

2.5 SYSTEM COMPONENTS:

A. Programmable Electronic Sounders:

- Electronic sounders shall operate on 24 VDC nominal.
- Electronic sounders shall be field programmable without the use of special tools, to provide slow whoop, continuous, or interrupted tones with an output sound level of at least 60 dBA measured at 10 feet from the device.
- Shall be flush or surface mounted as shown on plans.

B. Strobe lights shall meet the requirements of the ADA, UL Standard 1971 and shall meet the following criteria:

- The maximum pulse duration shall be 210 of one second.
- Strobe intensity shall meet the requirements of UL 1971.
- The flash rate shall meet the requirements of UL 1971.

C. Manual Fire Alarm Stations

- Manual fire alarm stations shall be non-code, non-breakglass type, equipped with key lock so that they may be tested without operating the handle.
- Stations must be designed such that after an actual activation, they cannot be restored to normal except by key reset.
- An operated station shall automatically condition itself so as to be visually detected as operated, at a minimum distance of 100 feet (30.5m) front or side.
- Manual stations shall be constructed of high impact Lexan, with operating instructions provided on the cover. The word FIRE shall appear on the manual station in letters one half inch (12.7mm) in size or larger.

D. Conventional Photoelectric Area Smoke Detectors

- Photoelectric smoke detectors shall be a 24 VDC, two wire, ceiling-mounted, light scattering type using an LED light source.
- Each detector shall contain a remote LED output and a built-in test switch.
- Detector shall be provided on a test-lock base.
- It shall be possible to perform a calibrated sensitivity and performance test on the detector without the need for the generation of smoke. The test method shall test all detector circuits.
- A visual indication of an alarm shall be provided by dual latching Light Emitting Diodes (LEDs), on the detector, which may be seen from ground level over 360 degrees. These LEDs shall flash every 10 seconds, indicating that power is applied to the detector.
- The detector shall not go into alarm when exposed to air velocities of up to 3000 feet (914.4m) per minute.
- The detector screen and cover assembly shall be easily removable for field cleaning of the detector chamber.
- All field wire connections shall be made to the base through the use of a clamping plate and screw.

E. Duct Smoke Detectors

- Duct smoke detectors shall be a 24 VDC type with visual alarm and power indicators, and a reset switch. Each detector shall be installed upon the composite supply/return air duct(s), with properly sized air sampling tubes.

F. Automatic Conventional Heat Detectors

- Automatic heat detectors shall have a combination rate of rise and fixed temperature rated at 135 degrees Fahrenheit (57.2 Celsius) for areas where ambient temperatures do not exceed 100 degrees (37.7 Celsius), and 200 degrees (93.33 Celsius) for areas where the temperature does not exceed 150 degrees (65.5 Celsius).
- Automatic heat detectors shall be a low profile, ceiling mount type with positive indication of activation.
- The rate of rise element shall consist of an air chamber, a flexible metal diaphragm, and a factory calibrated, moisture-proof, trouble free vent, and shall operate where the rate of temperature rise exceeds 15 degrees F (8.4 degrees C) per minute.
- The fixed temperature element shall consist of a fusible alloy retainer and actuator shaft.
- Automatic heat detectors shall have a smooth ceiling rating of 2500 square feet (762 square meters).

PART 3.0 - EXECUTION

3.1 INSTALLATION:

- Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.

- All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.

- Junction boxes shall be the color red.

- All fire detection and alarm system devices, control panels and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.

- Manual pull stations shall be suitable for surface mounting on matching backbox, or semiflush mounting on standard single gang box, and shall be installed at 48 inches above the finished floor.

3.2 TEST:

- Provide the service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment to technically supervise and participate during all of the adjustments and tests for the system.

- Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.

- Close each sprinkler system control valve and verify proper supervisory alarm at the FACP.

- Verify activation of all flow switches.

- Open initiating device circuits and verify that the trouble signal actuates.

- Open and short Notification appliance circuits and verify that the trouble signal actuates.

- Ground device circuits and verify response of trouble signals.

- Check proper operation of all alarm notification devices.

- Check installation, supervision, and operation of smoke detectors.

- Verify that each initiating device alarm signal is properly received and processed by the fire alarm control panel (Walk Test).

- Conduct tests to verify trouble indications for common mode failures, such as altering current power failure.

3.3 FINAL INSPECTION:

- At the final inspection a factory trained representative of the manufacturer of the major equipment shall demonstrate that the systems function properly in every respect.

3.4 INSTRUCTION:

- Provide instruction as required to the building personnel and fire and safety personnel. "Hands-on" demonstrations of the operation of the system shall be provided.

