CHAPTER 61
LIQUEFIED PETROLEUM GASES

User note:

About this chapter: Chapter 61 provides requirements for the safe handling, storing and use of LP-gas to reduce the possibility of damage to containers, accidental releases of LP-gas, and exposure of flammable concentrations of LP-gas to ignition sources. LP-gas (notably propane) is well-known as a camping fuel for cooking, lighting, heating and refrigerating and also remains a popular standby fuel supply for auxiliary generators, as well as being widely used as an alternative motor vehicle fuel. Its characteristic as a clean-burning fuel has resulted in the addition of propane dispensers to service stations throughout the country. Dispensing LP-gas into motor vehicles is addressed by Chapter 23.

SECTION 6101
GENERAL

6101.1 Scope. Storage, handling and transportation of liquefied petroleum gas (LP-gas) and the installation of LP-gas equipment pertinent to systems for such uses shall comply with this chapter and NFPA 58. Properties of LP-gases shall be determined in accordance with Appendix B of NFPA 58.

6101.2 Permits. Permits shall be required as set forth in Sections 105.6 through 105.7.12.8.

Distributors shall not fill an LP-gas container for which a permit is required unless a permit for installation has been issued for that location by the fire code official.

6101.3 Construction documents. Where a single LP-gas container is more than 2,000 gallons (7570 L) 125 gallons (473 L) in water capacity or the aggregate water capacity of LP-gas containers is more than 4,000 gallons (15 140 L), the installer shall submit construction documents for such installation.

Two sets of accurate plans shall be submitted to the fire code official for approval to conduct LP-gas cylinder exchange for resale. The plans shall identify, but not be limited to the location of the rack, distance to sources of ignition and exit doors, vehicle parking spaces, and the zoning districts and the name of occupancies adjoining the installation site.

SECTION 6102
DEFINITIONS

6102.1 Definitions. The following terms are defined in Chapter 2:

LIQUEFIED PETROLEUM GAS (LP-gas).
LP-GAS CONTAINER.

SECTION 6103
INSTALLATION OF EQUIPMENT

6103.1 General. LP-gas equipment shall be installed in accordance with the International Fuel Gas Code and NFPA 58, except as otherwise provided in this chapter.

6103.2 Use of LP-gas containers in buildings. The use of LP-gas containers in buildings shall be in accordance with Sections 6103.2.1 and 6103.2.2.

6103.2.1 Portable containers. Portable LP-gas containers, as defined in NFPA 58, shall not be used in buildings except as specified in NFPA 58 and Sections 6103.2.1.1 through 6103.2.1.7.

6103.2.1.1 Use in basement, pit or similar location. LP-gas containers shall not be used in a basement, pit or similar location where heavier-than-air gas might collect. LP-gas containers shall not be used in an above-grade underfloor space or basement unless such location is provided with an approved means of ventilation.

Exception: Use with self-contained torch assemblies in accordance with Section 6103.2.1.6.

6103.2.1.2 Construction and temporary heating. Portable LP-gas containers are allowed to be used in buildings or areas of buildings undergoing construction or for temporary heating as set forth in Sections 6.22.4, 6.22.5 and 6.22.8 of NFPA 58.

6103.2.1.3 Group F occupancies. In Group F occupancies, portable LP-gas containers are allowed to be used to supply quantities necessary for processing, research or experimentation. Where manifolded, the aggregate water capacity of such containers shall not exceed 735 pounds (334 kg) per manifold. Where multiple manifolds of such containers are present in the same room, each manifold shall be separated from other manifolds by a distance of not less than 20 feet (6096 mm).

6103.2.1.4 Research and experimentation. In Group I occupancies and laboratories for educational use in Group B and E occupancies, portable LP-gas containers are allowed to be used for research and experimentation. Such containers shall not be used in classrooms. Such containers shall not exceed a 50-pound (23 kg) water capacity in occupancies used for educational purposes and shall not exceed a 12-pound (5 kg) water capacity in occupancies used for institutional purposes. Where more than one such container is present in the same room, each container shall be separated from other containers by a distance of not less than 20 feet (6096 mm).
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6103.2.1.5 Demonstration uses. Portable LP-gas containers are allowed to be used temporarily for demonstrations and public exhibitions. Such containers shall not exceed a water capacity of 12 pounds (5 kg). Where more than one such container is present in the same room, each container shall be separated from other containers by a distance of not less than 20 feet (6096 mm).

