



# PORTABLE CYLINDER EXCHANGE

LPG guidelines

Issued May 2015

# Contents

|  |           |
|--|-----------|
| <b>Introduction</b>  | <b>3</b>  |
| <b>About these guidelines</b>  | <b>4</b>  |
| <b>1.0 Safety precautions</b>  | <b>5</b>  |
| 1.1 General safety precautions for handling portable cylinders       | 5         |
| 1.2 Transport of LPG cylinders in enclosed vehicles                  | 5         |
| 1.3 Safety Data Sheets   | 7         |
| <b>2.0 Product knowledge</b>   | <b>8</b>  |
| 2.1 Liquefied Petroleum Gas  | 8         |
| 2.2 Characteristics of LPG   | 8         |
| 2.3 Pressure and temperature influences on LPG                       | 9         |
| 2.4 Equipment freeze   | 9         |
| 2.5 LPG vapour cloud   | 10        |
| 2.6 LPG flammability   | 10        |
| 2.7 Characteristics of LPG storage cylinders (vessels)               | 10        |
| 2.8 Dangers of over-filled LPG cylinders                             | 11        |
| <b>3.0 First aid</b>   | <b>12</b> |
| 3.1 Immediate treatment  | 12        |
| <b>4.0 Installation requirements</b>                                 | <b>13</b> |
| 4.1 Cylinder cages   | 13        |
| <b>5.0 Emergency procedures</b>                                      | <b>15</b> |
| 5.1 LPG leak   | 15        |
| 5.2 LPG fire   | 15        |
| <b>6.0 Approximate capacities of cylinders for LPG (information)</b> | <b>16</b> |
| <b>7.0 How to contact Origin</b>                                     | <b>17</b> |

## Abbreviations

|         |                                    |
|---------|------------------------------------|
| AS/NZS: | Australia and New Zealand Standard |
| Cl:     | Clause                             |

# Introduction

## **A leading Australian energy provider**

In Australia, Origin is the largest energy retailer, offering customers leading strengths and a depth of experience.

Origin LPG is a truly national LPG supplier, with significant operations in all states and territories. We also operate in New Zealand and the Asia Pacific.

Our network of LPG import facilities and seaboard terminals is unequalled by any other LPG supplier in Australia. Located from Cairns to Hobart, these facilities provide strategic points of supply to our customers.

## **Safety is our first priority**

These guidelines have been produced by Origin to provide you with an overview of the procedures and safety requirements for exchanging portable LPG cylinders.

The information in these guidelines can help protect the health and safety of yourself, your employees and your customers.

While this information is based on Origin's extensive experience in the LPG business it does not take precedence over any statutory requirement or company health, safety and environmental procedures. Although every care has been taken in compiling these guidelines, it is reliant on the information available to Origin at the date of this release. While Origin believes the information to be correct, it is not in a position to warrant its accuracy or to anticipate every circumstance in which the information might be used. In addition, the law and standards may have changed since the date of this release. Accordingly, you are cautioned to make your own determination of the veracity and suitability of these guidelines to your own circumstances and to obtain independent advice relevant to those circumstances.

These guidelines may be amended by Origin from time to time. They are not to be copied or modified without Origin's prior written consent. For additional details or clarification please contact your agreed Origin LPG Account Manager or call 134 GAS (134 427).

## About these guidelines

The task of handling and exchanging portable LPG cylinders may be performed only by persons who have received appropriate instructions.

These guidelines should be used in conjunction with AS/NZS 1596 and any other relevant instruction issued by regulatory authorities.

# 1.0 Safety precautions

## 1.1 General safety precautions for handling portable cylinders

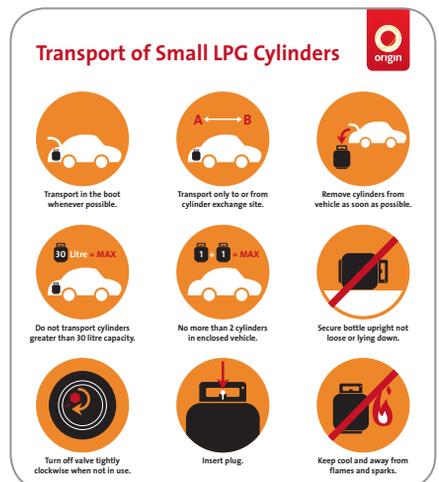
- 1.1.1 Cylinder valves must be kept closed regardless of whether the cylinders are empty or filled.
- 1.1.2 Keep cylinder valves and safety valves capped to prevent fouling of the valve or connections.
- 1.1.3 Filling of a portable LPG cylinder at an automotive refuelling station through the filler valve or through the Acme check connector valve using an adapter is dangerous and prohibited (AS1596 CL11.12.5)

