

GUIDELINES FOR INSTALLATION OF TEMPORARY AND PERMANENT ABOVEGROUND DIESEL FUEL TANKS FOR EMERGENCY AND STANDBY POWER SYSTEMS LOCATED OUTSIDE OF BUILDINGS

For Use by Unidocs Member Agencies or where approved by your Local Jurisdiction

Authority cited: California Fire Code, National Fire Protection Association 30 (NFPA) Flammable and Combustible Liquids Code, Local Hazardous Materials Storage Ordinances (Check with Authority Having Jurisdiction)

I. General Information

These guidelines are applicable to the installation of aboveground tanks using combustible liquids as fuel for emergency and standby generators. They apply to both temporary and permanent tank installations. These guidelines are a supplement to other requirements and/or guidelines, and are not all-inclusive.

II. Permits and Plans

- An installation permit is **usually** required from your local Planning and/or Building Department to install an emergency or standby generator tank, piping, and associated equipment;
- A new or modified Hazardous Materials Business Plan (HMBP) is required before placing the tank(s) in service;
- Notification of the electric utility is required;
- Permits may also be required from ~~the Bay Area~~ **your local** Air Quality Management District **or Air Pollution Control District**.

III. Definitions

The following definitions apply with regard to requirements specified in this document:

Temporary Tank – A tank which is on-site no longer than one (1) year.

IV. Quantity Limits

~~Many cities and counties have adopted specific prohibitions or limitations to the sizes of unprotected and protected aboveground storage tanks. Please contact the local fire authority having jurisdiction (AHJ) for any potential aboveground storage tank amendments their community may have made when adopting the California Fire Code.~~

- ~~• Unprotected Tank: 660 gallons maximum;~~
- ~~• Protected Tank: 4,000 gallons maximum (16,000 gallons aggregate maximum)
Contact the local jurisdiction regarding installing tanks exceeding these limits~~

A. Tanks

- Design and Construction-Listing:** Each tank shall be designed and constructed in accordance with nationally recognized standards (UL 142/2244 or equivalent. UL 2085 is the listing for protected tanks). If it is not UL listed, provide documentation showing that it has been designed and constructed to that standard. [CFC §3404.2.7 ~~7902.1.8.1.1 & 7902.1.8.2.1~~ & NFPA 30 §4.2.3.1.1]
- Location of Tanks ~~Separation Distances:~~** Aboveground tanks shall be located in accordance with Table 4.3.2.1.1(a) of NFPA 30, below. [CFC §3404.2.9.5.1.1]

[Note: Many cities and counties have adopted more stringent separation distances for unprotected and protected aboveground storage tanks. Please contact the fire agency having jurisdiction for any potential amendments pertaining to separation distances their community may have made when adopting the California Fire Code.]

NFPA 30 Table 4.3.2.1.1(a)

Type of Tank	Protection	Minimum distance from property line that is or can be built upon, including the opposite side of a public way (feet) ¹	Minimum distance from nearest side of any public way or from nearest important building on the same property (feet) ¹
Horizontal and vertical tanks with emergency relief devices to limit pressures to 2.5 p.s.i.g.	Protection for exposures ²	Table 4.3.2.1.1(b) value	Table 4.3.2.1.1(b) value
	None	2 x Table 4.3.2.1.1(b) value	Table 4.3.2.1.1(b) value
Protected aboveground tank	None	½ Table 4.3.2.1.1(b) value	½ Table 4.3.2.1.1(b) value

- The minimum distance shall not be less than five (5) feet.
- If a public fire department (or a private fire brigade maintained on the premises) is not available to provide cooling water streams to protect the property adjacent to the liquid storage, the distance shall be doubled.

