

# Chapter 5

## NFPA 58

Liquefied Petroleum  
Gas Code

# NFPA 58

## Liquefied Petroleum Gas

As many of us are aware, tropical storm Irene left a scene of devastation in its wake. Home's along Connecticut's shore line were hit particularly hard. As seen on the nightly news, many homes were damaged and some were even swept away when we were hit by high winds and high tides. Besides the problem of all the debris from these homes and their yards a much larger safety problem has been discovered. Large propane tanks that once fed homes were tipped over or washed out into Long Island sound. The environmental and safety concerns are obvious.

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## Liquefied Petroleum Gas

Recently in Connecticut a Massachusetts contractor was arrested and sentenced to two years probation as well as being fined \$20,000 arising from reckless and unlicensed installation of piping at a 30,000 gallon North Canaan propane facility. The court has also prohibited him or any of his employees from performing any work in the state for the next two years.

# NFPA 58

## Liquefied Petroleum Gas

NFPA 58 deals with the storage, use, handling and transportation of Liquefied Petroleum Gas only. CT currently references the 1995 edition of NFPA 58. PSI Examinations, who conducts the testing for the Connecticut Department of Consumer Protection references the 2008 addition of the standard for the state test. This standard contains 15 chapters, 12 annex and an index.

# The Chapters

- Administration
- Referenced Publications
- Definitions
- General Requirements
- LP Gas Equipment and Appliances
- Installation of LP Gas Systems
- LP-Gas Liquid Transfer
- Storage of Cylinders Awaiting Use, Resale or Exchange
- Vehicular Transportation of LP Gas
- Buildings or Structures Housing LP-Gas Distribution Facilities
- Engine Fuel Systems
- Refrigerated Containers
- Marine Shipping & Receiving
- Operation & Maintenance
- Pipe and Tubing Sizing Tables

# The Annex's

Unlike the chapters in this standard which are numbered, the Annex are listed as A through L. The index follows the last annex.

- Explanatory Material
- Properties of LP-Gas
- Design, Construction & Requalification of DOT (ICC) Cylinders
- Design of ASME & API-ASME Containers
- Pressure Relief Devices
- Liquid Volume Tables, Computations & Graphs
- Wall Thickness of Copper Tubing
- Procedure for Torch Fire & Hose Stream Testing of Thermal Insulation Systems for LP-Gas Containers
- Container Spacing
- Sample Ordinance Adopting NFPA-58
- Burial & Corrosion Protection for Underground & Mounted ASME Containers
- Informational References
- Index

# What is liquefied Propane Gas?

Liquefied Propane Gas more commonly referred to as LP Gas is a flammable mixture of hydrocarbon gases. LP gas has a variety of uses from fuel for heating and cooking equipment to powering vehicles. It is being used more and more as an aerosol propellant, it is also used as a refrigerant. Using it as a refrigerant helps our ozone layer by replacing harmful chlorofluorocarbons

# What is liquefied Propane Gas?

There are a variety of LP gases that are primarily propane or butane. The most common sold is a mixture of both these gases. An odorant, ethanethiol, is added to the gas to aid in leak detection. Amyl mercaptan or thiophene are two other odorants that may be used in place of ethanethiol.

# Where does LP gas come from?

LP gas is made from refining natural gas and is usually comes from fossil fuel sources manufactured from crude oil during the refining process. It can also be extracted from gas or oil streams as they are taken from the ground. LP gas burns cleanly with few sulfur emissions. Approximately 3% of the energy consumed is LP gas.

# The Storage Tank

- Containers come under section 5.2 of the 2008 addition of NFPA 58.
- Designed, fabricated tested & marked to US DOT and ASME Section VIII standards.
- Section 7.4 of the standard addresses the quantity of LP-gas in contains. Tables 7.4.2.2 addresses the maximum filling limit by weight while table 7.4.2.3(a) deals with the maximum filling weight by volume.

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## Liquefied Petroleum Gas

All gases are rated with a specific gravity identification. This number relates to air which is rated at 1. LPG has a specific gravity of 1.5 at vapor. Which means unlike natural gas, which has a specific gravity of .6 to .7, LPG is heavier than air and will sink rather than rise when in it's gaseous state.

# Safety

As was mentioned in the previous slide, LP-Gas, when in its gaseous state, is heavier than air. Why is this a concern? As plumbers we know that when working in any area that may contain vaporous gas we must first use a sniffer to test the atmosphere for any possible gas leaks before we use any tool or equipment that has an open flame or may create a spark. This is done to protect against creating an explosion that may occur by an open flame or spark.

