H & S Guidance - Liquified Petroleum Gas (LPG)

Liquefied Petroleum Gas (LPG)

See also: **Fire Safety** **Safety Signs**

INTRODUCTION

The most widely used forms of LPG are propane and butane. In the local authority enforced sector LPG will usually be found in cartridges (non-refillable containers of less than 1.4 L capacity) or cylinders (portable refillable containers up to 150 L capacity). LPG forms a flammable mixture in air between 2-10% by volume. It is colourless and heavier than air. The main hazards associated with LPG are fire, explosion and physical effects such as frost burns, asphyxiation and injuries from the manual handling of cylinders.

The guidance on the storage of LPG is extremely complex. This guidance aims to give a general indication of the requirements. If you are storing LPG you are strongly advised to seek guidance form from the Environmental Health Services (for non-factory premises, such as offices, hotels and leisure/holiday facilities etc.).

The advice covers:

1. Small scale storage and display of LPG at retail premises.
    - 1.1 Display and keeping for use
    - 1.2 Storage
    - 1.3 Storage in the open air for less than 400kg
    - 1.4 Indoor storage of less than 400kg
    - 1.5 More than 400kg outdoor storage
    - 1.6 Fire fighting/emergency procedures
2. LPG at fixed installations (i.e. bulk storage)
3. Mobile vehicles with LPG cookers.

1. SMALL SCALE STORAGE & DISPLAY OF LPG AT RETAIL PREMISES

The advice in this section applies to quantities between 15-400kg and where containers do not exceed 20kg capacity. All containers should be regarded as 'full' for the purposes of the guidance given.

1.1 DISPLAY AND KEEPING FOR USE

- Display stands must not be near the stairs or exits.
- There must be signs prohibiting smoking and naked lights nearby
- Only dummy or certified gas-free containers may be used in window displays or advertising stands.
- Maximum amount to be kept;
- No more than five cylinders or, if the cylinders are not more than 3kg, no more than 20 cylinders
- 70kg worth of cartridges
- Not more than four cylinders or 50kg may be connected for demonstration purposes
- Where LPG is used for heating and lighting, access/security and good ventilation (preferably open air) are important considerations. Connection should be via a rigid piped system. If this is not the case there is a maximum limit of 100kg.
- However, where there is residential accommodation above or to the side of the LPG retail store there must be a sixty-minute fire resisting separation and, if possible, no connecting doors between the two areas. If this cannot be complied with then a maximum of 15kg of LPG only may be stored in the shop when it is closed.

1.2 STORAGE

The LP Gas Association, Code of practice 7, 'Storage of Full and Empty LPG Cylinders and Cartridges' gives recommendations for various situations where LPG could be stored. These include open-air storage, storage against walls or between 2 or 3 walls, on rooftops and indoor storage (separate buildings, within parts of buildings or in cabinets/cupboards). The most common storage situations are summarised below. If you intend to store in any other way please contact Environmental Health Services for advice.

1.3 STORAGE IN THE OPEN AIR FOR LESS THAN 400KG

Storage in a yard is good practice. In brief, the following should be adhered to:

- If the whole yard is accessible to the public then the LPG must be stored in a cage.
- This should be constructed of weld mesh 12 gauge 50 x 50mm or similar standard. Any walk-in cage should be at least 1.8 metres high.
- It should have two outward opening exits which are lockable, but which permit immediate escape from inside without the use of a key. One exit is acceptable if the maximum travel distance is less than 12 metres within the cage.
- The stack must be at least 1 metre from the boundary, 2 metres from a cellar opening, drain, gully, door or window and 3 metres from any combustibles unless they are behind a 30-minute fire resisting structure.
- Storage of LPG may be directly against a wall greater than 2 metres high on a boundary if it is of 30 minutes fire resistance and imperforate for a width of 2 metres on either side of the LPG and for a height of 9 metres before any window etc. above.
- No smoking or naked lights allowed within 1 metre of the stack nor any vehicles except those which are specifically delivering or collecting the LPG.
- Only electrical apparatus suitable for use in a "Zone 2" area

(see BS EN 60079/10) is allowed in the storage area or in the separation distance. The separation distance for this quantity is 1.5 metre above the tallest cylinder and within 1 metre horizontally. You are advised to consult on any other quantity or circumstance.

- The area must be kept weed and litter free, but do not use sodium chlorate weedkiller.
- Floors must be concreted. Any slope should be away from the building or the stored materials.
- Notices such as, 'LPG Area', 'Flammable', 'No Smoking/ No Naked Lights' and 'Fire Procedure' should be prominently displayed. The signage provided must comply with the Safety Sign Regulations 1980.
- Flammable, combustible, corrosive, oxidising or toxic chemicals must not be kept in the separation distance.
- Procedures should be in place for checking, removing, storing (in open air) any damaged or leaking cylinders.
- Every container must be stored upright and kept closed and the protective caps in place on the valves.
- No stack should be higher than 2.5 metres nor contain
- more than 30kg worth of containers less than 6kg in size
- 45kg worth of 6 to 15kg containers nor
- more than 50kg of containers between 15 and 20kg in size.
- A non-combustible roof is acceptable provided at least 0.3 metres high clear ventilation space exists all round.

