UNIFIED FIRE AUTHORITY FIRE PREVENTION BUREAU

Aboveground LPG Tank Requirements

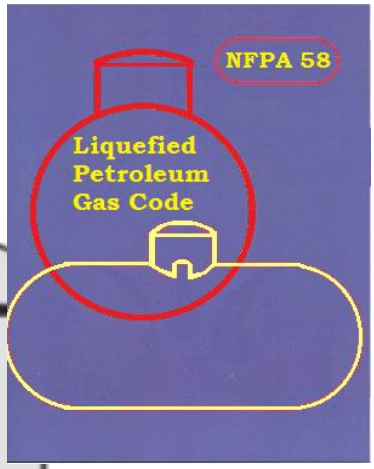
9/15/2010

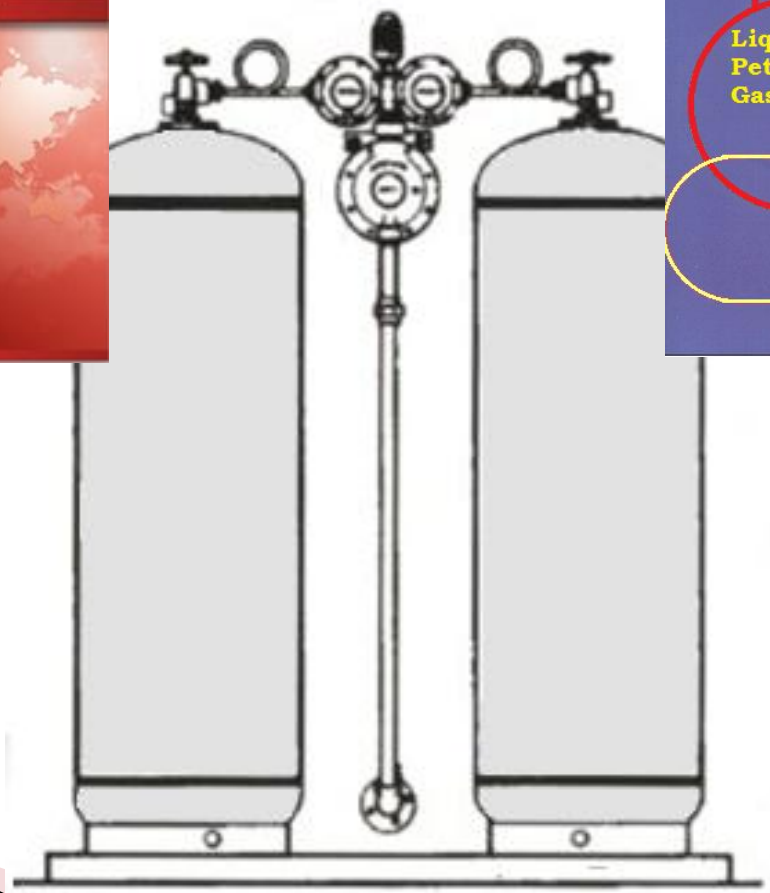
[This document is designed as a summary guide for the proper installation of liquid propane cylinders. This document uses the International Fire Code, and NFPA 58]

The following information is to be used whenever residential underground, or aboveground propane tanks are installed.

This information is to correlate with the International Fire Code and NFPA 58.

Plans must be submitted and a permit secured prior to any underground or aboveground LPG tank installation exceeding 125 gallons <u>with the exception of 500 gallon or smaller LPG tanks installed at R-3 occupancies</u>.



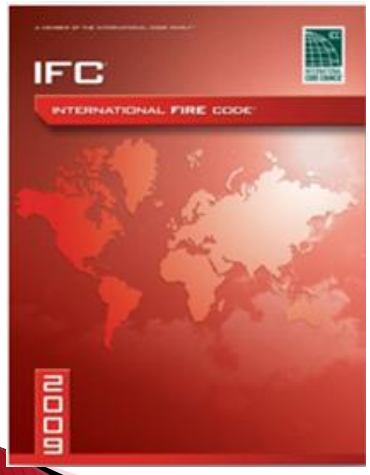


Permit Required

An operational permit is required for the storage and use of LPG containers.

However a permit is not required for an individual container with a 500-gallon water capacity or less serving occupancies in Group R-3. **See IFC 105.6.28**

Operation of cargo tankers that transport LP-gas are exempt, however they cannot be parked (1 hour max.) or left unattended in residential or commercial areas. **See IFC 3811**.



See 105.6.27 & 3811

Underground LPG Tanks

Installer Certification

The Utah State Fire Marshals Office requires the following:

Installation of any LPG tank is only to be done by individuals and companies that are certified by the Utah State Fire Marshals Office.

A list of certified and licensed individuals is available at:

http://publicsafety.utah.gov/firemarshal/

Reference R710-6

Tank Capacities, and Types

The maximum aggregate capacity of any one installation shall not exceed a water capacity of 2,000 gallons. Tanks must be approved for underground installation.
See IFC 3804.2

See IFC 3804.2

Propane Tank Weight and Capacities

Height 53"
Diameter 30"
Weight 272 lbs
Footing 22"
Capacity 125

This 125 gallon propane tank is best suited for a small modular home, or possibly a small shop with a single heater of 30,000 BTU's.

They can be hooked together in series.

They work excellent in a temporary situation where temporary heat is needed.

A 125 gallon propane tank holds 100 gallons of liquid propane and weighs 420 lbs.

Propane Tank Weight and Capacities

Length 7' 10"
Diameter 30"
Weight 483 lbs
Leg Spacing 60"
Capacity 250

A 250 gallon propane tank is best suited for a home of 1000 to 1250 square feet, utilizing two propane fired appliances. For example: a hot water heater and cooking, or heating.

