

Liquefied Petroleum (LP) Gas Inside Buildings

Hazards of Liquefied Petroleum (LP) Gas

LP gas is heavier than air so it tends to seek lower levels. Ignition sources that are at or near floor level are a concern inside of buildings. LP gas is also frequently known as propane, but also includes propylene, butane and butylenes.

LP gas is stored in containers as a liquid and expands to a gaseous state when released from the container. When released, a gallon of liquid expands to about 270 gallons of gas. Due to expansion, the release of even a small quantity of LP gas in a room can quickly reach explosive levels.

Storage vs. Use

People often confuse the terms storage and use.

- Storage means having the product in closed containers or cylinders that are typically sealed to prevent the release of the material.
- Use means placing the material into action or moving it from one area to another (or from a container to an appliance).

The “use” of LP gas is more common than “storage” inside buildings. If the LP gas container or cylinder is connected to a piece of equipment, it is considered in “use.”

Cylinders Used for Storage

LP gas cylinders come in various sizes. Here are examples of the more common containers. One-pound cylinders are commonly referred to “plumber’s torch size;” 20-pound cylinders are the size seen on many gas grills.



Storage Quantities

Because of the expansion and volatility of LP gas, the amount allowed for storage inside a building is somewhat limited and varies depending on how the building is used. Where there are more people or where there is a life safety risk, the quantities allowed are very low. These quantity limits can be



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found in National Fire Protection Association (NFPA) Standard Number 58, Liquefied Petroleum Gas Code (2017 edition) – Section 8.3. The following table summarizes these limits.

| Occupancy Type | Maximum Container Size | Quantity Allowed (in lbs.) | Increases Allowed (in lbs.) | Maximum Quantity Allowed (total) |
|--|------------------------|----------------------------|----------------------------------|----------------------------------|
| Assembly (Group A) | 1 lb. | 2 lbs. | 0 | 2 lbs. |
| Educational / Day Care (Group E) | 1 lb. | 2 lbs. | 0 | 2 lbs. |
| Educational laboratories – K-12, college & university laboratories | 20 lbs. | 20 lbs. | If separated by at least 20 feet | Room size will dictate |
| Health Care / Detention (Group I) | 1 lb. | 2 lbs. | 0 | 2 lbs. |
| Health Care – laboratories only | 5 lbs. | 5 lbs. | If separated by at least 20 feet | Room size will dictate |
| Residential (Group R) – hotels, homes, apartments, dorms, etc. Includes attached and detached garages. | 1 lb. | 2 lbs. | 0 | 2 lbs. (per dwelling unit) |
| Business (Group B) | 1 lb. | 2 lbs. | 0 | 2 lbs. |
| Retail / Mercantile (Group M) | 1 lb. | 200 lbs. | 0 | 200 lbs. |
| Retail / Mercantile (Group M) with 50' distance separation and higher sprinkler density | 1 lb. | 200 lbs. | 800 lbs. | 1,000 lbs. |
| Factory / Industrial (Group F) | n/a | 300 lbs. | 300 lbs. with 300 ft. separation | 600 lbs. |
| Storage (Group S) | n/a | 300 lbs. | 0 | 300 lbs. |
| Catered food service – attended | 10 oz. | 15 lbs. | 0 | 15 lbs. |
| Catered additional allowed with 2-hour fire wall separation | 10 oz. | 15 lbs. | 0 | 30 lbs. |
| Special buildings or rooms (see NFPA 58) | n/a | 10,000 lbs. | 0 | 10,000 lbs. |
| Assembly – flame effects | 20 lbs. | 20 lbs. | If separated by at least 20 feet | Room size will dictate |

Empty vs. Full Containers

Due to the volatility of LP gas, the codes treat all cylinders as being full, whether they are full, partially full, or empty (NFPA 58 – 8.2.1.4). If additional cylinders are needed, they should be stored outside in secure cages.

Cylinder Protection

To protect against the release of LP gas, the following requirements apply to cylinders stored in a building:

- Cylinder valves are to be kept closed when in storage (NFPA 58 – 8.2.2.2).
- For cylinders less than 45 pounds, valve outlets are required to be plugged, capped, or sealed (NFPA 58 – 8.2.2.3).



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- Cylinders larger than 1 pound must be stored so that the pressure relief valve is in the vapor space; this generally means that they should be stored upright (NFPA 58 – 8.2.1.2).
- Cylinders are not to be stored near exit doors, in corridors, in or near stairways, or in areas used for safe egress for occupants of the building (NFPA 58 – 8.2.1.3).
- Cylinders in storage are to be located to minimize exposure to (NFPA 58 – 8.2.1.1):
 - Excessive temperature rises (will cause venting due to expansion) – see Figure 5 for an example of cylinder exposed to a heater.
 - Physical damage (larger, tall cylinders in storage shall be secured in an upright position to keep from being knocked or topped over).
 - Tampering.



Figure 5 – LP gas cylinder and heater

Storage and Use of 20-Pound Cylinders for Residential Gas Grills

LP gas is a commonly used fuel source where other energy sources are not available or not practical and 20-pound cylinders are often used to fuel barbeque grills. However, cylinders larger than 1 pound must not be stored or used indoors at a residential property, including in attached and detached garages. A malfunctioning valve, a valve left slightly open, or the activation of a pressure release device due to heat exposure can cause a significant release and accumulation of flammable vapors. An available ignition source such as a pilot flame or electric switch could result in a devastating indoor explosion. Follow the code recommendations above regarding storage and use limitations.

Questions

Contact the SFMD at 651-201-7221 or by email at fire.code@state.mn.us.

