

Above Ground Fuel Tank Requirements

The purpose of this document is to provide information about general Fire Code requirements for above ground storage within the unincorporated areas of Merced County. It is intended to be general information only and may not address every situation that could arise. Contact the Merced County Fire Prevention Office at 385-7347 if you have any questions or need additional information

Design Standards for Storage Tanks

Atmospheric tanks include tanks of compartmented design and tanks that incorporate secondary containment (CFC A21.4.2.1.1)

Atmospheric tanks shall be designed and constructed in accordance with recognized engineering standards. Atmospheric tanks that meet any of the following standards shall be deemed as meeting the requirements of 21.4.2.1: (CFC 21.4.2.1.1*)

1. *API Specification 12B, Bolted Tanks for Storage of Production Liquids*
2. *API Specification 12D, Field Welder Tanks for Storage of Production Liquids*
3. *API Specification 12F, Shop Welded tanks for Storage of Production Liquids*
4. *API Specification 650, Welded Steel Tanks for Oil Storage*
5. *UL 58 Standard for Steel Underground Tanks for Flammable and Combustible Liquids*
6. *ANSI/UL 80, Standard for Steel Tanks for II-Burner Fuels and Other Combustible Liquids*
7. *ANSI/UL 142, Standard Steel Aboveground Tanks for Flammable and Combustible Liquids*
8. *UL 1316, Standard for Glass-Fiber Reinforced Plastic Under-ground Storage Tanks for Petroleum Products, Alcohols, and Alcohol-Gasoline Mixtures*
9. *ANSI/UL 1746 Standard for External Corrosion Protection Systems for Steel Underground Storage Tanks*
10. *UL 2080, Standard for Fire Resistant Tanks for Flammable and Combustible Liquids*
11. *ANSI/UL 2085, Standard for Protected Aboveground Tanks for Flammable and Combustible Liquids.*

Tanks supports shall be designed and constructed in accordance with recognized engineering standards. Tanks shall be supported in a manner that prevents excessive concentration of loads on the supported portion of the shell in areas subject to earthquakes, tank supports and connection shall be designed to resist damage as a result of such shocks. (NFPA 30- 22.5)

The design of the supporting structure for tanks shall be in accordance with the California Building Code and NFPA 30 (CFC 3404.2.7.7)

Where a tank is located in an area where it is subject to buoyancy because of a rise in the water table, flooding or accumulation of water from fire suppression operations, uplift protection shall be provided in accordance with Sections 22.14 and 23.14 of NFPA 30 (CFC 3404.2.7.8)

Supports or piling for above-ground tanks storing Class I, II, or IIA liquids elevated more than 12 inches (305 mm) above grade shall have a fire-resistance rating of not less than 2 hours in accordance with the fire exposure criteria specified in ASTM E 1529. (CFC 3404.2.9.2.3)

Exceptions:

1. *Structural supports tested as part of a protected above-ground tank in accordance with UL 2085.*
2. *Stationary tanks located outside of buildings when protected by an approved water-spray system designed in accordance with Chapter 9 and NFPA 15.*
3. *Stationary tanks located inside of buildings equipped throughout with an approved automatic sprinkler system designed in accordance with Section 903.3.1.1*

Electrical wiring and equipment shall be installed and maintained in accordance with Section 605 and the California Electrical Code. (CFC 3403.1)

Piping system components shall be designed and fabricated in accordance with the applicable standard listed in Table 3403.6.2 and Chapter 27 of NFPA 30, except as modified by Section 3403.6.2.1(CFC 3403.6.2)

Unless tested in accordance with the applicable section of ASME B31.9, piping, before being covered, enclosed or placed in use, shall be hydrostatically tested to 150 percent of the maximum anticipated pressure of the system, or pneumatically tested to 110 percent of the maximum anticipated pressure of the system, but not less than 5 pounds per square inch gauge (psig) (34.47kPa) at the highest point of the system. This test shall be maintained for a sufficient time period to complete visual inspection of joints and connections. For a minimum of 10 minutes, there shall be no leakage or permanent distortion. Care shall be exercised to ensure that these pressures are not applied to vented storage tanks. Such storage tanks shall be tested independently from the piping. (CFC 3403.6.3)

The repair, alteration or reconstruction, including welding, cutting and hot tapping or storage tanks and piping that have been placed in service, shall be in accordance with NFPA 30 (CFC 3404.2.7.6)

