2016 Emergency Power Supply Systems - Generators Reminder List

Applicable Codes and Standards

I. Scope
1. Emergency and standby power systems required by the California Building Code or the California Fire Code shall be installed in accordance with the California Building Code and the California Fire Code, NFPA 70 and NFPA 110.

2. Permanently installed on-site generator sets for health care facilities shall be tested in accordance with NFPA 110, Standard for Emergency and Standby Power Systems, Section 7.13, Installation Acceptance. All safety devices shall be tested as specified in Section 7.13.4.5; however, the safety devices provided may comply with NFPA 99, Health Facilities, Section 6.4.1.1.17 in lieu of NFPA 110, Section 5.6.5.2.

3. When EPSSs are installed in health care facilities, the installation of distribution and wiring systems shall also be in compliance with NFPA 99, Health Care Facilities Code.

4. Prevention, control and mitigation of dangerous conditions related to storage, use, dispensing, mixing and handling of flammable and combustible liquids shall be in accordance with California Fire Code Chapter 50 and Chapter 57.

5. Flammable and combustible liquids shall not be placed, stored or handled in any occupancy within the scope of California Code of Regulations, Title 19, Division 1 regulations, except as provided in the California Fire Code.

II. Generator Location

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1. Level 1 emergency power supply to be separated from the remainder of the building by a 2-hr Fire Barrier. This is a minimum requirement. Locations must also comply with the separation requirements of CBC, Section 508.

2. Exterior openings shall be protected below or within 10’ of building openings.

3. Interior openings in engine room not permitted in a Group I occupancy.

4. Generators shall not be located in a room or area used for any other purpose other than equipment and controls related to the generation and distribution of emergency power.

5. Location classified as a Group F-1 when quantity of diesel fuel storage located aboveground does not exceed the limits of CBC, Table 307.1(1) or CFC, Table 5003.1.1(1) for Class II combustible liquids.

6. Location classified as a Group H-3 when quantity exceeds limits of CBC, Table 307.1(1) or CFC, Table 5003.1.1(1) for Class II combustible liquids.

7. Locations shall be separated by fire barriers in accordance with CBC, Table 508.4 for a Group H-3. A group F-1 shall comply with CBC, Sec. 508.

8. Engines situated to be accessible for maintenance, repair and fire fighting.

9. Detached structures shall be of noncombustible or fire-resistant construction and located 5’ min from building openings and combustible construction or at least one of the exposed walls shall be 1-hour fire resistance rated or the detached structure shall be protected by fire sprinklers.

10. Detached structures shall have ventilation to prevent the accumulation of flammable vapors or gases.

11. Engines, and their weatherproof housings, installed on roofs shall be located at least 5 ft. from openings and from structures having combustible walls or adjacent construction shall be 1-hour resistance rated or the weatherproof enclosure shall be designed to contain a fire.

12. Roof installation shall have an oil containment system consisting of a curb or dike having a capacity greater than the greater of the fuel system or oil system.
13. Roof surface below engine and beyond the engine and the dike or curb shall be noncombustible to a minimum distance of 12”.

14. Engines, and their weatherproof housings, installed outdoors shall be located at least 5 ft. from building openings and combustible walls or adjacent construction shall be 1-hour resistance rated or the weatherproof enclosure shall be designed to contain a fire.

15. Adequate air to be provided for cooling, ventilation and to replenish engine combustion air.

16. Level 1 systems shall have supply and discharge air directly to the exterior or through a 2-hr fire rated transfer system w/o dampers.

17. Energy converters shall not be located in the generator room.

18. Provisions shall be made to maintain generator room not to exceed maximum ambient air temperature required by the EPS manufacturer.

19. When sprinklered, .3 gpm/2500 sq. ft. most remote area density w/ 100 sq. ft. max sprinkler spacing is required.

20. Indoor storage areas and storage buildings shall be provided with mechanical exhaust ventilation or natural ventilation where natural ventilation can be shown to be acceptable for the materials as stored.

21. Exhaust ventilation systems shall comply with CFC, Section 5004.3.1.

22. The minimum horizontal separation between an LP-gas container and a Class I, II or IIIA liquid storage tank shall be 20 feet.