NFPA 30 Table 4.3.2.1.1(b) – Reference Table for Use in Table 4.3.2.1.1(a)

Tank Capacity (gallons)	Minimum distance from property line that is or can be built upon, including the opposite side of a public way (feet)	Minimum distance from nearest side of any public way or from nearest important building on the same property (feet)
275 or less	5	5
276 to 750	10	5
751 to 12,000	15	5
12,001 to 30,000	20	5

~~Each tank shall be separated from property lines, important buildings, public ways, and other tanks in accordance with CFC Table 7902.2-F, below:~~

~~**TABLE 7902.2-F (as amended by local ordinance)
Reference Table for Use In CFC Table 7902.2-A**~~

Tank Capacity (gallons)	Minimum distance from property line of property which is or can be built upon, including the opposite side of a public way (feet)	Minimum distance from nearest side of any public way or from nearest important building on the same property (feet)

660 or less	10	10
661-4,000	15	10

• ~~These distances can be reduced if the tank is protected by an unpierced two (2) hour fire resistive wall extending not less than thirty (30) inches above and to the sides of the storage area.~~

3. Supports, Foundations, and Anchorage—Seismic Protection: Supports, foundations, and anchorage for aboveground ~~Seismic protection for~~ tanks shall be designed and constructed ~~provided~~ in accordance with NFPA 30 and the California Fire Uniform Building Code. [CFC §3404.2.9.2 ~~7902.1.12 & NFPA 30 §4.2.4~~]

[Exception: For temporary tanks, wheels may be chocked in lieu of providing seismic protection.]

4. ~~Vehicle Impact Protection from Vehicles:~~ Guard posts or other approved means shall be provided to protect tanks subject to vehicular damage in accordance with CFC §312. When guard posts are installed, posts shall be: [CFC §§2703.9.3 & 3404.2.9.6.5 ~~7902.1.9.7 and §7902.2.9~~]

- a. Constructed of steel not less than 4 inches in diameter and concrete filled;
- b. Spaced not more than 4 feet between posts on center;
- c. Set not less than 3 feet deep in a concrete footing of not less than 15 inches in diameter;
- d. Set with the top of the posts not less than 3 feet aboveground;
- e. Located not less than ~~3 5~~ feet from the ~~protected object tank~~.

[Exception: This does not apply to protected aboveground tanks having the impact protection incorporated into the system design in compliance with the impact test protocol of UL 2085.] [CFC §3404.2.9.6.5]

[Note: For temporary tanks, other approved physical barriers that comply with CFC §312.3 may be used ~~K rails or other substantial protection may be installed~~ in lieu of guard posts.]

5. Secondary Containment – Protected Tanks: Protected tanks shall be provided with secondary containment, drainage control, or diking in accordance with CFC §2704.2. A means shall be provided to establish the integrity of the secondary containment in accordance with NFPA 30. [CFC §3404.2.9.6.4]

6. Secondary Containment – Unprotected Tanks: Tanks shall be provided with secondary containment (i.e., containment external to and separate from primary containment). Secondary containment shall be constructed of materials of sufficient thickness, density, and composition so as not to be structurally weakened as a result of contact with the fuel stored and capable of containing discharged fuel for a period of time equal to or longer than the maximum anticipated time sufficient to allow recovery of discharged fuel. It shall be capable of containing 110% of the volume of the primary tank if a single tank is used, or in the case of multiple tanks, 150% of the largest tank or 10% of the aggregate, whichever is larger. If secondary containment is open to rainfall or sprinkler flow, contact the local jurisdiction for appropriate calculations. [Local Ordinances – Check with local Authority Having Jurisdiction]

76. Spill Containers Protection: ~~F~~Where required for unprotected tanks (~~≤ 660 gallons capacity~~), spill containers shall be provided on top-filling and/or top-withdrawal connections. Spill containers shall be non-combustible and shall be fixed to the tank. [Local Ordinances – Check with local Authority Having Jurisdiction]

For protected tanks ~~(between 661 to 4,000 gallon capacity)~~, spill containers of not less than 5 gallons shall be provided for each fill connection. Spill containers shall be non-combustible, and shall be fixed to the tank and equipped with a manual valve drain to the primary tank. For tanks with a remote fill connection, a portable spill container shall be ~~allowed~~ **provided**. [CFC §§~~3404.2.9.6.8 7902.1.9.10~~]

87. Overfill Prevention Protection: Unprotected tanks with capacities greater than 1,320 gallons, and protected tanks with any capacity ~~Tanks~~ shall be provided with equipment to prevent overfilling as per the following table: [CFC §§~~3404.2.7.5.8 & 3404.2.9.6.6~~]

Physical Situation	Approved Overfill Methods
At 90% of Tank Capacity	Audible or visual signal to notify tank filler; Or Tank level gauge marked at 90% of tank capacity; Or Other approved means. AND
At 95% of Tank Capacity	Automatically shut off the flow of fuel to the tank.
OR, in Lieu of the above two items:	
N/A	The system shall: 1.) Reduce the flow rate to not more than 15 gallons per minute so that at the reduced flow rate the tank will not overfill for at least 30 minutes, and 2.) Automatically shut off the flow into the tank prior to any tank top fittings being exposed to product.