The fire code requires that this size propane tank be set ten feet from a building and a property line.

A 250-gallon propane tank holds 200 gallons of liquid propane.

Propane Tank Weight and Capacities

A 325 gallon propane tank is best suited for a home of about 1200 to 1500 square feet, utilizing two or more propane fired appliances. For example: heating, cooking, and hot water or possibly propane fired dryer.

The fire code requires that this size of propane tank be set ten feet from a structure and a property line.

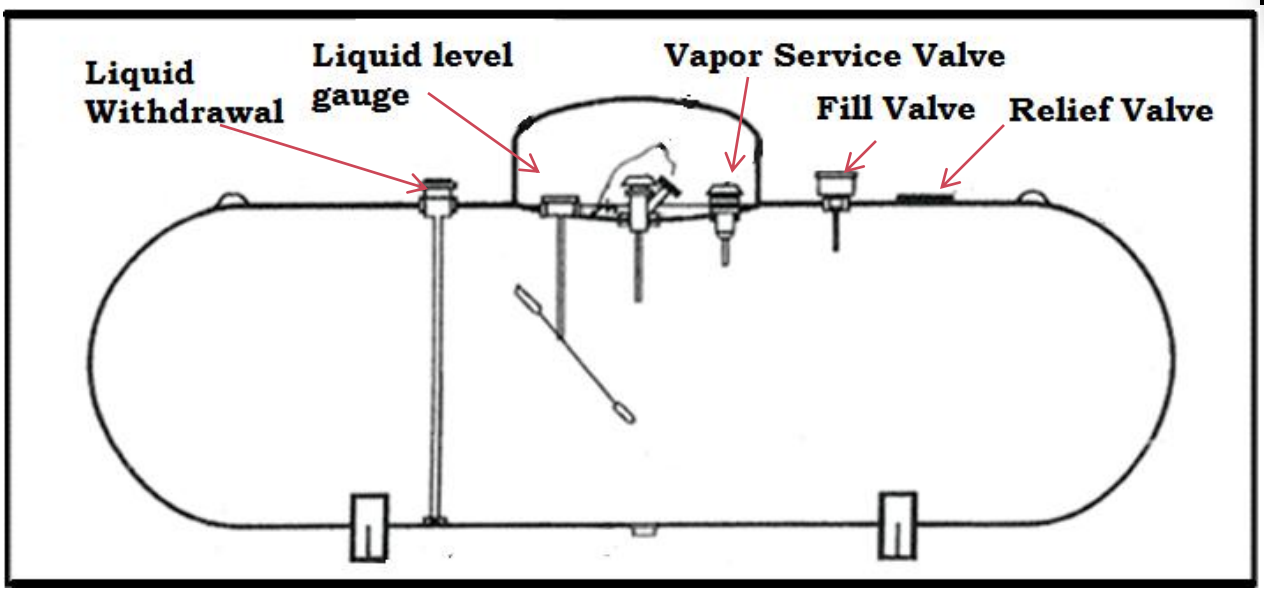
A 325 gallon propane tank holds 260 gallons of liquid propane.

325 Gal Tank

Length 9' 10"
Diameter 30"
Weight 597 lbs
Leg Spacing 60"
Capacity 325

This LPG tank is coated and prepared for an underground installation.

Propane Tank Weight and Capacities



A 500 gallon propane tank is best suited for a home of about 1500 to 2500 square feet, utilizing two or more propane fired appliances. For example heating, cooking, hot water and clothes drying.

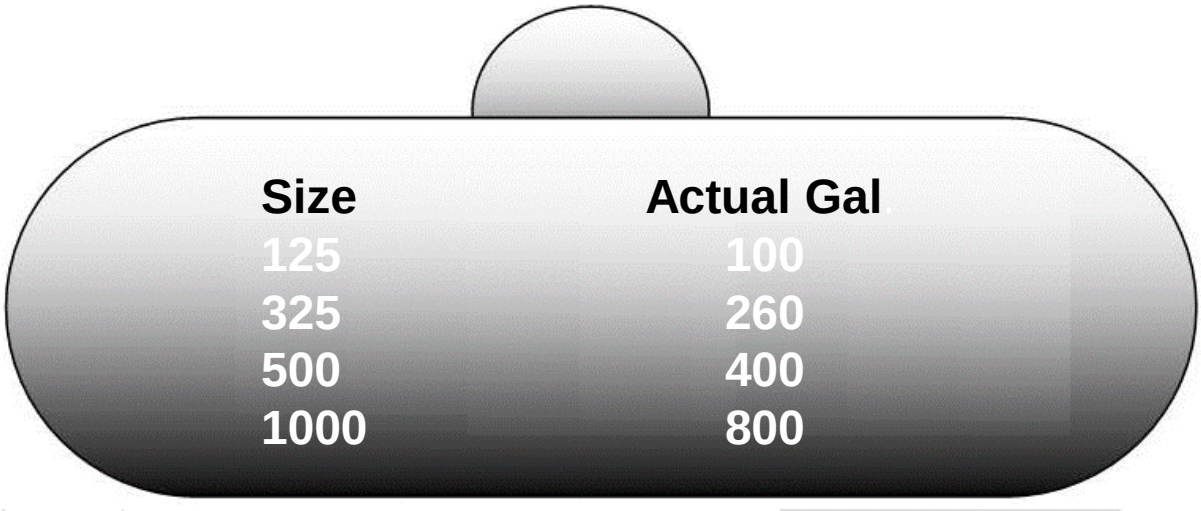
The fire code requires that this size of propane tank be set ten feet from a structure and a property line.