III. Generator Installation

1. No combustible materials permitted in room.

2. Sprinkler protection required when maximum allowable quantity exceeded (120 gal. for Class II).

3. Protected by fire sprinklers if Group H-3.

4. Remote manual stop station of a type to prevent inadvertent or unintentional operation located outside the room housing the prime mover, where so installed, or outside the enclosure where the prime mover is located outside the building.

5. EPS shall be heated as necessary to maintain water jacket and battery temperature required by manufacturer for cold start and load acceptance.

6. The ambient air temperature in the EPS equipment room or outdoor housing containing Level I rotating equipment shall be not less than 40°F.

7. Remote annunciation of alarms at a location on-site or off-site.

8. Remote annunciation at regular work station of operating personnel.

9. Remote audible & visible alarm at constantly monitored location.

10. Battery charger operated by the prime mover provided. Not required if automatic charger has high-low rate capable of charging during running conditions.

11. Automatic battery charger provided.

12. Level 1 control panel provided at generator.

13. Normal power service equipment not permitted in generator room where service equipment is >150 volts or ≥1000 amperes.

14. No other equipment, except those that serve the space, shall be permitted in the EPS room or EPS enclosure.
15. Equipment located to minimize damage resulting from vandalism, tampering, or sabotage.

16. Generators shall have a minimum clearance of 3 ft. on all sides readily accessible for repair, maintenance, cleaning, or replacement.

17. Flexible connections between radiator and air ducts for cooling system provided.

18. Flexible electrical conduit connections provided.

**IV. Generator Fuel Supply**

1. Minimum fuel supply of 24 hrs. for acute care hospital. (Min 72 hrs. for NPC-5)  
   CEC 700-12(B)(2)Exc.1

2. Minimum fuel supply of 6 hrs. for SNF, Psych, ICF.
   CEC 700-12(B)(2)Exc.2

   CEC 700-12(B)Exc.3

4. Minimum fuel supply of 96 hours in seismic design category C, D, E, or F as determined in accordance with ASCE 7. Not a CBC requirement. Required for CDPH, CMS and TJC approvals.  
   NFPA 110-2010, Sec. 5-1.2

5. Liquid fuel shall feed to engines by pumps only.

6. Fuel supply for exclusive use of EPSS or separate draw down.

7. Main fuel tank(s) shall be sized to accommodate 133% of the specific EPS class.

8. Low-fuel sensing switch required for the main fuel supply tank(s) when less than the minimum fuel required for the specific EPS class remains in the tank(s).

9. Low fuel annunciation at a remote location on-site or off-site.

10. Low fuel annunciation at a constantly monitored location.

11. Low fuel annunciation at regular work station of operating personnel.

**V. Generator Fuel Supply/Return Piping**

1. Provisions shall be made for pressure testing of piping.
   CFC, Sec. 5703.6.3

2. Protected from corrosion and galvanic action.
   CFC, Sec. 5703.6.5

3. Protected from vehicle damage by guard posts or other approved means.
   CFC, Sec. 5703.6.4

4. Supports protected by 2-hr fire rating, draining or other approved means.
   CFC, Sec. 5703.6.8

5. Approved metallic or nonmetallic flex connectors permitted to protect the piping.
   NFPA 37, Sec. 6.8.2.1

6. Valves shall be provided to control normal flow and shut off flow for breaks
   NFPA 37, Sec. 6.8.3

7. Fuel piping shall be of compatible metal to minimize electrolysis and be properly sized.
   NFPA 110, Sec. 7.9.3

8. Galvanized fuel lines shall not be used.
   NFPA 110, Sec. 7.9.3.1

9. Approved flexible fuel lines shall be used between the prime mover and the fuel piping.
   NFPA 110, Sec. 7.9.3.2

10. Fuel line solenoids shall be battery powered.
   NFPA 110, Sec. 7.9.9 & Sec. 5.6.3.2

11. EPS piping shall be designed to minimize damage from earthquakes.
   NFPA 110, Sec. 7.11.5

12. Gravity return fuel lines between the day tank and main supply tank shall flow freely to the main tank.
   NFPA 110, Sec. 7.9.4.2

13. Gravity feed to generator not permitted.
   NFPA 37, Sec. 6.5.1

14. Spill control, drainage control & secondary containment not required for piping connected to systems. See ANSI/ASME B31.3
   CFC, Sec. 5703.6.2
VI. Generator Day Tanks