Where subject to external corrosion, tanks shall be fabricated from corrosion-resistant materials, coated or provided with corrosion protection in accordance with Section 23.3.4 of NFPA 30 (CFC 3404.2.7.9)

The design, fabrication and construction of tanks shall comply with NFPA 30. Each tank shall bear a permanent nameplate or marking indicating the standard used as the basis of design. (CFC 3404.2.7)

The materials used in tank construction shall be in accordance with NFPA 30. (CFC3404.2.7.2)

Tank vents for normal venting shall be installed and maintained in accordance with Sections 3404.2.7.3.1 through 3404.2.7.3.6. (CFC 3404.2.7.3)

Vent-line flame arresters and venting devices shall be installed in accordance with their listings. Use of flame arresters in piping systems shall be in accordance with API 2028. (CFC 3404.2.7.3.2)

Vent pipe outlets for tank storing Class I, II OR IIIA liquids shall be located such that the vapors are released at a safe point outside of buildings and not less than 12 feet (3658 mm) above the finished ground level. Vapors shall be discharged upward or horizontally away from adjacent walls to assist in vapor dispersion. Vent outlets shall be located such that flammable vapors will not be trapped by eaves or other obstructions and shall be at least 5 feet (1524 mm) from building opening or lot liners of properties that can be built upon. Vent outlets on atmospheric tanks storing Class IIIB liquids are allowed to discharge inside a building if the vent is a normally closed vent. (CFC 3404.2.7.3.3)

Exception: *Vent pipe outlets on tanks storing Class IIIB liquid inside buildings and connected to fuel-burning equipment shall be located such that the vapors are released to a safe location outside of buildings.*

Tanks and pressure vessels storing Class IB or IC liquids shall be equipped with venting devices which shall be normally closed except when venting under pressure or vacuum conditions, or with listed flame arresters. The vents shall be installed and maintained in accordance with Section 21.4.3 or NFPA 30 or API 2000. (CFC 3404.2.7.3.6)

Stationary, above-ground tanks shall be equipped with additional venting that will relieve excessive internal pressure caused by exposure to fires. Emergency vents for Class I, II and III liquids shall not discharge inside buildings. The venting shall be installed and maintained in accordance with Section 22.7 of NFPA 30. (CFC 3404.2.7.4)

Exception: *Tanks larger than 12,000 gallons (45 420 L) in capacity storing Class IIIB liquids which are within the diked area or the drainage path of Class I or II liquids do not require emergency relief venting*
Diesel is not Class IIIB

Tanks shall be provided with a method of normal and emergency venting. Normal vents shall also be in accordance with Section 3404.2.7.3.

Emergency vents shall be in accordance with Section 3404.2.7.4. Emergency vents shall be arranged to discharge in a manner which prevents localized overheating or flame impingement on any part of the tank in the event that vapors from such vents are ignited.

Any provision of Section 3404 applies to:

1. *The storage of flammable and combustible liquids in fixed above-ground and underground tanks.*
2. *The storage of flammable and combustible liquids in fixed above-ground tanks inside of buildings.*
3. *The storage of flammable and combustible liquids in portable tanks whose capacity exceeds 660 gallons (2498 L)*
4. *The installation of such tanks and portable tanks. (CFC 3404.2)*

Fire Protection

A minimum of one approved portable fire extinguisher complying with Section 906 and having a rating of not less 20-B shall be located not less than 10 feet (3048 mm) or more than 50 feet (15,240 mm) from any Class I or II liquid storage area located outside of a liquid storage room. (CFC 3404.3.7.5.2)

**Not more than 10 feet (3048 mm) from the door opening into a liquid storage room.*

The California Fire Code requires fire flow requirements/on-site water storage as per CFC 507.1 To be determined by the authority having jurisdiction.

Signage

Labeling and signs for storage tanks and storage tank areas shall comply with Sections 3404.2.3.1 and 3404.2.3.2 (CFC 3404.2.3)

Signs shall be posted in storage areas prohibiting open flames and smoking. Signs shall comply with Section 3403.5. (CFC 3404.2.3.1)

Tanks more than 100 gallons (379 L) in capacity, which are permanently installed or mounted and used for storage of Class I, II, III, liquids, shall bear a label and placard identifying the material therein. Placards shall be in accordance with NFPA 704 (CFC 3404.2.3.2)

Exceptions:

1. Tanks of 300-gallon (1136 L) capacity or less located on private property and used for heating and cooking fuels in single-family dwellings.
2. Tanks located underground.