A 500-gallon propane tank holds 400 gallons of liquid propane.

500 Gal Tank

Length 9' 11"
Diameter 37"
Weight 946 lbs
Leg Spacing 60"
Capacity 400

Propane Tank Weight and Capacities



Size	Actual Gal
125	100
325	260
500	400
1000	800

A 1000 gallon propane tank is best suited for a home of about 2500 to 4500 square feet, utilizing three or more propane fired appliances. For example: Heating, cooking, hot water and clothes drying.

The fire code requires that this size of propane tank be set 25 feet from a structure and a property line.

A 1000 gallon propane tank holds 800 gallons of liquid propane.

1000 Gal Tank
Length 16'
Diameter 41"
Weight 1,760 lbs
Leg Spacing 121"
Capacity 1000

Sand Base

Although concrete or masonry foundations are not always required, sand should still be used in the bottom of the hole for drainage. It is a good practice to put a 6 to12 inch layer of coarse sand in the bottom of the hole before setting the tank. Ref. NFPA 58, 6.6.6 (n)

Water Tables

Underground LPG tanks are not allowed in areas of the county with high water tables or in federal flood zones, unless approved by the Fire Marshal.

If approved, underground tanks must be anchored or secured to a reinforced concrete foundation. Where straps come in contact with the tank, protection between the tank and the straps is to be provided. Thick tarpaper, celetex, etc. that is water resistant will suffice.

Tanks must be secured when water tables are high.

NFPA 58, 6.6.1.6

Corrosion Protection Equipment Tank Coating

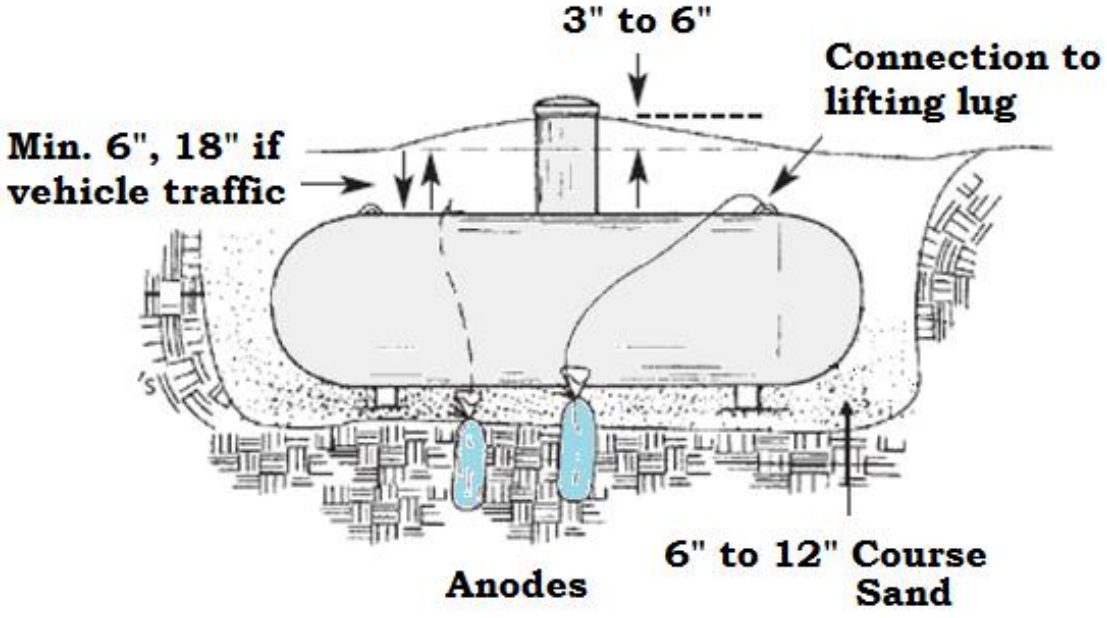
In order to reduce the problem of corrosion of underground tanks, sacrificial anodes are to be installed in the ground near the tank. The anodes are connected by a copper cable to the tank. Anodes are usually a soft metal, such as magnesium or zinc. They are made as solid rods or stakes, as well as soft powder in small bags.

Underground tanks must be designed and coated for underground installation. They are usually factory coated. However, coatings may have been scratched off during transportation and installation. As a result, the tank must be recoated onsite before it is installed in the ground.