END OF SECTION

SURGE PROTECTION DEVICE

1.1 SUMMARY

These specifications describe the electrical and mechanical requirements for a hybrid electrical transient surge suppression filter system integrating both transient voltage surge suppression (TVSS) and electrical high frequency noise filtering for exposure locations as defined in ANS/IEEE C82.41-1991. The unit shall be designed for parallel connection to the facility's wiring system. The suppression filter system shall be designed and manufactured in the USA by a qualified manufacturer of suppression filter system equipment. The qualified manufacturer shall have been engaged in the commercial design and manufacture of such products for a minimum of five (5) years. These specifications are based on Current Technology's TransGuard-TG suppression filter systems. Other manufacturers shall provide detailed compliance or exception statements, along with required test documentation, to all provisions of this specification fourteen (14) days prior to bid.

1.2 STANDARDS

The specified unit shall be designed, manufactured, tested and installed in compliance with the following standards:
ANS/IEEE C82.41-1991 and C82.45-1992;
ANS/IEEE C82.1 and C82.11;
Canadian Standards; (CUL);
Federal Information Processing Standards Publication 94 (FIPS PUB 94);
National Electrical Manufacturers Association (NEMA LS-1992 Guidelines);
National Fire Protection Association (NFPA 70 (NEC) 75, and 78);
Underwriters Laboratories UL 1449 Third Edition and 1283;
Underwriters Laboratories UL 149 and UL 158;
Underwriters Laboratories 249-1.
The unit shall be UL 1449 Third Edition Listed and CUL Approved as a Transient Voltage Surge Suppressor and UL 1283 Listed as an Electromagnetic Interference Filter.

1.3 ENVIRONMENTAL REQUIREMENTS

- 1.3.1 Storage Temperature. Storage temperature range: -40d to 85d C (-40d to +185d F).
- 1.3.2 Operating Temperature. Operating temperature range: -40d to +60d C (-40d to +185d F).
- 1.3.3 Relative Humidity. Reliable operation with 5% to 95% non-condensing relative humidity.
- 1.3.4 Audible Noise. The unit shall not generate any audible noise.
- 1.3.5 Magnetic Fields. No appreciable magnetic fields shall be generated. Unit shall be capable of use in computer rooms without danger to data storage systems or devices.

2.0 ELECTRICAL REQUIREMENTS

2.1 Unit Operating Voltage

The nominal unit operating voltage and configuration shall be as indicated on the drawings. For voltage configurations not listed, contact factory.

2.2 Maximum Continuous Operating Voltage (MCOV)

The MCOV shall be greater than 115% of nominal voltage for all TransGuard products. All Current Technology suppression filter systems maximum continuous operating voltages are in compliance with test and evaluation procedures outlined in NEMA LS 1-1992, paragraphs 2.2.6 and 3.6.

2.3 Operating Frequency

Protection frequency range shall be 47 to 63 Hertz.

2.4 Protection Modes

All protected modes are defined per NEMA LS-1-1992, paragraph 2.2.7. Following IEEE Standard 1100-1992, section 3.11.2 recommendations, TransGuard units shall provide protection in all modes. WYE configured systems shall provide Line-to-Neutral, Line-to-Line, Line-to-Line and Neutral-to-Ground protection. DELTA configured systems shall provide Line-to-Line protection and Line-to-Ground protection.

2.5 Rated Single Pulse Surge Current Capacity

The rated single pulse surge current capacity, in amps, for each mode of protection of the unit shall be no less than as follows: L-N 80,000A, L-G 80,000A, N-G 80,000A, L-L 80,000A & Per Phase 80,000A.

2.6 Tested Single Pulse Surge Current Capacity

In compliance with NEMA LS-1-1992, paragraphs 2.2.9 and 3.9, Current Technology suppression filter systems are single pulse surge current tested in all modes at rated surge currents by an industry recognized independent test laboratory. Single pulse surge current capacities of 200,000 amps or less are established by single-unit testing of all components within each mode. Due to present industry test equipment limitations, single pulse surge current capacities over 200,000 amps are established via testing of individual components or sub-assemblies within a mode. The test shall include a UL 1449 Third Edition surge defined as a 1.2 X 50 micro-sec, 600V open circuit voltage waveform and an 8 X 20 micro-sec, 500A short circuit current waveform to benchmark the unit's suppression voltage, followed by a single pulse surge of maximum rated surge current (for units rated over 200,000A per mode, components or sub-assemblies are tested) magnitude with an approximated 8 X 20 micro-sec waveform. To complete the test, another UL1449 surge shall be applied to verify the unit's survival. Survival is achieved if the suppression voltage measured from the two UL1449 surges does not vary by more than 10%.