Smoking and open flames are prohibited in storage areas in accordance with Section 2703.7. (CFC 3404.2.4)

Exception: Areas designated as smoking and hot work areas and areas where hot work permits have been issued in accordance with this code

Other General Requirements

Above-ground tanks shall not be used for the storage of Class I, II or IIIA liquid motor fuels except as provided by this section. (CFC 2206.2.3)

1. Above-ground tanks used for outside, above-grade storage of Class I liquids shall be listed and labeled as protected above-ground tanks and be in accordance with Chapter 34. Such tanks shall be located in accordance with Table 2206.2.3
2. Above-ground tanks used for above-grade storage of Class II or IIIA liquids are allowed to be protected above-ground tanks or, when approved by the fire code official, other above-ground tanks that comply with Chapter 34. Tank locations shall be in accordance with Table 2206.2.3.
3. Tanks containing fuels shall not exceed 12,000 gallons (45,420 L) in individual capacity or 48,000 gallons (181,680 L) in aggregate capacity. Installations with the maximum allowable aggregate capacity shall be separated from other such installations by not less than 100 feet (30,480 mm).
4. Tanks located at farms, construction projects, or rural areas shall comply with Section 3406.2 Verify tank capacity in accordance to CFC 3406.2.4

Table 2206.2.3

Minimum Separation Requirements for Above-Ground Tanks

CLASS OF LIQUID AND TANK TYPE	INDIVIDUAL TANK CAPACITY (gallons)	MINIMUM DISTANCE FROM NEAREST IMPORTANT BUILDING ON SAME PROPERTY (feet)	MINIMUM DISTANCE FROM NEAREST FUEL DISPENSER (feet)	MINIMUM DISTANCE FROM LOT 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 (feet)	MINIMUM DISTANCE BETWEEN TANKS (feet)
Class I protected above-ground tanks	Less than or equal to 6,000	5	25 ^a	15	5	3
	Greater than 6,000	15	25 ^a	25	15	3
Class II and III protected above-ground tanks	Same as Class I	Same as Class I	Same as Class I	Same as Class I	Same as Class I	Same as Class I
Tanks in vaults	0-20,000	0 ^b	0	0 ^b	0	Separate compartment required for each tank
Other tanks	All	50	50	100	50	3

An approved means or method in accordance with Section 3404.2.9.6 shall be provided to prevent the overflow of all Class I, II, and IIIA liquid storage tanks. Storage tanks in refineries, bulk plants or

terminals regulated by Section 3406.4 or 3406.7 shall have overfill protection in accordance with API 2350. (CFC 3404.2.7.5.8)

An approved means or method in accordance with Section 3404.2.9.7.6 shall be provided to prevent the overfill of Class IIIB liquid storage tanks connected to fuel burning equipment inside buildings.

Exception: *Outside above-ground tanks with a capacity of 1320 gallons (5000 L) or less.*

Above-ground tanks operating at pressured not exceeding 2.5 psig (17.2 kPa) for storage of Class I, II or IIIA liquids, which are designed with a floating roof, a weak roof-to-shell seam or equipped with emergency venting devices limiting pressure to 2.5 psig (17.2 kPa), shall be located in accordance with Table 22.4.1.1 (a) of NFPA 30 (CFC 3404.2.9.6.1.1)

Exceptions:

1. *Vertical tanks having a weak roof-to-shell seam and storing Class IIIA liquids are allowed to be located at one-half the distances specified in Table 22.4.1.1 (a) of NFPA 30, provided the tanks are not within a diked area or drainage path for a tank storing Class I or II liquids.*
2. *Liquids with boil over characteristics and unstable liquids in accordance with Section 3404.2.9.6.1.3 and 3404.2.9.6.1.4.*
3. *For protected above-ground tanks in accordance with Section 3404.2.9.7 and tanks in at-grade or above-grade vaults in accordance with section 3404.2.8, the distances in Table 22.4.1.1 (b) of NFPA 30 shall apply and shall be reduced by one-half, but not less than 5 feet (1524 mm)*