## 1.2 Transport of LPG cylinders in enclosed vehicles

Enclosed vehicles means any vehicle where there is not adequate ventilation. This applies whether or not the vehicle is used for private or business purposes or is used for providing public transport and whether or not one or more of the vehicles windows are open. For example, it can include boots or passenger compartments, enclosed trucks, taxis, buses and other public transport, private or business vehicles of any kind where the cylinder is not located substantially in open air. Adequate ventilation is when the ventilation produces a flow of air that circulates throughout the compartment, in particular throughout the highest and lowest parts of the compartment, and must allow for the air to be released from the compartment after the air has circulated.

- 1.2.1 For private use or private vehicles: The maximum aggregate quantity of LPG cylinders that may be transported for private use is 65 litres water capacity (equivalent to 26.5 kg of LPG). However, see 1.2.3 below for restrictions relating to enclosed transport. Refer to Appendix O in AS1596 for additional guidance.
- 1.2.2 For commercial or trade use: The maximum aggregate quantity of cylinders that may be transported on a vehicle for commercial or trade use without placarding / signage, safety equipment, and owners insurance, all in compliance with the specific requirements of the Australian Dangerous Goods Code (ADG) is 250 litres water capacity. Refer to the ADG code for full information on these requirements. Refer also to Appendix P in AS1596 for additional guidance.
- 1.2.3 Transporting in an enclosed vehicle or compartment: Irrespective of whether cylinders are being carted for domestic or commercial / trade use, the maximum aggregate quantity that can be transported in an enclosed vehicle or compartment is 33 litres water capacity (13.5 kg of LPG). In Queensland this limit is reduced to 30 litres water capacity (11 kg of LPG).

- 1.2.4 Cylinders placed in enclosed vehicles are to be:
- securely held in an upright position, preferably in the boot if possible or luggage area of the vehicle;
  - checked to ensure the service valve and the liquid level/bleeder valve are tightly closed and leak free. In Queensland the service valve outlet must be fitted with a screwed plug before it leaves the premises (this is recommended in all locations); and
  - stored in such a manner as to avoid excessive exposure to heat or direct exposure to sunlight.
- 1.2.5 Where a cylinder is to be transported in the passenger compartment of a vehicle, it should be in the rear of the compartment. The cylinder should be restrained in order to prevent movement or physical damage to the cylinder or the vehicle's occupants. Note: Unrestrained cylinders can cause serious injury if the vehicle suddenly brakes or is involved in an accident.
- 1.2.6 Where a cylinder is to be transported in the boot of a vehicle, it needs to be secured so that it cannot fall over during transport.
- 1.2.7 Cylinders should not be left unattended inside the vehicle, particularly during hot weather. Note: A moderate increase in temperature can cause the gas pressure inside the vehicle to rise and can lead to an abrupt discharge of LPG.
- 1.2.8 LPG is flammable; do not smoke or have any naked flame present while handling or transporting a cylinder.
- 1.2.9 Discharge any personal static build-up by touching a grounded (earthed) metal object (e.g. the body of the car) with your bare hands immediately before handling LPG cylinders.
- 1.2.10 Transport instructions are to be displayed at filling and/or exchange point, similar to the illustrated example. This is mandatory in Queensland.
- 1.2.11 Cylinders must not be supplied if any of the above requirements cannot be complied with.



In Queensland, cylinders shall be supplied with a label to the following effect:

#### **CYLINDER SAFETY INSTRUCTIONS**

LPG cylinders are safe if used correctly. It is important that:

- a. Cylinders are carried and stored upright at all times
- b. Cylinders are secured upright in vehicles, preferably in the boot, and not more than 2 cylinders are carried at a time
- c. Valves are checked to ensure they are tightly turned off
- d. Cylinders are kept away from heat or direct sun
- e. Contents of cylinder must not be inhaled.

