

SECTION 16670
SURGE SUPPRESSION AND LIGHTNING PROTECTION SYSTEMS

A. Surge Suppression Systems

1. Provide a UL 1449 2nd Edition "Master Plan" transient voltage surge suppressor (TVSS) and filter system for the protection of AC electrical circuits and equipment from the effects of lightning induced currents, substation switching transients, and internally generated transients resulting from inductive and/or capacitive load switching and other electronic equipment.
2. The surge suppression system shall be comprised of distribution class arresters at the utility equipment, an ANSI/IEEE C62.41 Category "C" TVSS at the building service entrance, ANSI/IEEE C62.41 Category "B" TVSS's at critical distribution panels within the building, and ANSI/IEEE C62.41 Category "A" TVSS receptacles in telecommunications MDF and IDF rooms and in areas as directed by engineering.

B. Transient Voltage Surge Suppressors (TVSS)

1. Distribution Class Arresters.
 - a. Equipment shall comply with ANSI/IEEE C62.11, metal oxide varistor distribution surge arrester requirements.
 - b. Equipment shall employ metal oxide varistor technology, mounted in ceramic housing. Equipment shall be rated 3 kV on 4,160 V distribution system, 9 kV on 12,470 V distribution system, and 10 kV on 13,800 V distribution system. Equipment shall provide line-to-ground protection. Like Cooper Power Systems VariSTAR.
 - c. Equipment for pad mounted applications shall employ metal oxide varistor technology mounted in premolded rubber elbows. Equipment shall be rated 3 kV on 4,160 V distribution system, 9 kV on 12,470 V distribution system, and 10 kV on 13,800 V distribution system. Equipment shall provide line-to-ground protection. Like Cooper Power Systems M.O.V.E. Elbow.
 - d. Preferred manufacturers are Cooper Power Systems, General Electric, and McGraw-Edison.
2. Category "C" TVSS
 - a. Equipment shall comply with ANSI/IEEE C62.41 (IEEE 587), Category "C" requirements, tested to ANSI C62.45, listed to UL 1449 Second Edition, and bear the UL label.

- b. Equipment shall operate bi-directionally and treat both positive and negative impulses, yielding line control and short flicker ride-through, and with per mode power handling capacity exceeding 200,000 AMPS L-L and L-N, 150,000 AMPS L-G and N-G, 350,000 AMPS per phase for repeated strikes. Equipment shall be capable of passing the entire UL duty/cycle and life test for a minimum of 10 times with less than 1 percent degradation. Equipment shall have UL 1449 Second Edition certified listing suppression level, after duty/cycle and life tests, of peak voltage phase-to-neutral ratings of 400 volts or less for units on 120/208 volt systems and 800 volts or less for units protecting 277/480 volt systems. Equipment shall protect against line-to-line, line-to-neutral, line-to-ground, and neutral-to-ground voltage transients. Equipment shall provide high frequency noise filtering of up to 50 db attenuation (MIL-STD-220A), both in normal and common modes, at frequencies of 100 KHz to 100 MHZ. Equipment shall actively track the AC sine wave to further remove low level surges, sharp wave fronts and eliminate error producing high frequency noise bursts. Like Current Technology Model MP.
- c. Preferred manufacturers are Current Technology, Cutler-Hammer, General Electric, Innovative Technology, LEA International, Leviton and Leibert.

3. Category "B" TVSS

- a. Equipment shall comply with ANSI/IEEE C62.41 (IEEE 587), Category "B" requirements, tested to ANSI C62.45, listed to UL 1449 Second Edition, and bear the UL label.
- b. Equipment shall operate bi-directionally and treat both positive and negative impulses, yielding line control and short flicker ride-through, and in conjunction with the service entrance TVSS, power handling capacity exceeding 135,000 transient amps per phase for repeated strikes.
- c. Equipment shall be capable of passing the entire UL duty/cycle and life test for a minimum of 10 times with less than 1 percent degradation. Equipment shall, in conjunction with service entrance TVSS, perform as follows for disturbances injected at the source and measured at this unit:

Injected Signal:	Typical measured output of signal at same time:
1) IEEE 587 'A' Ring Wave (6000 volts, 200 amps)	3 volts
2) IEEE 587 'B' Ring Wave (6000 volts, 200 amps)	4 volts
3) IEEE 587 'B' Unipolar UL1449	120 volts

(6000 volts, 3000 amps)

4) Attenuation (100 kHz) 66 db

- d. Equipment shall protect against line-to-line, line-to-neutral, line-to-ground, and neutral-to-ground voltage transients. Equipment shall provide high frequency noise filtering of up to 60 db attenuation (MIL-STD-220A), both in normal and common modes, at frequencies of 100 KHz to 100 MHZ. Equipment shall actively track the AC sine wave to further remove low level surges, sharp wave fronts and eliminate error producing high frequency noise bursts. Like Current Technology Model MPA.
- e. Preferred manufacturers are Current Technology, Cutler-Hammer, General Electric, Innovative Technology, L.E.A. Dynatech, Leviton and Leibert.

4. Category "A" TVSS

- a. Equipment shall comply with ANSI/IEEE C62.41 (IEEE 587), Category "A" requirements, tested to ANSI C62.45, listed to UL 1449 Second Edition, and bear the UL label.
- b. Equipment shall be duplex type receptacle, NEMA 5-20R, and shall protect against line-to-line, line-to-neutral, line-to-ground, and neutral-to-ground voltage transients. Receptacles shall have a minimum of two, 130V, 20mm metal oxide varistors (MOV), visible and audible surge status indicators, thermoplastic base, and ivory face. Devices shall not be used to provide "down-stream" protection of other receptacles.
- c. Preferred manufacturers are General Electric, Hubbell, Pass and Seymour, and Leviton.

C Lightning Protection Systems

- 1. Provide lightning protection system for the protection of University structures from direct lightning strikes.
- 2. This is an optional system that should be evaluated for inclusion in new construction projects. Evaluation shall be made in accordance with guidelines set forth in NFPA 780, Lightning Protection systems, Appendix H, Risk Assessment Guide. Submit copies of the evaluation for review by Engineering Services or CFS.
- 3. The lightning protection system shall be comprised of air terminals, conductors, ground terminals, counterpoised ground conductor, interconnecting conductors, arresters and other connectors or fittings required to complete the system. The lightning protection ground components shall be connected to the electrical

service ground. System design shall be in accordance with NFPA 70, National Electrical Code, NFPA 780, Lightning Protection Systems and the LPI-175, Lightning Protection Institute, Standard of Practice. The system shall be LPI certified.