For Non-Protected Tanks (<660 gallon capacity):

Physical Situation	Approved Overfill Methods	Reference
Level of liquid in tank IS within sight of the operator and filling device IS within immediate control of operator	Visual observation	HMSO
Level of liquid in tank is NOT within sight of the operator and/or filling device is NOT within immediate control of operator	High level (90%) alarm (with posted sign explaining alarm condition) Or Other liquid level limit control*	HMSO

* ~~A liquid level limit control is a mechanical or electronic device which physically limits the level of liquid in the tank (e.g. ball float or flapper valve in the fill line, dispenser nozzle shutoff, etc.).~~

For Protected Tanks (661-4,000 gallon capacity):

Physical Situation	Approved Overfill Methods	Reference
At 85% of Tank Capacity	Audible or visual signal to notify tank filler; Or Tank level gauge marked at 85%; Or Other approved means. AND	CFC 7902.1.9.8
At 90% of Tank Capacity	Mechanical Shutoff Device	CFC 7902.1.9.8

Information Signs for Protected Tanks

A permanent sign shall be provided at the fill point documenting the filling procedure and tank calibration chart. The filling procedure shall require the person filling the tank to **note the gallonage currently in the tank** and determine the **additional** gallonage required to fill the tank to 90% of capacity before commencing the fill operation. [CFC §§3404.2.9.6.6.1 & 3404.2.9.6.6.2 ~~7902.1.9.8~~]

[Note: Many cities and counties have adopted more stringent requirements for overfill protection (e.g., requiring overfill prevention for any size unprotected tank). Please contact the Authority Having Jurisdiction for any additional overfill prevention requirements.]

~~8. **Projectile Protection:** When a projectile test is required by the chief (for protected tanks between 661 and 4,000 gallons), the protected tank shall comply with the requirements for bullet resistance (see CFC 7701.3.4.3). (CFC §7902.1.9.5)~~

B. Piping Systems

1. **Piping Support:** Piping systems shall be substantially supported and protected against physical damage and excessive stresses arising from settlement, vibration, expansion or contraction, or exposure to fire. [CFC §3403.6.8 ~~7901.11.6~~]

2. **Seismic Protection:** Seismic protection for piping, ~~-tank supports~~ and connections shall be provided in accordance with the Uniform Building Code. [CFC §2703.2.2.1 #1 ~~8001.4.3.2~~]

[Exception: Not normally required for temporary ~~piping-tanks~~.]

3. ~~**Special Low Melting Point Materials:**~~ For primary piping, low melting point materials (such as aluminum, copper, and brass), materials which soften on fire exposure (such as non-metallic materials), or non-ductile materials (such as cast iron), shall be **in accordance with American Society of Mechanical Engineers (ASME) B31.9 “Building Services Piping Code for Pressure Piping”** and ~~within their pressure and temperature limitations. When such materials are used, they shall be~~ either: [CFC §3403.6.2.1 ~~7901.11.1.2~~]

- a. Suitably protected against fire exposure; or
- b. Located such that leakage resulting from failure would not unduly expose persons, buildings, or structures; or
- c. Located where leakage can readily be controlled by operation of accessible remotely-located valves.

4. ~~**Vehicle Impact Protection from Vehicles:**~~ Guard posts or other approved means shall be provided to protect piping, valves or fittings subject to vehicular damage **in accordance with CFC §312**. When installed, posts shall be: [CFC §§312 & 3403.6.4 ~~7901.11.2~~]

- a. Constructed of steel not less than 4 inches in diameter and concrete filled;
- b. Spaced not more than 4 feet between posts on center;
- c. Set not less than 3 feet deep in a concrete footing of not less than 15 inches in diameter;
- d. Set with the top of the posts not less than 3 feet aboveground;
- e. Located not less than ~~3~~ **5** feet from the ~~protected object-tank~~.