Underground Tank Depth and Backfill

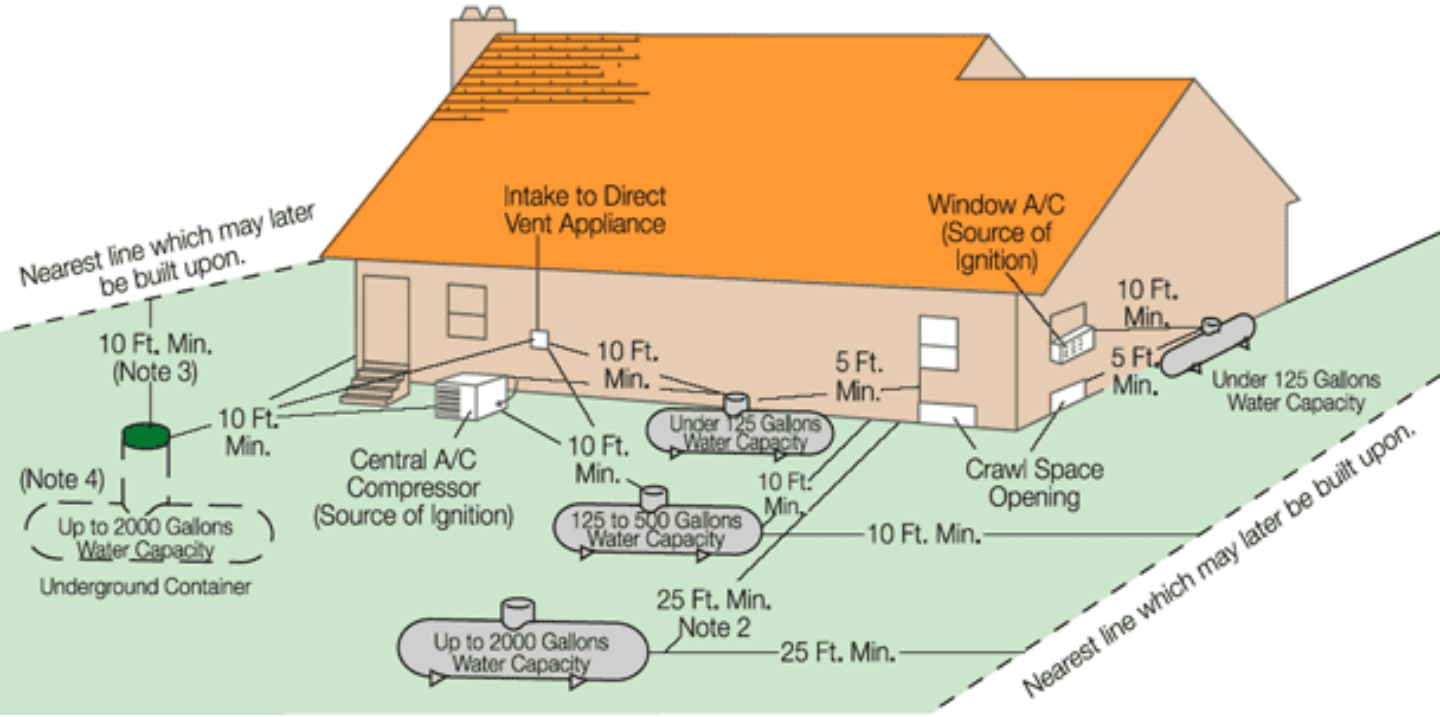
The top of the tank when set in the hole must be at least six (6) inches below grade. If the tank is to be installed in an area where vehicles may travel over the top of the tank, 18" -24" of compacted earth shall be set below grade.

The hole is to be backfilled with rock free dirt or coarse sand. The tanks surface is **not to be scratched**. A minimum of twelve (12) inches of backfill is to be tamped down around the tank at any one time, then an additional twelve (12) inches is filled in and tamped, etc. until the hole is full.



LPG Allowable Placement for Cylinders

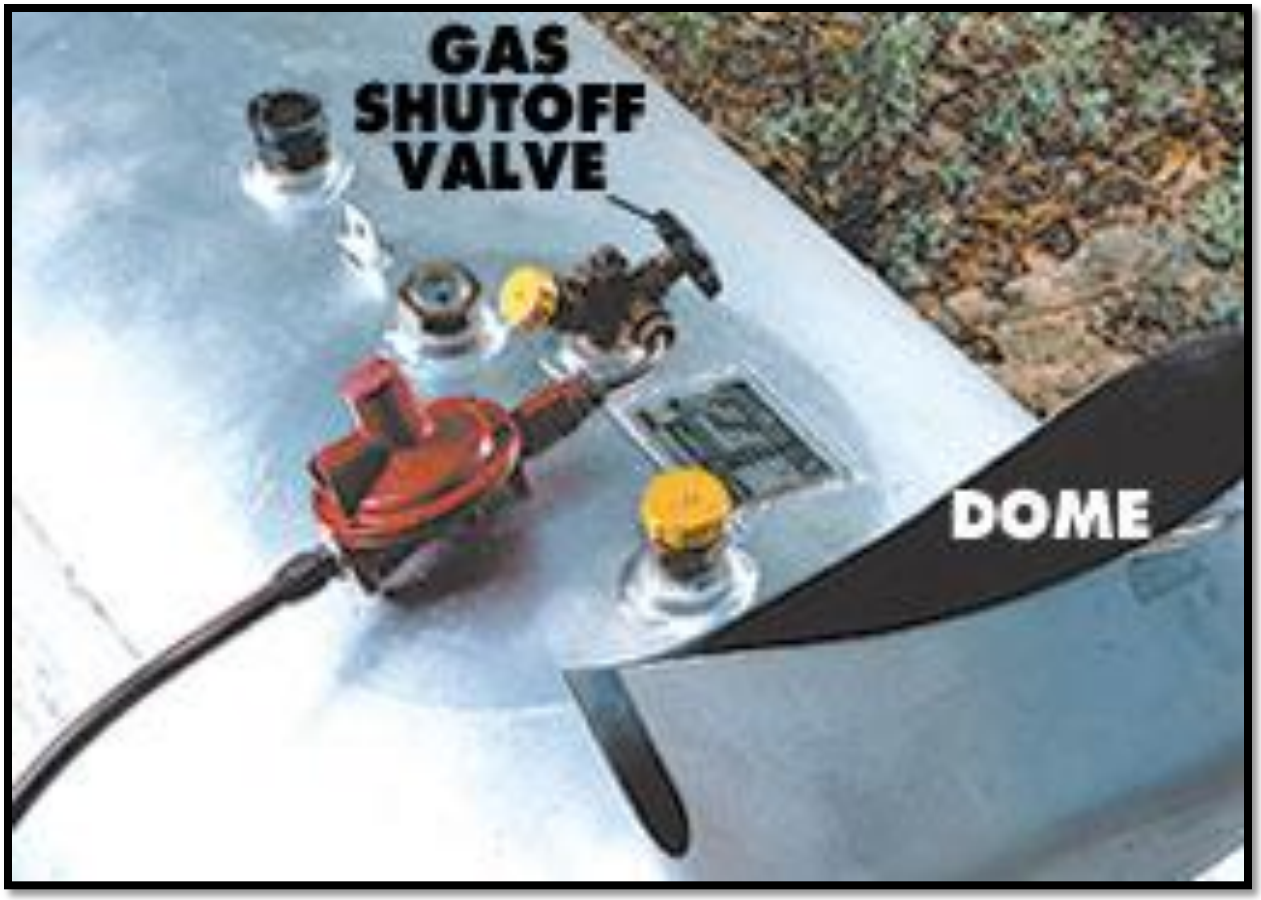
The minimum separation between containers that are underground shall be three (3) feet, and the minimum distance from buildings, public ways, or lot lines of adjoining property shall be ten (10) feet.