6103.2.1.6 Use with self-contained torch assemblies. Portable LP-gas containers are allowed to be used to supply approved self-contained torch assemblies or similar appliances. Such containers shall not exceed a water capacity of 2.7 pounds (1.2 kg).

6103.2.1.7 Use for food preparation. Where approved, listed LP-gas commercial food service appliances are allowed to be used for food-preparation within restaurants and in attended commercial food catering operations in accordance with the International Fuel Gas Code, the International Mechanical Code and NFPA 58.

6103.2.2 Industrial vehicles and floor maintenance machines. LP-gas containers on industrial vehicles and floor maintenance machines shall comply with Sections 11.13 and 11.14 of NFPA 58.

6103.3 Location of equipment and piping. Equipment and piping shall not be installed in locations where such equipment and piping is prohibited by the International Fuel Gas Code.

SECTION 6104
LOCATION OF LP-GAS CONTAINERS

6104.1 General. The storage and handling of LP-gas and the installation and maintenance of related equipment shall comply with NFPA 58 and be subject to the approval of the fire code official, except as provided in this chapter.

6104.2 Maximum capacity within established limits. Within the limits established by law restricting the storage of liquefied petroleum gas for the protection of heavily populated or Congested areas, the aggregate capacity of any one installation shall not exceed a water capacity of 2,000 gallons (7570 L).

Exception: In particular installations, this capacity limit shall be determined by the fire code official, after consideration of special features such as topographical conditions, nature of occupancy, and proximity to buildings, capacity of proposed LP-gas containers, degree of fire protection to be provided and capabilities of the local fire department.

TABLE 6104.3
LOCATION OF LP-GAS CONTAINERS

<table>
<thead>
<tr>
<th>LP-GAS CONTAINER CAPACITY (water gallons)</th>
<th>MINIMUM SEPARATION BETWEEN LP-GAS CONTAINERS AND BUILDINGS, PUBLIC WAYS OR LOT LINES OF ADJOINING PROPERTY THAT CAN BE BUILT UPON</th>
<th>MINIMUM SEPARATION BETWEEN LP-GAS CONTAINERS (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounded or underground LP-gas containers</td>
<td>Above-ground LP-gas containers</td>
<td>(feet)</td>
</tr>
<tr>
<td>Less than 125&lt;sup&gt;e,d&lt;/sup&gt;</td>
<td>10</td>
<td>5&lt;sub&gt;e&lt;/sub&gt;</td>
</tr>
<tr>
<td>125 to 250</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>251 to 500</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>501 to 2,000</td>
<td>10</td>
<td>25&lt;sub&gt;f&lt;/sub&gt;</td>
</tr>
<tr>
<td>2,001 to 30,000</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>30,001 to 70,000</td>
<td>50</td>
<td>75</td>
</tr>
<tr>
<td>70,001 to 90,000</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>90,001 to 120,000</td>
<td>50</td>
<td>125</td>
</tr>
</tbody>
</table>

For SI: 1 foot = 304.8 mm, 1 gallon = 3.785 L.

a. Minimum distance for underground LP-gas containers shall be measured from the pressure relief device and the filling or liquid-level gauge vent connection at the container, except that all parts of an underground LP-gas container shall be not less than 10 feet or more from a building or lot line of adjoining property which that can be built upon.

b. For other than installations in which the overhanging structure is 50 feet or more above the relief-valve discharge outlet. In applying the distance between buildings and ASME LP-gas containers with a water capacity of 125 gallons or more, a minimum of not less than 50 percent of this horizontal distance shall also apply to all portions of the building that project more than 5 feet from the building wall and that are higher than the relief valve discharge outlet. This horizontal distance shall be measured from a point determined by projecting the outside edge of such overhanging structure vertically downward to grade or other level upon which the LP-gas container is installed. Distances to the building wall shall not be not less than those prescribed in this table.

c. Where underground multicontainer installations are composed of individual LP-gas containers having a water capacity of 125 gallons or more, such containers shall be installed so as to provide access at their ends or sides to facilitate working with cranes or hoists.

d. At a consumer site, if the aggregate water capacity of a multicontainer installation, comprised of individual LP-gas containers having a water capacity of less than 125 gallons, is 500 gallons or more, the minimum distance shall comply with the appropriate portion of Table 6104.3, applying the aggregate capacity rather than the capacity per LP-gas container. If more than one such installation is made, each installation shall be separated from other installations by not less than 25 feet. Minimum distances between LP-gas containers need not be applied.

e. The following shall apply to above-ground containers installed alongside buildings:

1. LP-gas containers of less than a 125-gallon water capacity are allowed without a separation distance where in compliance with Items 2, 3 and 4.