1. Day tank required when fuel pump lift (suction head) is not adequate.  
   NFPA 110, Sec. 7.9.2

2. Day tank required if the engine manufacturer’s fuel pump static head pressure limits are exceeded when the level of fuel in the tank is at maximum.  
   NFPA 110, Sec. 7.9.2.1

3. Spill control required when any individual vessel exceeds 55 gal. or the aggregate capacity exceeds 1,000 gals.  
   CFC, Sec. 5004.2.1

4. Secondary containment required when maximum allowable quantity exceeds provisions of CFC Table 5003.1.1(1).  
   CFC, Sec. 5703.4

5. Listed generator subbase secondary containment fuel tanks of (660 gal) capacity and below shall be permitted to be installed outdoors or indoors without diking or remote impounding.  
   NFPA 110, Sec. 7.9.12

6. Monitoring of secondary containment of tanks located indoors required.  
   CFC, Sec. 5004.2.2.5

7. Diesel day tanks shall be installed below the engine fuel return elevation.  
   NFPA 110, Sec. 7.9.4

8. Return line to day tank shall be below the fuel return elevation.  
   NFPA 110, Sec. 7.9.4.1

9. Drainage control or diking required for aboveground tanks located outside.  
   CFC, Sec. 5704.2.10

10. Drainage control or diking not required for listed secondary containment aboveground tanks located outside.  
    CFC, Sec. 5704.2.10, Exc. 2

11. Shall not be located near or be allowed to obstruct an egress route.  
    CFC, Sec. 5704.3.3.3

12. Sprinkler protection required when maximum allowable quantity is exceeded (120 gal for Class II).  
    CFC, Sec. 5705.3.7.3

13. Protected by fire sprinklers if Group H-3.  
    NFPA 30, Sec. 6.3.2.4 & Sec. 6.3.4.2

14. Spill control and secondary containment when tank located inside structure or roof of structure.  
    NFPA 30, Sec. 6.5.4

15. Fuel tanks supplied by pumps shall have (1) overflow line piped to source tank, (2) high level alarm and (3) high-level automatic shutoff.  
    NFPA 37, Sec. 6.5.4

16. Filling, emptying and vapor recovery connections shall be located outside buildings, away from sources of ignition not less than 5 ft. from building openings or lot lines of property that can be built on, not more than 5 ft. above finished ground level.  
    CFC, Sec. 5704.2.7.5.2 & Sec. 5704.2.7.5.6

17. Signs prohibiting open flames and smoking.  
    CFC, Sec. 5704.2.3.1

18. Signage in accordance with NFPA 704 >100 gal. capacity.  
    CFC, Sec. 5704.2.3.2

19. Piping, connections, fittings and other appurtenances shall be installed in accordance with Section 5703.6.  
    CFC, Sec. 5704.2.7.5.3

VII. Integral Tanks

1. Liquid storage room/warehouse required when maximum allowable quantity exceeded.  
   CFC, Sec. 5704.3.4.3

2. Liquid storage room (H-3) >1000 sq. ft. must have at least 25% of perimeter on an exterior wall.  
   CBC, Sec. 415.6

3. Liquid storage room must be separated from adjacent occupancies as required for H-3 occupancies.  
   CBC, Sec. 508.4.4

4. The design of the supporting structure shall be in accordance with CBC and NFPA 30.  
   CFC, Sec. 5704.2.7.7

5. Horizontal cylindrical and rectangular tanks shall not exceed a gauge pressure of 1 psi and shall be limited to 2.5 psi under emergency conditions.  
   NFPA 30, Sec. 21.4.2.1.4