Above-ground tanks for the storage of Class I, II, IIIA, liquids operating at pressure exceeding 2.5 psig (17.2 kPa) or equipped with emergency venting allowing pressures to exceed 2.5 psig (17.2kPa) shall be located in accordance with Table 22.4.1.3 of NFPA 30.(CFC 3404.2.9.6.1.2)

Exception: *Liquids with boil over characteristics and unstable liquids in accordance with Sections 3404.2.9.6.1.4 and 3404.2.9.6.1.5.*

Dispensing, Use Mixing and Handling

Liquid transfer equipment and methods for transfer of Class, I, II, and IIIA liquids shall be approved and be in accordance with Sections 3405.2.1 through 3405.2.6. (CFC 3405.2)

Positive-displacement pumps shall be provided with pressure relief discharging back to the tank, pump suction or other approved location, or shall be provided with interlocks to prevent over-pressure. (CFC 3405.2.1)

Spill control shall be provided in accordance with Section 3403.4 where Class I, II or IIIA liquids are dispensed into containers exceeding a 1.3-gallon (5L) capacity or mixed or used in open containers or systems exceeding a 5.3-gallon (20L) capacity. Spill control and secondary containment shall be provided in accordance with Section 3403.4 when the capacity of an individual container exceeds 55 gallons (208L) or the aggregate capacity of multiple containers or tanks exceeds 100 gallons (378.5L). (CFC3405.3.7.5.3)

Dispensing activities which exceed the quantities set forth in Table 3405.3.8.2 shall not be conducted within 15 feet (4572 mm) of building or combustible materials or within 25 feet (7620 mm) of building openings, lot lines, public streets, public alleys or public ways. Dispensing activities that exceed the quantities set forth in Table 3405.3.8.2 shall not be conducted within 15 feet (4572 mm) of storage of Class I, II or III liquids unless such liquids are stored in tanks which are listed and labeled as 2-hour protected tank assemblies in accordance with UL 2085.(CFC 3405.3.8.2)

Exceptions:

1. *The requirements shall not apply to areas where only the following are dispensed: Class III liquids; liquids that are heavier than water; water-miscible liquids; and liquids with viscosities greater than 10,000 centipoise (cp) (10Pa s)liquids; and liquids with viscosities greater than 10,000 centipoise (cp) (10Pa s)*
2. *Flammable and combustible liquid dispensing in refineries, chemical plants, process facilities, gas and crude oil production facilities and oil blending and packaging facilities, terminals and bulk plants.*

Table 3405.3.8.2

Maximum Allowable Quantities for Dispensing of Flammable and Combustible Liquids in Outdoor Control Areas

CLASS OF LIQUID	QUANTITY (gallons)
Flammable	
Class IA	10
Class IB	15
Class IC	20
Combination Class IA, IB and IC	30 ^c
Combustible	
Class II	30
Class IIIA	80
Class IIIB	3,300

For SI: 1 gallon=3.785L

- a. *For definition of "Outdoor Control Area" see Section 2702.1*
- b. *The fire code official is authorized to impose special conditions regarding locations, types of containers, dispensing units, fire control measures and other factors involving fire safety.*
- c. *Containing not more than the maximum allowable quantity per control area of each individual class*

Also see section (CFC 2206.2.3, 3406.2.4, 3406.2.4.3)

Special Operations

This section shall cover the provisions for special operations which include, but are not limited to, storage, use, dispensing, mixing or handling of flammable and combustible liquids. The following special operations shall be in accordance with Section 3401, 3403, 3404, 3405, except as provided in Section 3406.(CFC 3406.1)

1. *Storage and dispensing of flammable and combustible liquids on farms and construction sites.*
2. *Well drilling and operating.*
3. *Bulk plants or terminals.*
4. *Bulk transfer and process transfer operations utilizing tank vehicles and tank cars.*
5. *Tank vehicles and tank vehicle operation.*
6. *Refineries.*
7. *Vapor recovery and vapor-processing systems.*

Permanent and temporary storage and dispensing of Class I, and II liquids for private use on farms and rural areas and at construction sites, earth-moving projects, gravel pits or borrowing pits shall be in accordance with **Section 3406.2.1 through 3406.2.8.1**(CFC 3406.2)

Exception: *Storage and use fuel oil and containers connected with oil-burning equipment regulated by Section 603 and the California Mechanical Code.*