2. Department of Transportation (DOTn) specification LP-gas containers shall be located and installed so that the discharge from the container pressure relief device is not less than 3 feet horizontally from building openings below the level of such discharge and shall not be beneath buildings unless the space is well ventilated to the outside and is not enclosed for more than 50 percent of its perimeter. The discharge from LP-gas container pressure relief devices shall be located not less than 5 feet from exterior sources of ignition, openings into direct-vent (sealed combustion system) appliances or mechanical ventilation air intakes.

3. ASME LP-gas containers of less than a 125-gallon water capacity shall be located and installed such that the discharge from pressure relief devices shall not terminate in or beneath buildings and shall be located not less than 5 feet horizontally from building openings below the level of such discharge and not less than 5 feet from exterior sources of ignition, openings into direct vent (sealed combustion system) appliances or mechanical ventilation air intakes.

4. The filling connection and the vent from liquid-level gauges on either DOTn or ASME LP-gas containers filled at the point of installation shall not less than 10 feet from exterior sources of ignition, openings into direct vent (sealed combustion system) appliances or mechanical ventilation air intakes.

f. This distance is allowed to be reduced to not less than 10 feet for a single LP-gas container of 1,200-gallon water capacity or less, provided that such container is at least...
6104.3 Container location. LP-gas containers shall be located with respect to buildings, public ways and lot lines of adjoining property that can be built upon, in accordance with Table 6104.3.

6104.3.1 Installation on roof prohibited. LP-gas containers used in stationary installations shall not be located on the roofs of buildings.

6104.3.2 Special hazards. LP-gas containers shall be located with respect to special hazards including, but not limited to, above-ground flammable or combustible liquid tanks, oxygen or gaseous hydrogen containers, flooding or electric power lines as specified in Section 6.4.4 of NFPA 58.

6104.3.3 Screen walls. Screen walls constructed around LP-gas cylinders or containers shall be in accordance with 6104.3.3.1 and 6104.3.3.2. Screen walls shall not be constructed around containers with a water capacity greater than 2,000 gallons (7570 L).

6104.3.3.1 Construction. The walls shall be of noncombustible construction. Not more than three walls shall be erected to screen LP-gas containers.

6104.3.3.2 Height. The walls shall not exceed 4 feet (1219 mm) in height, and have 50% opening in the bottom 2 feet (610 mm) as calculated by the plan submitter.

6104.4 Multiple LP-gas container installations. Multiple LP-gas container installations with a total water storage capacity of more than 180,000 gallons (681 300 L) [150,000 gallon (567 750 L) LP-gas capacity] shall be subdivided into groups containing not more than 180,000 gallons (681 300 L) in each group. Such groups shall be separated by a distance of not less than 50 feet (15 240 mm), unless the containers are protected in accordance with one of the following:

1. Mounded in an approved manner.
2. Protected with approved insulation on areas that are subject to impingement of ignited gas from pipelines or other leakage.
3. Protected by firewalls of approved construction.
4. Protected by an approved system for application of water as specified in Table 6.5.1.2 of NFPA 58.
5. Protected by other approved means.

Where one of these forms of protection is provided, the separation shall be not less than 25 feet (7260 mm) between LP-Gas container groups.

SECTION 6105
PROHIBITED USE OF LP-GAS

6105.1 Nonapproved equipment. LP-gas shall not be used for the purpose of operating devices or equipment unless such device or equipment is approved for use with LP-gas.

6105.2 Release to the atmosphere. LP-gas shall not be released to the atmosphere, in accordance with Section 7.3 of NFPA 58.

SECTION 6106
DISPENSING AND OVERFILLING

6106.1 Attendants. Personnel qualifications. Dispensing of LP-gas shall be performed by a qualified attendant. Persons who transfer liquid LP-gas shall be trained in proper handling procedures, including the applicable requirements of NFPA 58. Refresher training shall be provided at least every 3 years. The training shall be documented. Dispensing of LP-gas as a motor vehicle fuel shall be in accordance with Chapter 23 of this code.

6106.2 Overfilling. LP-gas containers shall not be filled or maintained with LP-gas in excess of either the volume determined using the fixed liquid-level gauge installed in accordance with the manufacturer’s specification and in accordance with Section 5.9.5. of NFPA 58 or the weight determined by the required percentage of the water capacity marked on the container. Portable LP-gas containers shall not be refilled unless equipped with an overfilling prevention device (OPD) where required by Section 5.9.3 of NFPA 58.