For added safety, fit a screw plug to the cylinder outlet when not in use.

### **1.3 Safety Data Sheets**

- 1.3.1 Safety Data Sheets (SDS) provide the information needed for the safe handling of hazardous substances. These may be obtained from the Origin website at [originlpg.com.au](http://originlpg.com.au).
- 1.3.2 The SDS provides:
  - information needed for the safe handling of a hazardous substance;
  - the physical description of the product;
  - health hazard information;
  - precautions for use;
  - personal protection information;
  - actions in the event of an LPG emergency including first aid information; and
  - contact information.

## 2.0 Product knowledge

### 2.1 Liquefied Petroleum Gas

LPG is derived principally from two sources. It is separated from crude oil or natural gas as it leaves the wells, or it is produced from crude oil distillation in the normal refining process. In Australia, LPG is usually propane or butane or a mixture of both. Propane is used for residential and commercial burners. Butane is also mixed with propane to produce Autogas. Butane is sometimes used for commercial/industrial purposes.

It is important not to use butane or Autogas on appliances designed to burn propane and vice versa, without obtaining expert advice on such items as jet sizes and regulator pressures, which may require replacement or adjustment.

### 2.2 Characteristics of LPG

#### 2.2.1 Physical properties

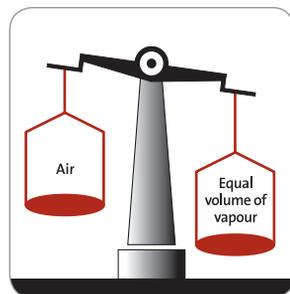
LPG is a colourless liquid when stored under pressure. It is odourless in its natural state. Odourant is added as a safety measure to give the liquid and vapour the characteristic gas smell to aid in the quick detection of leaks.

Other physical properties are printed in the LPG Safety Data Sheet (SDS). Refer to Section 1.2.

#### 2.2.2 Vapour density of LPG

Propane has a vapour density of 1.5 compared to air which has a vapour density of 1.0. LPG vapour is heavier than air and, therefore, any LPG escape will flow downwards and may accumulate in low-lying areas and be slow to dissipate without ample ventilation and air movement.

If an LPG vapour or liquid leak occurs, the greatest danger is at or near ground level. The vapour will gravitate to all the lower levels, particularly downwind of the leak. LPG liquid is approximately half the density of water and, therefore, any escape may flow across water before vaporising.



### 2.2.3 Toxicity

LPG is not poisonous or toxic but vaporised LPG when released into confined spaces can cause mild anaesthesia, headaches, nausea or dizziness. Avoid breathing vapours and mists. It can cause asphyxiation due to the exclusion of oxygen. Deliberate misuse can adversely affect the central nervous system, including confusion and a lack of coordination. All LPG filling installations are required to be well ventilated by being open on at least two sides.

### 2.2.4 Freeze burns

Propane or butane liquid in contact with the skin can cause serious freeze burns (see Section 3 – First aid). Approved thermal protective gloves, safety eye wear, non synthetic long sleeved shirt, trousers and appropriate closed-in footwear must be worn when handling LPG to protect against freeze burns.

## 2.3 Pressure and temperature influences on LPG

LPG vapour, when compressed sufficiently, will change from a vapour to a liquid. Similarly, when vapour is cooled at atmospheric pressure to below its boiling point of -42 degrees Celsius it will also liquefy.

As the temperature of the LPG in the cylinder varies in line with changes in ambient temperature the pressure inside the cylinder also varies. Temperature increases will cause the pressure to increase, decreases in temperature will cause the pressure to decrease. As vapour is drawn from the cylinder, the resultant lowering of the pressure in the cylinder causes any remaining liquid to give off more vapour to restore the pressure in the cylinder.

The expansion ratio of LPG is 1:270. This means that one litre of liquid, if vaporised, will occupy a volume 270 times greater than one litre of its liquid state.

**Note:** Leaking liquid is extremely hazardous due to its large and sudden expansion to vapour.

## 2.4 Equipment freeze

As LPG liquid expands to vapour it can cause surrounding temperatures to drop rapidly. This temperature drop can cause water vapour present in the air to form ice on an open valve, causing it to freeze over and may even close off the valve opening, thus giving a false impression of the state of the system.