6. Tanks inside buildings required to have means to prevent overflow into the building.  
   CFC, Sec. 5704.2.9.5.1

   CFC, Sec. 5704.2.7
8. Spill control required when any individual vessel exceeds 55 gal. or the aggregate capacity exceeds 1,000 gals.  
9. Secondary containment required when maximum allowable quantity exceeds provisions of CFC Table 5003.1.1(1).  
10. Listed generator subbase secondary containment fuel tanks of (660 gal) capacity and below shall be permitted to be installed outdoors or indoors without diking or remote impounding.  
11. Monitoring of secondary containment of tanks located indoors required.  
12. Drainage control or diking required for aboveground tanks located outside.  
13. Drainage control or diking not required for listed secondary containment aboveground tanks located outside.  
14. Tank location distance to property lines, public ways and important buildings shall be in accordance NFPA 30, Table 22.4.1.1(a).  
15. Tank, tank vent and tank filler locations in accordance with NFPA 55, Table 9.3.2.  
16. Shall not be located near or be allowed to obstruct an the egress route.  
17. Sprinkler protection required when maximum allowable quantity is exceeded (120 gal for Class II).  
18. Protected by fire sprinklers if Group H-3.  
19. Spill control and secondary containment when tank located inside structure or roof of structure.  
20. Fuel tanks supplied by pumps shall have (1) overflow line piped to source tank, (2) high level alarm and (3) high-level automatic shutoff.  
21. Filling, emptying and vapor recovery connections shall be located outside buildings, away from sources of ignition not less than 5 ft. from building openings or lot lines of property that can be built on, not more than 5 ft. above finished ground level.  
22. Signs prohibiting open flames and smoking.  
23. Signage in accordance with NFPA 704 >100 gal. capacity.  
24. Piping, connections, fittings and other appurtenances shall be installed in accordance with Section 5703.6.  

**VIII. Tank Venting**

1. Vents for normal venting shall vent to exterior not less than 12 ft. above ground level and not less than 5’ from openings or lot lines of property that can be built on.  
2. The vent pipe shall terminate outside the building at a point at least 24 in. from any building opening at the same or lower level.  
3. Piping for normal venting shall discharge vertically or horizontally and shall not be trapped by eaves or other obstructions.  
4. Piping for normal venting shall drain back to tank.  
5. Vent piping shall not be manifolded unless otherwise required.  
6. Normal vent line piping not used for any other purpose.  
7. Vent piping protected from vehicle damage by guard posts or other approved means.  
8. Aboveground tanks require additional emergency venting.  

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**Sources:**

- CFC, Sec. 5004.2.1
- CFC, Sec. 5703.4
- NFPA 110, Sec. 7.9.12
- CFC, Sec. 5004.2.2.5
- CFC, Sec. 5704.2.10
- CFC, Sec. 5704.2.10, Exc. 2
- NFPA 55, Sec. 9.3.2
- CFC, Sec. 5704.3.3.3
- CFC, Sec. 5704.3.7.3
- NFPA 37, Sec. 6.3.2.4 & Sec. 6.3.4.2
- NFPA 37, Sec. 6.5.4
- CFC, Sec. 5704.7.5.2 & Sec. 5704.7.5.6
- CFC, Sec. 5704.2.3.1
- CFC, Sec. 5704.2.3.2
- CFC, Sec. 5704.2.7.3.1
- CFC, Sec. 5704.2.7.3.2
- CFC, Sec. 5704.2.7.3.3
- CFC, Sec. 5704.2.7.3.4
- CFC, Sec. 5704.2.7.3.5
- CFC, Sec. 5704.2.7.4
- CFC, Sec. 5704.2.7.4
- NFPA 37, Sec. 6.7.1.1
- CFC, Sec. 5704.2.7.4
- CFC, Sec. 5704.2.7.4
- CFC, Sec. 5703.6.4
- CFC, Sec. 5704.2.7.4
- CFC, Sec. 5704.2.7.4
IX. Generator Exhaust

1. Exhaust shall terminate minimum 25' from ventilation air inlets or windows.  
   CMC, Sec. 407.2.1

2. Exhaust shall terminate not less than 10 ft. above adjoining grade.  
   CMC, Sec. 407.2.2

3. Exhaust shall terminate not less than 10' from doors, occupied areas or operable windows.  
   CMC, Sec. 407.2.2

4. Low points in exhaust systems shall have suitable drains.  
   NFPA 37, Sec. 8.1.5 & NFPA 110, Sec. 7.10.3.1

5. Exhaust systems shall terminate outside of structure.  
   NFPA 37, Sec. 8.2.3.1

6. Exhaust systems shall be a metal, masonry, or factory-built chimney where they pass through a floor, ceiling, attic, or concealed space.  
   NFPA 37, Sec. 8.2.5