[Note: For temporary piping systems, other approved physical barriers that comply with CFC §312.3 tanks, ~~K-rails or other substantial protection~~ may be ~~used-installed~~ in lieu of guard posts.]

- 5. Secondary Containment:** Supply and return piping shall be provided with secondary containment (i.e., containment external to and separate from primary containment). Secondary containment shall be constructed of materials of sufficient thickness, density, and composition so as not to be structurally weakened as a result of contact with the fuel stored, and capable of containing discharged fuel for a period of time equal to or longer than the maximum anticipated time sufficient to allow recovery of discharged fuel. [Local Ordinances – Check with local Authority Having Jurisdiction]

Potentially acceptable methods of containment include:

- Double-contained piping;
- Metal pan;
- Concrete berm;
- “Portable” berm (made of diesel-compatible materials);
- Containment enclosure.

- 6. Connections:** Connections to a tank located below normal liquid level shall be provided with internal or external ~~isolation-control~~ valves located as close as practical to the shell of the tank. When external, such valves, and their connections to the tank, shall be of steel. [CFC §3403.6.7 ~~7901.11.5~~]

- 7. Fill Pipe Length:** For tanks with a top-fill connection, metallic fill pipes shall terminate within 6 inches of the tank bottom to minimize static electricity. [CFC §3404.2.7.5.5 ~~7902.2.7.2~~]

- 8. ~~Filling/Withdrawal Location of Connections That are Made or Broken:~~** Filling and withdrawal connections which are made and broken shall be located outside of buildings and not less than 5 feet from building openings. [CFC §3404.2.7.5.6 ~~7902.2.7.2~~]

- 9. Fill Pipe Connections for Protected Tanks:** The tank fill pipe shall be provided with a means for making a direct connection to the tank vehicle’s fuel delivery hose so that the delivery of fuel is not exposed to the open air during the filling operation. Where any portion of the fill pipe exterior to the tank extends below the level of the top of the tank, a check valve shall be installed in the fill pipe not more than 12 inches from the fill hose connection. [CFC §3404.2.9.6.7]

- 109. Tank Vents for Normal Venting:** Normal venting shall be provided for the primary tank as follows:

- a. The diameter of the normal vent opening shall be equal to the size of the fill/withdrawal opening, or at a minimum, 1.25 ~~1-1/4~~ inches, whichever is greater. [CFC §3404.2.7.3 ⇒ §3403.6.2 ⇒ NFPA 30 §4.2.5.1.2 ~~7902.1.13.8.1~~]
- b. Vapors shall be directed to discharge upward or horizontally away from closely adjacent walls, and the top of the vent shall be a minimum of 12 feet above adjacent ground level. The vent opening shall be at least 5 feet from any building opening and/or property line. [CFC §3404.2.7.3.3 ~~7902.1.13.4~~]

- c10. Normal Vent Piping:**—Vent pipes shall be installed such that they will drain toward the tank without sags or traps in which liquid can collect. Vent pipes shall be installed such that they are not subject to physical damage or vibration. [CFC §3404.2.7.3.4 ~~7902.1.13.5~~]

11. Emergency Venting: Tanks shall be equipped with additional venting that will relieve excessive internal pressure caused by exposure to fires. The pressure relief device shall not discharge inside buildings. The venting device shall be installed and maintained in accordance with NFPA 30 §4.2.5.2. [CFC §3404.2.7.4]

Emergency venting shall be supplied as follows:

- a. ~~Tanks shall be equipped with adequate additional venting that will relieve excessive internal pressure caused by exposure to fires. (CFC §7902.2.6.1)~~
- b. ~~The pressure relief device shall not discharge inside a building. (CFC §7902.2.6.5.1)~~

(Note: for the purposes of emergency venting requirements, enclosures which can be occupied are considered buildings whereas enclosures which cannot be occupied are not considered buildings).