1.4 INDOOR STORAGE OF LESS THAN 400KG

Indoor storage is also acceptable in a separate building to the shop, provided that the building is only used for LPG and only accessible to authorised people.

- It should be at ground level, have no open drains and 30 minutes fire resisting walls.

- At least 2% of those walls and roof area is to be open as ventilation at both high and low levels and well dispersed around the perimeter.

- At least half of the roof or wall is to be lightweight so as to give explosion relief and there are to be at least two exits (one exit is acceptable if there is less than 12 metres escape travel distance within the building).

Storage inside a special fireproof cabinet inside a shop is acceptable up to a maximum of 400kg. The cabinet must have:

- 30 minutes fire resistance.

- High and low level ventilation direct to external air.

- If more than 0.5 cu. metre in size the cabinet must have an explosion relief panel equivalent to half the area of the back or the side.

1.5 MORE THAN 400KG OUTDOOR STORAGE (AND ANY STORAGE OF 47KG CONTAINERS)

The following standards are set for storage of more than 400kg of LPG or for any containers over 20kg. Unless compensating factors exist then the following standards are required:

- Good through ventilation.
- Best if entirely open mesh sides.
- Walls on two adjacent sides may create a stagnant corner, so keep LPG away from that area if possible.

The following table gives general separation distances for specified stacks of LPG.

Total quantity of LPG storage in cylinders (tonnes)		Largest stack (tonnes)	Seperation distance to boundary if no firewall (m)	With Firewall	
From	To			Firewall to boundary (m)	Stack to firewall (m)
0.015	0.4	0.4	1	0	1
0.4	1	1	3	1	1.5
1	4	1	4	1	1.5
4	6	3	5	1.5	1.5

See LP Gas Association Code of Practice 7 for larger quantities.

The signage must prominently be provided and indicate:

a. that it is an LPG storage area;
b. that the contents are flammable;
c. that smoking and other ignition sources are prohibited;
d. the procedures to be followed in case of fire.

Any electrical fittings within the area must be suitable for Zone 2 use (i.e. explosive vapour-air mixture not likely to occur in normal operation). Of course Zone 1 (mixture likely) or Zone 0 (mixture continuously present) equipment would also be suitable.

Training: Relevant staff must be fully trained to cope with their tasks and emergencies.

1.6 FIRE FIGHTING/EMERGENCY PROCEDURES

Fire fighting equipment must be provided. Dry powder type extinguishers should be used, one 9kg dry powder is suitable for a store of up to 400kg of LPG.

Instruction and training should be provided for all appropriate employees to include actions in the event of a leakage and in case of fire.

Full advice should be sought from the Fire Officer as hoses for cooling cylinders and extinguishing other combustibles may also be required.

2. LPG AT FIXED INSTALLATIONS (i.e. Bulk Storage)

General guidance to safe practice in storing and handling LPG at fixed storage installations where tanks are filled on site is given in Code of Practice 1 - Bulk LPG Storage at Fixed Installations.

Part 1: Design, Installation and Operation of Vessels Located above Ground. Matters covered include storage tank location and safety distances; the storage tanks themselves; their piping, valves and fittings; pumps; compressors and meters; vaporisers; electrical considerations; fire protection; operations. If you require any further information please do not hesitate to contact Environmental Health Services.

3. MOBILE VEHICLES WITH LPG COOKERS

The LPG cylinders must be stored external to the vehicle interior. They should be in a well-ventilated, vandal proof compartment. As much of the pipework as possible should be in rigid metal, though the final connection to the appliance may be of natural rubber if required. This rubber hose has a limited life span of around 5 years and must be renewed before the date printed on it. Clips should be provided at the connection of the rubber hose to ensure a good seal rather than just rely upon the push fit friction. Code of Practice 24 -Use of LPG Cylinders Part 3:2000 Use of LPG in Mobile Catering Vehicles and Similar Commercial Units gives general guidance in this situation. HELA Circular 52/13 as detailed in the reference section also gives advice.

REFERENCES/FURTHER DETAILS

Publications

1. Chemical Sheet 4-Use of LPG in small bulk tanks (HSE).
2. Chemical Sheet 5 – Small scale use of LPG in cylinders (HSE).
3. LP Gas Association: CoP 1: Bulk LPG Storage at Fixed Installations Part 1: Design, Installation and Operation of Vessels Located above Ground.
4. LP Gas Association: Code of Practice 7: Storage of Full & Empty

LPG Cylinders and Cartridges

5. LP Gas Association: Code of Practice 24 – Use of LPG Cylinders Part3:2000 – Use of LPG in Mobile Catering Vehicles and Similar Commercial Units
6 LP Gas Association: Code of Practice 24 – Use of LPG cylinders Part 4:1999 – Use of LPG for Catering at Outdoor Functions.
7. LP Gas Association:Code of Practice 24 – Use of LPG Cylinders Part 6:2000 – Use of Propane in Cylinders at Commercial and Industrial Premises.
8 HELA Circular 52/13 The Keeping of LPG in Vehicles- Mobile Catering Unit

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