6106.3 Dispensing locations. The point of transfer of LP-gas from one LP-gas container to another shall be separated from exposures as specified in NFPA 58.

SECTION 6107
SAFETY PRECAUTIONS AND DEVICES

6107.1 Safety devices. Safety devices on LP-gas containers, equipment and systems shall not be tampered with or made ineffective.

6107.2 Smoking and other sources of ignition. “No Smoking” signs complying with Section 310 shall be posted where required by the fire code official. Smoking within 25 feet (7620 mm) of a point of transfer, while filling operations are in progress at LP-gas containers or vehicles, shall be prohibited.

Control of other sources of ignition shall comply with Chapter 3 of this code and Section 6.25 of NFPA 58.

6107.3 Clearance to combustibles. Weeds, grass, brush, trash and other combustible materials shall be kept not less than 10 feet (3048 mm) from LP-gas tanks or containers.

6107.4 Protecting containers from vehicles. Where exposed to vehicular damage due to proximity to alleys, driveways or parking areas, LP-gas containers, regulators and piping shall be protected in accordance with NFPA 58.

SECTION 6108
FIRE PROTECTION
LIQUEFIED PETROLEUM GASES

6108.1 General. Fire protection shall be provided for installations having LP-gas storage containers with a water capacity of more than 4,000 gallons (15 140 L), as required by Section 6.29 of NFPA 58.

6108.2 Portable fire extinguishers. Portable fire extinguishers complying with Section 906 shall be provided as specified in NFPA 58.

6109. Exposure hazards.

6109.2. Exposure hazards. LP-gas containers that have not previously been in LP-gas service shall comply with Sections 6109.2

6109.3. Exposure hazards. Portable fire extinguishers complying with Section 906 shall be provided as specified in NFPA 58.

6109.8. Protection of valves on LP-gas containers in storage. LP-gas DOT cylinder valves shall be protected by screw-on type caps or collars that shall be securely in place on all containers stored regardless of whether they are full, partially full or empty. Container outlet valves shall be closed or plugged.

6109.9. Storage within buildings open to the public. Department of Transportation (DOTn) specification cylinders with maximum water capacity of 2.7 pounds (1.2 kg) used in completely self-contained hand torches and similar applications are allowed to be stored or displayed in a building accessible to the public. The quantity of LP-gas shall not exceed 200 pounds (91 kg) except as provided in Section 6109.11.

6109.10. Storage within buildings not open to the public. The maximum quantity allowed in one storage location in buildings not open to the public, such as industrial buildings not exceed a water capacity of 735 pounds (334 kg) [nominal 300 pounds (136 kg) of LP-gas]. Where additional storage locations are required on the same floor within the same building, they shall be separated by not less than of 300 feet (91 440 mm). Storage beyond these limitations shall comply with Section 6109.11.

TABLE 6109.12

<table>
<thead>
<tr>
<th>QUANTITY OF LP-GAS STORED (pounds)</th>
<th>MINIMUM SEPARATION DISTANCE FROM STORED LP-GAS CYLINDERS TO (feet):</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nearest important building or group of buildings or line of adjoining property that may be built upon</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td>720 or less</td>
<td>0</td>
</tr>
<tr>
<td>721 – 2,500</td>
<td>0</td>
</tr>
<tr>
<td>2,501 – 6,000</td>
<td>10</td>
</tr>
<tr>
<td>6,001 – 10,000</td>
<td>20</td>
</tr>
<tr>
<td>Over 10,000</td>
<td>25</td>
</tr>
</tbody>
</table>

For SI: 1 foot = 304.8 mm, 1 pound = 0.454 kg.

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mobile vehicles need not be considered in the total storage capacity in Section 6109.10, provided that such vehicles are stored in private garages and do not carry more than three LP-gas containers with a total aggregate LP-gas capacity not exceeding 100 pounds (45.4 kg) per vehicle. LP-gas container valves shall be closed.

6109.11 Storage within rooms used for gas manufacturing. Storage within buildings or rooms used for gas manufacturing, gas storage, gas-air mixing and vaporization, and compressors not associated with liquid transfer shall comply with Sections 6109.11.1 and 6109.11.2.

6109.11.1 Quantity limits. The maximum quantity of LP-gas shall be 10,000 pounds (4540 kg).

6109.11.2 Construction. The construction of such buildings and rooms shall comply with requirements for Group H occupancies in the International Building Code, Chapter 10 of NFPA 58 and both of the following:

1. Adequate vents shall be provided to the outside at both top and bottom, located not less than 5 feet (1524 mm) from building openings.
2. The entire area shall be classified for the purposes of ignition source control in accordance with Section 6.25 of NFPA 58.