# Safety

Since natural gas has a specific gravity that is less than that of air, this gas will rise within an atmosphere. When we test for any natural gas that might be in the atmosphere, we normally will test the air closer to the ceiling. Since LP-Gas has a specific gravity heavier than air we should be testing closer to the floor. The mechanic should be aware of what equipment is in the area. Although there may not be the obvious such as furnaces, heaters or cooking appliances. Propane powered tow motors may use the area as a path of travel or storage. A gas leak from this equipment could pool in an area which could have a devastating effect if the mechanic caused a source of ignition in the vicinity.

**Be safe check before you start.**

# Container vs. Cylinder

**3.3.13 Container:** Any vessel, including cylinders, tanks, portable tanks, and cargo tanks, used for the transporting or storing of LP-Gases.

**3.3.16 Cylinders:** A container designed, constructed, tested, and marked in accordance with U.S. DOT specifications, Title 49, Code of Federal Regulations, or in accordance with a valid DOT exemption.

## 6.6.2 Installation of Cylinders

6.6.2.1 Cylinders shall be installed only aboveground set upon a firm foundation or otherwise be firmly secured. The cylinder shall not be in contact with soil.

6.6.2.2 Flexibility shall be provided in the connecting piping. Where flexible connectors are used, they shall comply with 6.9.6.

## 6.9.6 Flexible Connectors

- Flexible connectors shall be installed in accordance with the manufacturer's instructions.
- Flexible metallic connectors shall not exceed 60" in overall length when used with liquid or vapor piping on stationary containers of 2000 gallons water capacity or less.

# Installation

In the next few slides we will be discussing the installation of ASME cylinders and containers. Due to time restrictions we will only highlight some of this information. When installing these systems you should consult your local building official as to the proper method. You may also want to check OSHA section 1926.153 which addresses Liquefied Petroleum Gas.

## 6.6.3 Installation of Horizontal Aboveground ASME Containers

Addresses methods and regulation for supporting containers of under 2000 gallons and over 2000 gallons. Which include...

- Setting on masonry or noncombustible surface.
- Saddles.
- Structural steel supports.
- Interconnections.
- Requirements for area's with snow depths and,
- Vehicle mounting.

# Table 6.6.3.3 Installation of Permanently Installed Horizontal ASME Containers with Attached Supports

Table 6.6.3.3 lists information on,

- Container Size
- Attached Support and
- Height of Bottom of the Container.

# 6.6.4 Installation of Vertical ASME Containers

Addresses installation of vertical containers over 125 gallons.

- Installed on reinforced concrete or steel structural supports on reinforced concrete foundations that meet 5.2.4.3.
- Steel supports shall be protected against fire exposure, w/minimum 2 hr. rating.
- Vertical ASME containers used in liquid service shall not be manifolded to horizontal ASME containers.
- Vertical ASME containers of different dimensions shall not be manifolded together.

# 6.6.5 Temporary Container Installations

- Allows for the setting of containers on paved surfaces or firm earth for not more than 12 months.
- When placed on earth the area must be cleared of dry grass, weeds and other combustible materials within 10'.
- Flexibility in connecting piping as with 6.9.6.
- Potable containers installed isolated locations w/bottoms of skids/runners above ground be either fire resistive or non fire resistive must meet...
  - Height outside bottom of container not exceed 5' above the ground.
  - Must have approval of Authority Having Jurisdiction.

# 6.6.6 Installation of Underground & Mounded Containers

When installing containers underground section 6.6.6 should be followed. This section will address such things as minimal coverage above the tank along with protection of fitting housing, housing cover, container connections, and piping against vehicular damage. Party responsibility, abandoning a container. Partially installed underground containers. Section **6.6.7 Installation of Containers on Roofs of Buildings**

# Other NFPA Standards

Although not commonly known, there are other NFPA Standards that have some plumbing aspects involved. They are listed on the next slide along with the edition that the state currently recognizes.

# NFPA Standards

- NFPA 30-1996
  - › Flammable & Combustible Liquids Code (gasoline)
- NFPA 30A-1996
  - › Automotive & Marine Service Station
- NFPA 30B-1994
  - › Manufacturing & Storage of Aerosol Products
- NFPA 31-1992
  - › Installation of Oil Burning Equipment
- NFPA 34-1995
  - › Standard for Dipping & Coating Using Flammable Liquids
- NFPA 35-1995
  - › Standard for the Manufacture of Organic Coatings
- NFPA 37-1994
  - › Installation & Use of Stationary Combustion Engines & Turbines
- NFPA 52-1992
  - › Natural Fuel Gas Code
- NFPA 54-1996
  - › Compressed Natural Gas
- NFPA 57-1996
  - › Liquefied Natural Gas Vehicles Fuel Systems
- NFPA 58-1995
  - › Standard for Storage & Handling of Liquid petroleum Gasses
- NFPA 395-1993
  - › Storage of Flammable Liquids on Farms & Isolated Construction Projects
- NFPA 401-1996
  - › Aircraft Fueling Services
- NFPA 415
  - › Aircraft Fuelling Ramp Drainage