12. Flame Arrestors: For protected tanks ~~(i.e. between 661 and 4,000 gallon capacity)~~, approved flame arrestors or pressure-vacuum breather valves shall be installed in normal vents. [CFC §3404.2.9.6.3 7902.1.9.4]

13. Anti-Siphon Devices: For protected tanks, an ~~A~~ approved anti-siphon devices shall be installed in each external pipe connected to the ~~aboveground~~ tank when the pipe extends below the level of the top of the tank. [CFC §3404.2.9.6.10 7902.1.9.12]

C. Additional Requirements

1. Security: Storage, dispensing, use, and handling areas shall be secured against unauthorized entry and safeguarded in an approved manner. ~~with such protective facilities as public safety requires.~~ [CFC §2703.9.2 8001.11.2]

2. Electrical: Electrical wiring and equipment shall be installed in accordance with the Electrical Code. [CFC §3403.1 8001.11.4]

3. Monitoring: ~~Where secondary containment is required, T~~ tank and piping secondary containment systems shall be monitored either visually or electronically. Monitoring shall occur at the low point of each secondary containment system. ~~Where secondary containment is subject to the intrusion of water, a monitoring method for detecting water shall be provided.~~ If electronic monitoring is used, it shall be connected to attention-getting visual and audible alarms. Contact your local agency for approved monitoring methods. [CFC §3404.2.9.6.4 ⇒ §2704.2.2.5 (Protected Tanks); or Local Ordinances – Check with local Authority Having Jurisdiction]

(Note: If response to monitoring alarms is hampered due to absence of site response personnel or there is a history of problems with alarm response at the site, the local agency may require shutdown of the generator during alarm activation.)

4. Testing:* Prior to being placed in service, tanks and associated piping shall be field tested in accordance with the following: [CFC §§3404.2.12 & 3403.6.3 7901.11.10 & 7902.1.8.2.5]

	Field Test	Duration
Primary Tank Test	3 to 5 p.s.i.g.	30 60 minutes
Secondary Tank Test	3 to 5 p.s.i.g.	30 60 minutes

Primary Piping Test	Hydrostatically at 150% of anticipated pressure Or Pneumatically at 110% of anticipated pressure	Sufficient time period to complete visual inspection of joints and connections. Minimum of 10 30 minutes with no leakage or permanent distortion
Secondary Piping Test	5 p.s.i.g.	Sufficient time period to complete visual inspection of joints and connections. Minimum of 10 30 minutes with no leakage or permanent distortion

* If the manufacturer’s specifications do not support the above testing procedures, follow the manufacturer’s recommended procedure.

5. **Hazardous Materials Signage and Labeling:** Warning and identification signs shall be posted to clearly identify hazards. All piping shall be labeled in accordance with ASME Standard A13.1 “Scheme for the Identification of Piping Systems.” The design of signs and labeling of piping shall be in accordance with ~~the Unidocs’~~ “Marking Requirements and Guidelines for Hazardous Materials and Hazardous Wastes” (available ~~on the Internet~~ at www.unidocs.org), ~~and other applicable codes and standards (e.g. ANSI A13.1 Scheme for the Identification of Piping Systems, etc.).~~ [CFC §§3404.2.3 & 2703.2.2.1 #2 7901.9 & 7902.1.3.2]
6. **Additional Signage:** A sign shall be placed at the main electrical shut-off box identifying type and location of all normal and emergency power sources connected at that location. [CEC §§901.9A & 902.8A 702.8a]
7. **Fire Protection:** At least one ~~20-B:C~~ **40:BC** portable fire extinguisher shall be provided ~~near and~~ within **50 feet sight** of the equipment. [CFC §3403.2 7901.5.3]
8. **Access Roads:** The required width of a fire apparatus access road (20 feet²) shall not be obstructed in any manner, including the siting of generator/tank assemblies. [CFC §503.4 902.2.4]
9. **Spill Prevention Control and Countermeasure (SPCC) Plan:** The owner or operator of any facility that stores **an aggregate quantity of more than 1,320 gallons of petroleum (including used oil) aboveground in containers or tanks 55 gallons or larger, or stores petroleum in any aboveground tank larger than 660 gallons in capacity,** must prepare an SPCC Plan in accordance with guidelines contained in Part 112 of Title 40 of the Code of Federal Regulations. **Contact your local Certified Unified Program Agency (CUPA) for additional information.** ~~Information regarding SPCC Plan preparation and submittal requirements is available on the Internet at www.swreb.ca.gov/~cwphome/agt/index.htm.~~ [HSC §2527005(e)]

[Exception: Tank facilities located on a farm, nursery, logging site, or construction site are not required to prepare an SPCC Plan if no tank exceeds 20,000 gallons and cumulative storage capacity does not exceed 100,000 gallons.]