

# NFPA-70 (NEC) COMPLIANCE DETAILS FOR LPS INSPECTORS

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## Notes:

1. This document is based on the 2017 NEC.
2. Authority for NEC compliance can be found in AFI 32-1065 Section 2 "Codes and Specifications" and in Attachment 1 "References".

1. NEC 300.21. Cables, cable trays and raceways transiting through fire-rated walls, floors and ceilings must use an approved firestop method. They cannot be left open.
2. NEC 406.9(B). AC voltage (120-250) outdoor receptacles installed in wet locations shall have weatherproof enclosures. Outlet box hoods must be rated for "extra duty" durability.
3. NEC 708.4(A through C) for Critical Operations Power Systems (COPS). Designated Critical Power Areas (DCOA) include but are not limited to emergency management centers, power systems, HVAC, fire alarm, security, communications, and signaling for DCOA.

3.1 NEC 708.4(B.1) Example: Standby power to structure with LPS. A Meteorological Risk Assessment shall be performed and a mitigation plan designed and implemented. Further guidance is in *NFPA 1600 Standard on Disaster/Emergency Management and Business Continuity Programs*. NFPA 1600 states lightning should be included.

3.2 NEC 708.20(D) SPDs shall be provided at all facility distribution voltage levels.

See further references in NFPA-780 (2017) sections 4.20.1, A.4.20.1, 4.20.2.5, A.4.20.2.5, and Annex J "Protection of Smart Structures".

4. NEC 280 Arrestors. Describes over 1000V on premises wiring systems. Installation and connection requirements for surge arrestor.
5. NEC 285 Surge Protection Devices (SPDs). Describes 1000V or less. Covers general requirements, installation requirements and connection requirements for permanently installed SPDs. Important definitions:

Type 1 SPDs on the Supply side or the Service side.

Type II SPDs on the Service or Feeder or Load side.

Type III SPDs on load side of branch circuits

6. NEC 250.64(C). Counterpoise (ring) buried ground wires shall be installed in one continuous length with no splices or joints. [Should be same for catenary/overhead shield wires]. See permitted circumstances.

7. NEC 250.64(B.4). Grounding electrode conductors (counterpoise/ring) shall be contact with the earth. Also see NFPA-780 section 4.13.4.1 ground ring “in direct contact with the earth”. [Direction boring not permitted.]

8. NEC 250.52. Types of electrodes permitted for grounding.

8.1 Metal underground water pipe, min. 3m in direct contact with earth.

Metal in-ground support structures which extend extend the building frame into the earth.

8.2 Concrete-encased electrode, with min. 6m rebar or copper conductor. inch dia. X

8.3 Ground ring or counterpoise.

8.4 Rod and pipe electrodes, min. size 15.87mm (3/4 in.) X 2.44m (8 ft.). At least 2.44m (8 ft.) in contact with the earth (NEC 250.53(G)).

8.5 Plate electrodes, min. 0.185mm (2 ft.) X 6.4mm (1/4 in.).

8.6 Other buried underground systems such as metal pipes, metal tanks, well casings.

8.7 Combinations of the above.

8.8 Not permitted for grounding electrodes: aluminum; underground metal gas piping.

9. NEC 250.53. Installation of rod, pipe or plate electrodes.

NEC 250.(A.2). A single rod, pipe or plate requires a supplemental electrode.

“Exception: If a single rod, pipe or plate grounding electrode has a resistance to earth of 25 ohms or less, the supplemental electrode shall not be required.”

NEC 250.53(B). Rod, pipe or plate electrodes shall be not less than 1.83m (6 ft.) apart.

NEC 250.53(F). Ground ring installed not less than 750mm (30 in.) below earth surface.

10. NEC 250.64(F.1) Raceways and enclosures for grounding conductors. Ferrous metal conduits enclosing grounding conductors shall be bonded at both ends so as to provide an electrically parallel path and to avoid an inductive choke effect.

11. NEC 250.106. Lightning Protection Systems. The LPS grounding shall be bonded to the building or structure grounding electrode system. See Exhibit 250.44.

12. NEC 450.9, NEC 110.13, NEC 708.21 Ventilation.

13. NEC 708.20(D) SPDs must be installed on distribution panels for Critical Operations Power Systems (COPS). Includes SPDs at ATs per NEC 708.24(C). Transfer equipment shall supply only COPS loads per NEC 708.24(D).

14. NEC 110.26 Spaces About Electrical Equipment, 1000V or Less.

110.26(B) Clear space not used for storage.

110.26(C.2.a) Unobstructed egress.

110.26(F) Rooms must be locked.

110.26(E) Dedicated equipment space, protected from damage.