Storage areas shall be kept free from weeds and extraneous combustible material. Open flames and smoking are prohibited in flammable or combustible liquid storage areas. (CFC3406.21)

Tanks and containers or the storage of liquids above ground shall be conspicuously marked with the name of the product which they contain and the words: FLAMMABLE-KEEP FIRE AND FLAME

AWAY. Tanks shall bear the additional marking: KEEP 50 FEET FROM BUILDINGS. (CFC 3406.2.2)(CFC 3406.2.2)

The capacity of permanent above-ground tanks containing Class I or II liquids shall not exceed 1,100 gallons (4164 L). The capacity of temporary above-ground tanks containing Class I or II liquids shall not exceed 10,000 gallons (37,854 L). Tanks shall be of the single-compartment design. (CFC 3406.2.4)

Special Note! *Permanent above-ground tanks of greater capacity which meet the requirements of Section 3404.2, other requirements from 3404 may supersede the special operations section.*

Tanks containing Class I or II liquids shall be kept outside and at least 50 feet (15,240 mm) from buildings and combustible storage. Additional distance shall be provided when necessary to ensure that vehicles, equipment and containers being filled directly from such tanks will not be less than 50 feet (15,240) from structures, hay sacks or other combustible storage. (CFC 3406.2.4.3)

Portable fire extinguishers with a minimum rating of 20-B: C and complying with Section 906 shall be provided where required by the fire code official. (CFC3406.2.7)

Where pumps are used for liquid transfer, means shall be provided to deactivate liquid transfer in the event of a liquid spill or fire. (CFC 18.5.2.3)

Discontinuance of Tanks

Above-ground tanks taken out of service shall comply with Sections 3404.2.13.2.1 and 3404.2.13.2.3 (CFC 3404.2.13.2)

Above-ground tanks temporarily out of service shall have all connecting lines isolated from the tank and be secured against tampering. (CFC 3404.2.13.2.1)

Exception: *In-place fire protection (foam) system lines.*

Above-ground tanks not used for a period of 90 days shall be safeguarded in accordance with Section 3404.2.13.1.2 or removed in accordance with Section 3404.2014.(CFC 3404.2.13.2.2)

Exceptions:

1. *Tanks and containers connected to oil burners that are not in use during the warm season of the year or are used as a backup heating system to gas.*
2. *In-place active fire protection (foam) system lines.*

Above-ground tanks that have been out of service for a period of one year shall be removed in accordance with Section 3404.2.14. (CFC 3404.2.13.2.3)

Exception: *Tanks within operating facilities.*

Removal of above-ground and underground tanks shall be in accordance with all of the following: (CFC 3404.2.14.1) (CFC 3404.2.14.1)

1. *Flammable and combustible liquids shall be removed from the tank and connected piping.*

2. Piping at tank opening that is not to be used further shall be disconnected.

3. Piping shall be removed from the ground.

Exception: Piping is allowed to be abandoned in place where the fire code official determines that removal is not practical. Abandoned piping shall be capped and safeguarded as required by the fire code official.

4. Tank opening shall be capped or plugged, leaving a 1/8 inch to 1/4 inch diameter (3.2 mm to 46.4 mm) opening for pressure equalization.

5. Tanks shall be purged of vapor and inerted prior to removal.

6. All exterior above-ground fill and vent piping shall be permanently removed.

Exception: Piping associated with bulk plants, terminal facilities and refineries.

Tanks shall be disposed of in accordance with federal, state, and local regulations. (CFC 3404.2.14.2)

Storage areas shall be provided with spill control and secondary containment in accordance with Section 3403.4 (CFC 3404.4.3)

Exception: Containers stored on approved containment pallets in accordance with Section 2704.2.3 and containers in cabinets and lockers with integral spill containment.

Storage areas shall be protected against tampering or trespassers by fencing or other approved control measures. (CFC 3404.4.4)

Guard posts or other means shall be provided to protect exterior storage tanks from vehicular damage. When guard posts are installed, the posts shall be installed in accordance with Section 312. (CFC 3404.4.5)

The storage area shall be kept free from weeds, debris and combustible materials not necessary to the storage. The area surrounding an exterior storage area shall be kept clear of such materials for a minimum distance of 15 feet (4572 mm) (CFC 3404.4.7)

Weather protection for outdoor storage shall be in accordance with Section 2704.13. (CFC 3404.4.7)