See IFC 3804

Shut off Valves

Compressed gas systems conveying flammable gases shall be provided with approved manual or automatic emergency shutoff valves that can be activated at each point of use and at each source.



Underground LPG Tank Inspection Checklist

- Plans are submitted and approved showing tank placement.
- Tank does not exceed 2,000 gallons water capacity.
- Tank installed by a Utah Fire Marshals Office, licensed and certified company.
- Permit for tank installation on-site.
- Tank must be ASME approved as indicated on the tank.
- Sand base provide.
- Concrete base with protected tie downs in areas of the county with high water tables. (Must be approved prior to installation)
- Sacrificial anodes are installed in the ground near the tank.
- If scratched, tank must be recoated onsite before it is installed in the ground.
- Proper depth and compacted earth.
- Shut off valve accessible.

If the installation meets code, issue an FP 135 and return a copy along with the approved plans to the Fire Prevention Bureau. Plans and FP 135 to be filed.

Aboveground LPG Tanks

Installer Certification is required.

Normally in residential and heavily populated area the installation of an LPG tank is regulated.

Communities may have an ordinance to prevent LPG tanks greater than 2,000 from being installed.

See IFC 3804.2

Aboveground Tank Locations

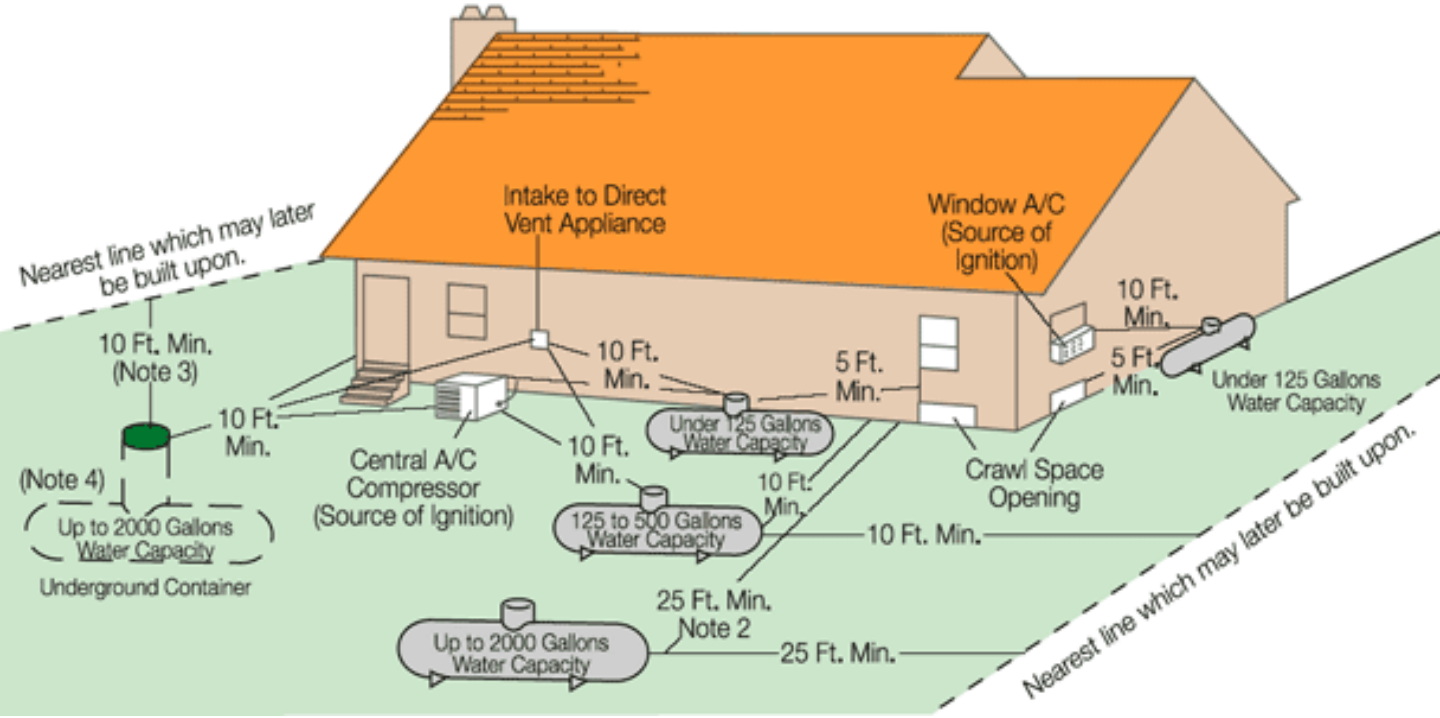
Consult IFC Table 3804.3 for location of LPG containers. In many instances tanks will have to be a minimum of 25 feet from buildings, public ways, or lot lines of adjoining property.