7. Exhaust pipes <1400°F shall have clearances from combustible materials of not less than 9".  
   NFPA 37, Sec. 8.3.1

8. Exhaust pipes <1400°F passing through combustible roofs shall be protected by a ventilated thimble at least 9" on each side and 6" in diameter larger than the pipe.  
   NFPA 37, Sec. 8.3.2

9. Approved thimble(s) required where <1400° F exhaust passes through combustible walls or partitions.  
   NFPA 37, Sec. 8.3.3 & NFPA 110, Sec. 7.10.3.4

10. Exhaust pipes >1400° F shall comply with NFPA 211.  
    NFPA 37, Sec. 8.4

11. Exhaust piping shall be connected to the prime mover by means of a flexible connector.  
    NFPA 37, Sec. 8.2.2 & NFPA 110, Sec. 7.10.3

12. Exhaust shall be independently supported.  
    NFPA 110, Sec. 7.10.3

13. Exhaust system shall be designed so it does not create excessive backpressure.  
    NFPA 110, Sec. 7.10.4

14. Exhaust shall terminate at a point where hot gases, sparks, or products of combustion will discharge to a safe location.  
    NFPA 37, Sec. 8.2.3.1

15. Exhaust shall terminate with a rain cap, tee, Ell pointing downward or vertically with provisions for trapping and draining rain water and snow melt.  
    NFPA 110, Sec. 7.10.3.5

16. Exhaust systems shall be guarded where necessary to prevent personnel burns.  
    NFPA 37, Sec. 8.2.4

X. Emergency Power

1. Battery charger for task illumination connected to life safety branch (hospitals).  
   CEC, Sec. 517-32(E)

2. Receptacles at Gen Set connected to life safety branch (hospitals).  
   CEC, Sec. 517-32(E)

3. Generator accessories for performance connected to life safety branch (hospitals)  
   CEC, Sec. 517-32(F)

4. Task illumination connected to life safety branch (SNF’s).  
   CEC, Sec. 517-42(F)

5. Receptacles at Gen Set connected to life safety branch (SNF’s).  
   CEC, Sec. 517-42(F)

6. Battery powered emergency lighting required at EPS location.  
   NFPA 110, Sec. 7.3.1

7. Equipment essential to operation of generator (ventilation, fuel oil pumps, etc.) powered by EPS.  
   NFPA 110, Sec. 7.12.5

XI. Exiting

1. Maximum length of common path of egress travel for Group H-3 is 25 ft.  
   CBC, Sec. 1006.2.1

2. Maximum travel distance for Group H is 150 ft.  
   CBC, Sec. 1017.2

3. Two exits required if Group H with occupant load greater than 3.  
   CBC, Sec. 1006.2.1

4. Swing in direction of egress if Group H.  
   CBC, Sec. 1010.1.2.1

5. Panic hardware required if Group H.  
   CBC, Sec. 1010.1.10

6. Maximum length of common path of egress for Group F-1; 75 ft. unsprinklered and 100 ft. sprinklered.  
   CBC, Sec. 1006.2.1

7. Maximum travel distance for Group F-1; 200 ft. unsprinklered, 250 ft. sprinklered.  
   CBC, Sec. 1017.2

8. Two exits required if Group F-1 with an occupant load greater than 49.  
   CBC, Sec. 1006.2.1
XII. Testing

1. Testing shall be in accordance with NFPA 110.  
   CEC, Sec. 700.3(A)
2. Cold start & 1.5 hour test with building load.  
   NFPA 110, Sec. 7.13.4.1
3. 2-hour test with full load.  
   NFPA 110, Sec. 7.13.4.3
   NFPA 110, Sec. 7.13.4.4
5. All safeties required by NFPA 110, Sec. 5.6.5.2 or NFPA 99, Section 6.4.1.1.17 shall be tested.  
   CEC, Sec. 700.3(A)

NOTE
Compliance with all items on this list does not necessarily assure compliance with all provisions of the applicable codes and standards. This check list should be used only by persons with a comprehensive knowledge of the applicable codes and standards.

http://www.oshpd.ca.gov/FDD/Regulations/CANs/index.html
OSHPD Project Review Status
http://www.oshpd.ca.gov/FDD/project_status/index.asp
OSHPD Public Use Forms
http://www.oshpd.ca.gov/FDD/Forms/index.html