more than 10% deviation of clamping voltage at the specified surge current.
3. Surge Current Ratings shall be as follows:
   a. Service Entrance Locations
      (1) Maximum Single Impulse Surge Current Rating: 150kA per mode.
      (2) UL 1449 Nominal Discharge Current Rating (In): 20kA
      (3) Minimum Surge Life Rating: 20,000 IEEE C62.41 C-High (C3) impulses
   b. Distribution Locations
      (1) Maximum Single Impulse Surge Current Rating: **80**kA per mode.
      (2) UL 1449 Nominal Discharge Current Rating (In): 20kA
      (3) Minimum Surge Life Rating: 5,000 IEEE C62.41 C-High (C3) impulses
   c. Branch and Lighting Panels
      (1) Maximum Single Impulse Surge Current Rating: [100] [80] [**65**] kA per mode.
      (2) UL 1449 Nominal Discharge Current Rating (In): 20kA
      (3) Minimum Surge Life Rating: 5,000 IEEE C62.41 C-High (C3) impulses
4. The UL assigned Voltage Protection Rating (VPR) shall be tested in accordance with UL 1449, 3rd Edition. Where an integral disconnect is provided, the VPR shall be determined with the integral disconnect included. The VPR rating shall not exceed the values of the following tables.
   a. UL 1449 3rd Edition Voltage Protection Ratings (VPR) with integral disconnect.

SPD Voltage Rating	**System Configuration**	**L-N**	**N-G**	**L-G**	**L-L**
120/208-240	WYE (or) Single-Split Phase	900	900	900	1200
277/480	WYE	900	900	900	1200
347/600	WYE	1500	1500	1500	2000
240	Delta	1500	1500	1500	3000
480	Delta			1500	2000

   b. UL 1449 3rd Edition Voltage Protection Ratings (VPR) without integral disconnect.

SPD Voltage Rating	System Configuration	L-N	N-G	L-G	L-L
120/208-240	WYE (or) Single-Split Phase	700	700	700	1200
277/480	WYE	700	700	700	1200
347/600	WYE	1200	1200	1200	2000
240	Delta	1500	1500	1500	3000
480	Delta			900	1800

C. SPD Emission Ratings
   1. Audible Noise: No Audible Noise
   2. Surface Temperature: less than 55°C

D. General Performance and Design Requirements
   1. SPD shall be UL witness tested to a fault current rating equal to or greater than the fault current rating of the distribution equipment. The SPD short-circuit current (SCCR) rating shall be marked on the SPD in accordance with the requirements of UL 1449 and NEC Article 285.
   2. The use of smaller, electronic grade (<40mm) MOVs is not acceptable. SPDs that use gas tubes, silicon avalanche diodes or selenium rectifiers or combinations of these components along with MOVs are not acceptable.
   3. SPDs shall provide protection in each of the following modes: L-N, L-G, N-G, and L-L for WYE Systems. L-G and L-L for Delta Systems.
   4. The Maximum Continuous Operating Voltage (MCOV) for all voltage configurations shall be at least 115% of nominal on 480/277 volt systems and 125% of nominal on 240-208/120 volt systems.
   5. EMI/RFI Noise Suppression: -50 dB attenuation at 100 kHz, tested per MIL-STD 220B.
   6. The SPD fusing system shall be capable of allowing the rated Maximum Single Impulse Surge Current to pass without premature fuse operation. SPDs utilizing a fusing system that opens at or below the Maximum Single Impulse Surge Current rating are unacceptable.
   7. SPDs shall include integral fusing for each suppression component. Designs that rely solely on an electrical panel's main breaker to interrupt fault currents resulting from a shorted suppression component are not allowed.
   8. The use of plug-in type suppression modules is not allowed.
   9. SPDs installed in main switchgear, switchboards, or other service entrance locations shall have an integral non-fused disconnect, independently tested to the maximum surge current rating of the device. SPDs installed in distribution or branch panel locations shall be either direct connected to the main bus or via a dedicated branch breaker.

E. Standard Monitoring Features
   1. Green LED operational status indicator per each protected phase.
   2. Audible alarm with Red LED alarm status indicator and test / silence switch, enabled via a front panel pushbutton switch.

3. Dry contacts for remote monitoring purposes, 1NO & 1NC contact. Change in state indicated on MOV failure.
4. Six-Digit Digital Surge Event Counter with battery backup.

F. SPDs shall be factory-mounted integral to the electrical distribution equipment and shall not violate the equipment manufacturer's UL label.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Verify in the field that all factory made connections and terminations are torqued to manufacturer's recommended tolerances. Also, all field-made connections shall be torqued to manufacturer's recommendations using calibrated torquing tools.

3.2 CLEANING AND ADJUSTMENT

A. After completion, clean the interior and exterior of dirt, paint and construction debris.

B. Touch up paint all scratched or marred surfaces with factory furnished touch-up paint of the same color as the factory applied paint.

C. Adjust and align panelboard interior and trim in accordance with manufacturer's recommendations, and to eliminate gaps between the two.

END OF SECTION 26 43 13