TABLE 3804.3
LOCATION OF LP-GAS CONTAINERS

CONTAINER CAPACITY (water gallons)	MINIMUM SEPARATION BETWEEN CONTAINERS AND BUILDINGS, PUBLIC WAYS OR LOT LINES OF ADJOINING PROPERTY THAT CAN BE BUILT UPON		MINIMUM SEPARATION BETWEEN CONTAINERS[b, c] (feet)
	Mounded or underground containers[a] (feet)	Above-ground containers[b] (feet)	
Less than 125[c, d]	10	5[e]	None
125 to 250	10	10	None
251 to 500	10	10	3
501 to 2,000	10	25[e, f]	3

Many foot notes exist. For tanks greater than 2, 000 see IFC Table 3804.3.

Typical Tank Location Requirements



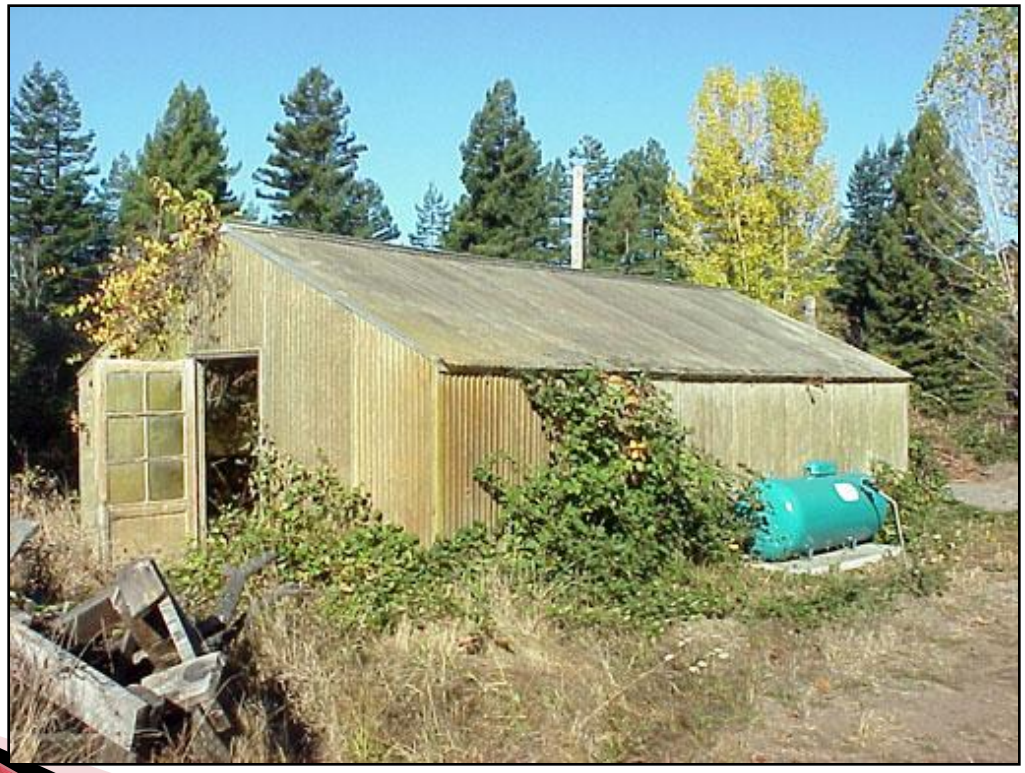
Remember that when plans are submitted for review the type of tank, location and gallons must be clearly indicated. Lot lines, property lines and location to structures is also required.