2.7 Minimum Repetitive Surge Current Capacity

Per ANS/IEEE C82.41-1991 and ANS/IEEE C82.45-1992, all Current Technology suppression filter systems are repetitive surge current capacity tested in every mode utilizing a 1.2 X 50 micro-sec, 20 KV open circuit voltage, 8 X 20 micro-sec, 10 KA short circuit current Category C3 wave at one minute intervals without suffering either performance degradation or more than 10% deviation of clamping voltage at the specified surge current. Ref Impulses=4,000.

2.8 NEMA LS-1992 Clamping Voltage Data

All Current Technology suppression filter system clamping voltages are in compliance with test and evaluation procedures outlined in NEMA LS-1-1992, paragraphs 2.2.10 and 3.10. Maximum clamping voltages for TransGuard units without and with an integral disconnect are as follows.

Voltage	Mode	TC80				
		B3 Ringwave	8kV/500A Wave	B3C1 Wave	C3 Wave	
120/208	L-G	400 / 425	350 / 350	400 / 450	575 / 725	
	N-G	325 / 325	325 / 325	450 / 475	800 / 700	
	L-L	400 / 475	625 / 625	725 / 775	875 / 1100	

2.9 Unit UL1449 Third Edition Suppression Voltage Ratings

The UL 1449 Third Edition listed suppression voltage ratings shall be published, as assigned by Underwriters Laboratories utilizing the test procedure described in section 4.3 of this document titled UL 1449 Third Edition Suppression Voltage Performance Testing.

2.10 High Frequency Extended Range Power Filter

All Current Technology TransGuard suppression filter systems EM-RFI noise rejection or attenuation values are in compliance with test and evaluation procedures outlined in NEMA LS-1-1992, paragraphs 2.2.11 and 3.11.

Attenuation Frequency	50KHz	100KHz	500KHz	1MHz	5MHz	10MHz	50MHz	100MHz
100	47	50	37	37	37	38	47	53

The TransGuard suppression filter system shall function in conjunction with other suppression filter devices of the same manufacturer via coordinated filters within the facility-wide MasterPlan suppression filter system that provide minimum noise attenuation as follows:

Attenuation Frequency	50KHz	100KHz	500KHz	1MHz	5MHz	10MHz	50MHz	100MHz
MasterPlan	85	83	69	68	68	67	78	84

NOTE: Standardized insertion loss data obtained utilizing MIL-STD-220A 50 ohm insertion loss methodology, based on a minimum of 100ft. of #4 AWG conductor between the two devices. Noise source = 100V to model maximum average circuit distance, filter connection distance = 6".

2.11 Overcurrent Protection

- 2.11.1 Each suppression element shall be individually fused such that the failure of a single fuse element remains isolated and does not render the entire mode, or product, deficient by more than the following percentages:

Model	Maximum Deficiency Percentage
TC80-080-208-3Y-27091	<17%

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- 2.11.2 For systems utilizing a hybrid technology, each element type shall be individually fused.

- 2.11.3 Every electrical current carrying conductor shall be fused such that every fault is isolated at the point of the fault or at the device level.

- 2.11.4 Fusing shall be present in all modes, including Neutral-to-Ground.

- 2.11.5 All overcurrent/ fault current protection shall be UL249-1 Recognized as a stand-alone fuse.

- 2.11.6 All fusing must be UL249-1 Recognized and tested at 200k A/C. Testing shall be inclusive of all available product voltages.

- 2.11.7 In accordance with UL249-1, all fuses and overcurrent/ fault current devices must be tested with a 0.2 power factor.

- 2.11.8 All fused and overcurrent/ fault current protection devices shall consist of self-arc-quenching, sans-quenching UL249-1 Recognized fuse assembly. Each fuse shall be individually sealed in a manner that eliminates arc arcing.

- 2.11.9 The device shall be capable of withstanding the full single pulse surge current capacity for every mode without the operation of failure of overcurrent/ fault current protection of fuses.

- 2.12 Transient Conduction Path. All full magnitude transient current shall be conducted on low-impedance solid copper bussing. If printed circuit boards are utilized in surge current paths, no single trace shall be allowed to conduct more than the proportional current share of the connected TVSS component.

- 2.13 The device shall be capable of withstanding the full single pulse surge current capacity for every mode without the operation of failure of overcurrent/ fault current protection of fuses.

- 2.14 Fusing shall be present in all modes, including Neutral-to-Ground.

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6.0 PRODUCT

- 6.1 High Performance Suppression System
The unit shall include an engineered solid-state high performance suppression system utilizing arrays of non-linear voltage dependent metal oxide varistors with