6109.12 Location of storage outside of buildings. Storage outside of buildings of LP-gas containers awaiting use, resale or part of a cylinder exchange program shall be located in accordance with Table 6109.12.

6109.13 Protection of containers. LP-gas containers shall be stored within a suitable enclosure or otherwise protected against tampering. Vehicle impact protection shall be provided as required by Section 6107.4

Exception: Vehicle impact protection shall not be required for protection of LP-gas containers where the containers are kept in lockable, ventilated cabinets of metal construction.

6109.14 Alternative location and protection of storage. Where the provisions of Sections 6109.12 and 6109.13 are impractical at construction sites or at buildings or structures undergoing major renovation or repairs, the storage of containers shall be as required by the fire code official.

6109.15 LP-gas cylinder exchange for resale. In addition to other applicable requirements of this chapter, facilities operating LP-gas cylinder exchange stations that are accessible to the public shall comply with the following requirements:

1. Cylinders shall be secured in a lockable, ventilated metal cabinet or other approved outdoor enclosure.
2. Cylinders shall be available only by authorized personnel or by use of an automated exchange system in accordance with Section 6109.15.1
3. A sign shall be posted on the entry door of the business operating the cylinder exchange stating “DO NOT BRING LP-GAS CYLINDERS INTO THE BUILDING” or similar approved wording.
4. An emergency contact information sign shall be posted within 10 feet (3048 mm) of the cylinder storage cabinet. The content, lettering, size, color and location of the required sign shall be as required by the fire code official.
5. LP-gas cylinder exchange for resale shall only be conducted outdoors.
6. Individual LP-gas containers do not exceed 20-pound propane capacity.
7. The containers are not connected for use.
8. LP-gas exchange programs shall be conducted in zoning districts approved by the jurisdiction.
9. Approved racks shall be installed a minimum of 10 feet from any entrance or exit from a building or other building openings intended to be used for the safe egress of people.
10. Each rack shall be secured to prevent the rack from falling over.
11. Storage racks shall be protected against vehicle impact in accordance with the following:
   1. Section 3.12 or
   2. A 6 foot (1829 mm) long parking block, installed in accordance with the manufacturer’s instructions, shall be allowed in parking spaces located horizontal to the rack when:
      1. A 6-inch (152.4 mm) high sidewalk curb (measured vertical from grade level) is not available, and
      2. The front of the rack is a minimum of 4 feet (1219 mm) from the curb edge.

   EXCEPTION: When a rack is located and maintained behind a pillar or other stationary object, additional vehicular protection shall not be required.
12. A minimum 20:BC rated fire extinguisher shall be installed within 50 feet of storage racks. The extinguisher shall be visible and accessible at all times.
13. An approved fire hydrant shall be installed within 350 feet of the LP-gas storage containers.
14. Electrical equipment inside of or within 5 feet (1524 mm) of a cabinet storing cylinders, including but not limited to electronics associated with vending operations, shall comply with the requirements for Class I, Division 2 equipment in accordance with NFPA 70.
15. No smoking signs shall be posted near the storage racks so as to be immediately visible to the public.

6109.15.1 Automated cylinder exchange stations. Cylinder exchange stations that include an automated vending system for exchanging cylinders shall comply with Section 6109.15 and the following additional requirements:

1. The vending system shall only permit access to a single cylinder per individual transaction.
2. Cabinets storing cylinders shall be designed such that cylinders can only be placed inside when they are oriented in the upright position.
3. Devices operating door releases for access to stored cylinders shall be permitted to be pneumatic, mechanical or electrically powered.
4. Electrical equipment inside of or within 5 feet (1524 mm) of a cabinet storing cylinders, including but not limited to electronics associated with vending operations, shall comply with the requirements for Class I, Division 2 equipment in accordance with NFPA 70.

5. A manual override control shall be permitted for use by authorized personnel. On newly installed cylinder exchange stations, the vending system shall not be capable of returning to automatic operation after a manual override until the system has been inspected and reset by authorized personnel.

6. Inspections shall be conducted by authorized personnel to verify that all cylinders are secured, access doors are closed and the station has no visible damage or obvious defects, which necessitate placing the station out of service. The frequency of inspections shall be as specified by the fire code official.