Tank Security, Signs, Combustible Materials

Tank has a method of locking and securing the operational valves. See IFC 3807.1

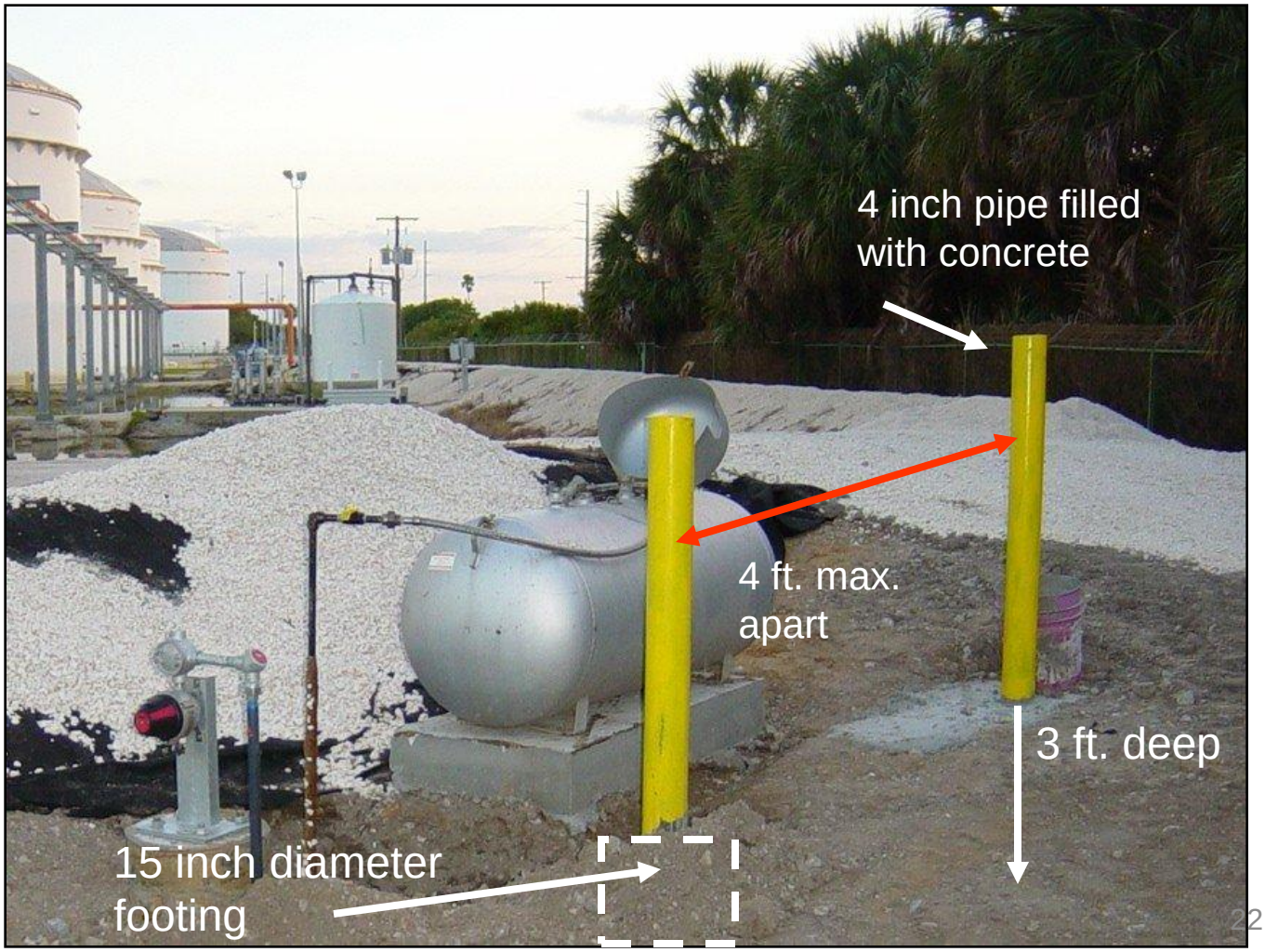
No smoking signs are posted on the tank. Sign to read, "NO SMOKING WITHIN 15 FEET". See IFC 3807.2

Weeds, grass, bush, trash and other combustible materials are kept a minimum of 10 feet away from LPG tanks. See IFC 3807.3



Guard Posts

If exposed to vehicular damage due to proximity to alleys, driveways or parking areas, LPG tanks, regulators and piping shall be protected by guard posts constructed of steel, not less than 4 inches in diameter, filled with concrete. Posts are to be spaced not more than 4 feet apart, set not less than 3 feet deep in a concrete footing of not less than a 15-inch diameter. The top of the posts is not to be less than 3 feet above the ground, and located not less than 3 feet from the tank. Other means of tank protection if approved may consist of landscape type boulders, cement walls. etc. **See IFC 3807.4**



Snow and Ice

HEAVY SNOW OR ICE - Heavy accumulations of snow or ice on regulators, piping, tubing and valves may cause damage that could result in a gas leak.

Regulator vents must remain clear of snow and ice to operate properly.

Appliance vents, chimneys and flues must be kept clear of snow and ice so appliances may vent properly, especially on roofs of mobile homes.

When removing snow:

- Use care around tanks, piping, tubing, valves, regulators and other equipment to prevent damage.
- Use a broom instead of a shovel.
- Do not shovel snow from roofs onto propane equipment.

IFC 603.9 Gas meters. Above-ground gas meters, regulators and piping subject to damage shall be protected by a barrier complying with Section 312 or otherwise protected in an approved manner.

Painting

The tank is to have a light color to prevent heat absorption. White, silver, etc. is acceptable.
See NFPA 58

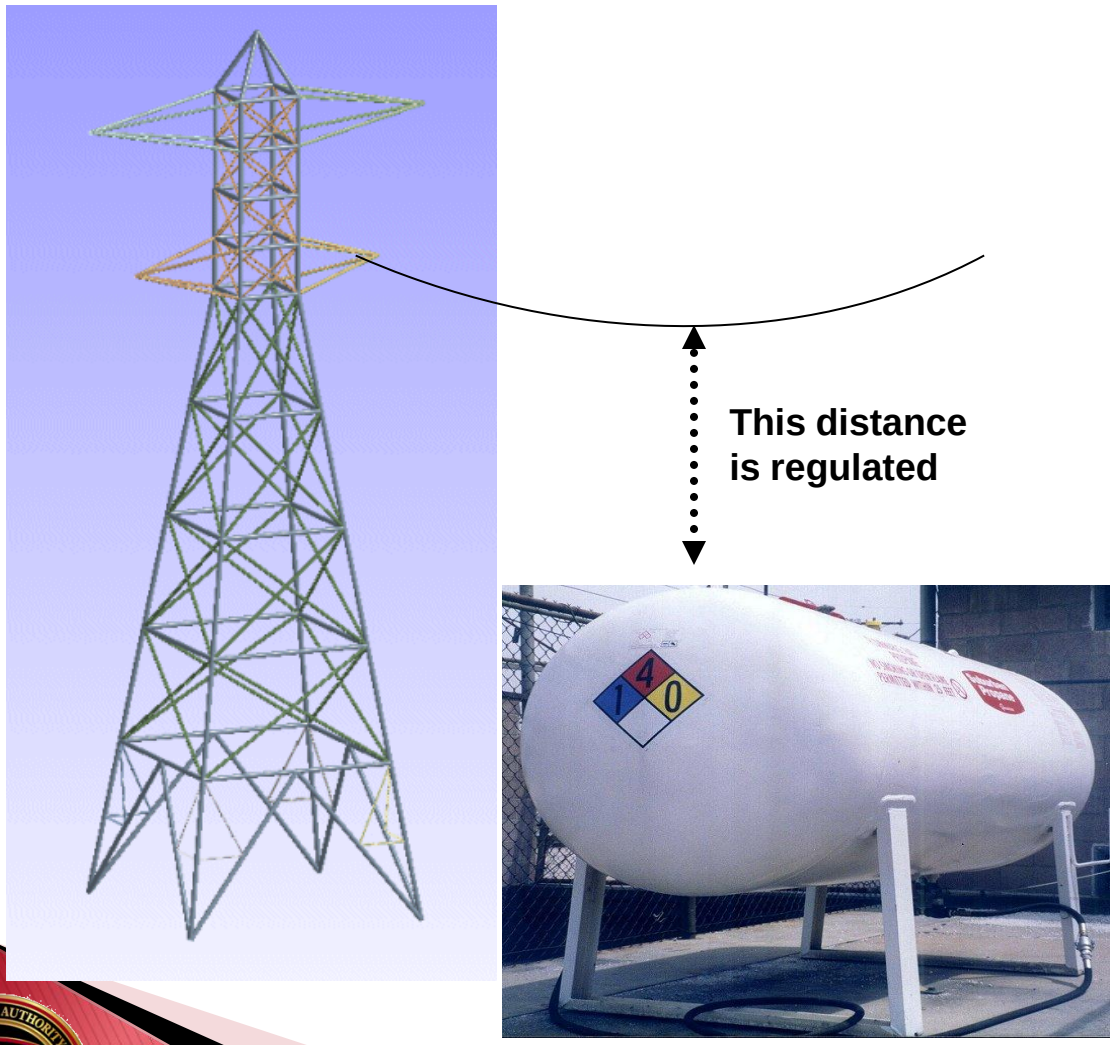
This tank is painted, but is missing the sign to identify its content.

Tanks cannot be allowed to rust out and leak. White or silver paint is approved.

NFPA 58 A.6.6.1.4 Generally, a light reflecting color paint is preferred unless the system is installed in an extremely cold climate.

Power Lines

The LPG tank or any of its parts, shall not be located within 6 feet of a vertical plane beneath overhead electric power lines that are over 600 volts. See NFPA 58.



Installation Foundation & Shut off Valves

As mentioned before:

Tanks shall be installed upon a firm foundation or be otherwise firmly secured. Recommended is a 4-inch think concrete pad with a minimum ½-inch x 6-inch grade 8 galvanized bolts. See NFPA 58

A readily accessible shutoff valve shall be located at the tank, at the upstream side of the secondary regulator prior to entering the building and at each appliance.

Aboveground LPG Tank Inspection Checklist

- Plans are submitted and approved showing tank placement.
- Tank does not exceed 2,000 gallons water capacity.
- Tank installed by a Utah Fire Marshals Office, licensed and certified company.
- Permit for tank installation on site.
- Tank must be ASME approved as indicated on the tank.
- Tank is located per IFC Table 3804.3.
- Tank has a method of locking and securing the operational valves.
- No smoking signs are posted on the tank.
- Weeds, grass, bush, trash and other combustible materials are kept a minimum of 10 feet away from the LPG tank.
- Guard posts are installed if necessary.
- LPG cylinders cannot be installed underneath any building.
- The LPG tank shall be marked to identify its content.
- The LPG tank is located in relation to overhead power lines.
- Tanks shall be painted (proper color required).
- Tank is installed upon a firm foundation and/or is firmly secured.
- Shut off valve accessible.

Code Problems?

Code Infractions in this picture

1. Not on a firm base.
2. Missing “NO SMOKING WITHIN 15 FEET” signs.
3. “Flammable Gas” signs are missing.
4. Hood must be capable of being locked.
5. Bollards to protect the tank may be required.

Questions for review

1. What is the minimum distance a 2000 gallon water capacity above ground LPG tank can be to a property line?
2. What color paint is allowed on above ground LPG tanks?
3. Can LPG tanks be installed underneath a building?
4. How close can a 1000 gal. LPG tank be (in vertical clearance) to a 1,550 volt power line?
5. What is the recommended thickness that a concrete pad be for an LPG tank to be set upon?
6. In areas where vehicle traffic is expected, a noninterchangeable underground container shall be installed at least _____ inches below grade, or the container shall be protected from damage from vehicles.
7. Who regulates the license and certification of individuals and companies that can legally install an LPG tank?

Questions for Review Cont.

8. All _____ for outdoor installations shall be designed, installed, or protected so their operation will not be affected by the elements (freezing rain, sleet, snow, ice, mud, or debris).

9. Where should the manual and/or automatic emergency shutoff valve be located?

10. How far away are weeds, grass, bush, trash and other combustible materials to be kept away from LPG tanks?

Answers to Questions for Review

1. 25 ft. sub note “e” and “f” apply. See IFC Table 3804.3
2. White or silver. See NFPA 58
3. NO See NFPA 58, 6.3.4.2, 6.4.4.1
4. 6 ft. minimum. See NFPA 58, 6.4.5.12
5. 4 inches. See NFPA 58
6. 18 in. See NFPA 58, 6.6.6.1 (B)
7. The Utah State Fire Marshals Office. See R 710-6
8. Regulators. See NFPA 58, 6.7.4.4
9. Compressed gas systems conveying flammable gases shall be provided with approved manual or automatic emergency shutoff valves that can be activated **at each point of use and at each source**. See IFC 3503.1.3
10. 10 ft. See IFC 3807.3