SECTION 6110
LP-GAS CONTAINERS NOT IN SERVICE

6110.1 Temporarily out of service. LP-gas containers whose use has been temporarily discontinued shall comply with all of the following:

1. Be disconnected from appliance piping.
2. Have LP-gas container outlets, except relief valves, closed or plugged.
3. Be positioned with the relief valve in direct communication with the LP-gas container vapor space.

6110.2 Permanently out of service. LP-gas containers to be placed permanently out of service shall be removed from the site.

SECTION 6111
PARKING AND GARAGING OF LP-GAS TANK VEHICLES

6111.1 General. Parking of LP-gas tank vehicles shall comply with Sections 6111.2 and 6111.3.

Exception: In cases of accident, breakdown or other emergencies, LP-gas tank vehicles are allowed to be parked and left unattended at any location while the operator is obtaining assistance.

6111.2 Unattended parking. The unattended parking of LP-gas tank vehicle shall be in accordance with Sections 6111.2.1 and 6111.2.2.

6111.2.1 Near residential, educational and institutional occupancies and other high-risk areas. LP-gas tank vehicles shall not be left unattended at any time on residential streets or within 500 feet (152 m) of a residential area, apartment or hotel complex, educational facility, hospital or care facility. Tank vehicles shall not be left unattended at any other place that would, in the opinion of the fire code official, pose an extreme life hazard.

6111.2.2 Durations exceeding 1 hour. LP-gas tank vehicles parked at any one point for longer than 1 hour shall be located as follows:
1. Off public streets, highways, public avenues or public alleys.
2. Inside of a bulk plant.
3. At other approved locations not less than 50 feet (15240 mm) from buildings other than those approved for the storage or servicing of such vehicles.

6111.3 Garaging. Garaging of LP-gas tank vehicles shall be as specified in NFPA 58. Vehicles with LP-gas fuel systems are allowed to be stored or serviced in garages as specified in Section 11.16 of NFPA 58.

SECTION 6112
LP-GAS FLAME EFFECTS

6112.1 Flame effects before an audience. LP-gas cylinders used for flame effects before an audience are prohibited.

Exception:
1. With approval from the fire code official and,
2. In accordance with NFPA 160 Standard for Flame Effects Before an Audience and
3. In accordance with any current Life Safety report, and
4. The requirements of this section.

6112.2 Submittal. The plan for the use of flame effects shall be submitted in writing to the fire code official. The plan shall include the following:
1. The name of the person, group or organization responsible for the production.
2. The dates and times of the production.
3. The location of the production.
4. The design criteria in Appendix B of NFPA 160.
5. The flame effect classification.
6. A site plan showing the following:
   6.1. A narrative description of the flame effect.
   6.2. The location of flame effect devices to be fired and their controls and control sequence.
   6.3. The area affected by the flame effect device.
   6.4. The location of the audience.
   6.5. The fuels used and their estimated consumption.
   6.6. Air for combustion and ventilation for indoor effects.
   6.7. Flammable materials piping.
   6.8. Storage and holding areas and their capacities.
   6.9. Supplemental fire protection features.
7. A current material safety data sheet (MSDS) for the materials (fuels) consumed in the flame effect.
8. Documentation that the combustible materials used for
construction of the flame effects have been rendered flame retardant.

9. The name of the effect operator.

6112.3 Cylinder volume. Cylinders shall be limited to a maximum volume of 20 pounds (18 L) of propane and shall only be used for vapor service.

6112.4 Cylinder limit. Not more than three cylinders shall be connected to any flame effect apparatus.

6112.5 Cylinder hoses. Hoses shall be designed for a working pressure of 350 psig (6 kPa) with a safety factor of 5 to 1 and shall be continuously marked with “LP-GAS, PROPANE, 350 PSI WORKING PRESSURE”, and the manufacturer’s name or trademark. Hose assemblies, after the application of couplings, shall have a design capability of 700 psig. Hose assemblies shall be leak tested at the time of installation at not less than the operating pressure of the system in which they are installed.

6112.6 Manifolded cylinder connections. When a flame effect requires two or more cylinders, the cylinders shall be connected to the flame effect apparatus as follows:

1. A check valve shall be installed directly downstream of each cylinder valve,
2. The manifold shall be constructed of piping complying with NFPA 58, and

6112.7 Cylinder connection. Cylinders shall not be connected or disconnected during the flame effect or performance.

6112.8 Idle cylinders. Cylinders in storage awaiting use shall be stored outside of Group A occupancies.

6112.9 Cylinder marking. A cylinder that passes the visual examination shall be marked in accordance with DOT requirements.