## 2.5 LPG vapour cloud

On vaporisation, LPG itself is invisible. However, the escape of LPG liquid promotes condensation of water vapour from the air, and this makes the resulting vapour cloud adjacent to the discharge point visible. Consequently, on very hot dry days the vapour cloud from a liquid escape might not be so readily visible.

## 2.6 LPG flammability

LPG vapour, which is heavier than air, can combine with up to 50 times its own volume of air to form a flammable mixture.

LPG vapour / air mixtures ranging between 2 and 10% concentration of LPG are flammable. If such a mixture of LPG and air is ignited, it will flash back to the source of escape; and if ignited in a confined space it will explode.

## 2.7 Characteristics of LPG storage cylinders (vessels)

LPG is stored as a liquid under pressure in specially designed cylinders.

An important characteristic of all LPG cylinders is that they are designed to never be completely full of liquid. They must never be over-filled (see paragraph 2). An adequate vapour space must always be maintained above the liquid. This vapour space allows for expansion of liquid caused by temperature change, such as occurs when the cylinder is exposed to strong sunlight. The pressure is not affected by the amount of liquid in the cylinder, as long as there is adequate vapour space, but is affected by the temperature of the liquid within the cylinder. The maximum standard filling level for propane cylinders is 80%.

All cylinders filled by decanting are fitted with a liquid level/bleeder valve. The liquid level/bleeder valve:

- indicates when the liquid level in the cylinder reaches 80%; and
- releases the vapour from the cylinder to allow the flow of liquid when filling by decanting.

The liquid level/bleeder valve is also known as:

- ullage gauge or valve;
- bleeder valve or screw; or
- fixed liquid level gauge.

Most of the LPG storage cylinders used are designed for propane. Whilst butane can be stored in propane cylinders, propane must not be stored in cylinders designed for butane.

## 2.8 Dangers of over-filled LPG cylinders

When an LPG cylinder is over-filled any rise in ambient temperature will cause the pressure in the cylinder to increase as the liquid expands. This increase could cause the cylinder pressure relief valve to discharge LPG if excessive pressure has developed in the container.

The relief valve will continue to discharge LPG until the pressure inside the cylinder drops to below the relief valve setting. This opening and closing action may occur many times before the liquid level falls sufficiently to provide adequate vapour space inside the cylinder for the existing temperature conditions. Ignition of the gas being discharged could cause a serious fire emergency or explosion.

Over-filling can also pose a danger when the cylinder is reconnected to an appliance. Liquid LPG could over flow through regulating equipment thus supplying liquid LPG instead of vapour LPG to the appliance.

This situation is extremely dangerous and could lead to:

- over pressurisation of connected internal pipe work, or hose and possible rupture;
- incomplete combustion within the appliance and generation of poisonous Carbon Monoxide;
- escaping liquid LPG within, or around, the premises; and
- potential for fire and/or subsequent explosion.

If you suspect that an over-filled condition exists, close the cylinder supply valve and report the situation to your supervisor immediately. If a cylinder is over-filled, the excess liquid will need to be removed and your supervisor will determine the most appropriate course of action.

## 3.0 First aid

This section outlines the actions to follow whenever someone comes into contact with liquid LPG.

Contact temperatures are usually below -30 Degrees Celsius and tissue contact at this temperature results in snap freezing of the affected area causing damage similar to a heat burn.

Contact with equipment at below zero temperatures can cause the skin to stick fast and the flesh may be torn. Direct bodily contact with LPG liquid must be avoided.

### 3.1 Immediate treatment

- 3.1.1 If possible, remove any affected clothing contaminated or splashed with liquid LPG not adhering to the skin, and place the injured person in a warm area.
- 3.1.2 Immediately bathe the affected area with large quantities of warm water for at least 15 minutes to bring the affected areas back to normal body temperature.
- 3.1.3 If possible have the injured person gradually move the injured area to re-establish / maintain circulation to assist in the re-warming process..
- 3.1.4 Seek immediate medical attention for all but superficial injuries, Advise the hospital / doctor of the injury (e.g. freeze burn, inhalation, etc.).

**Note:** If the affected area re-warms too rapidly, further damage may be caused to the tissue. Do not apply direct heat or cold such as heat lamps, hot water, or ice to affected parts. If warm water is not available, tap water will suffice, but be careful not to cause cooling.

- 3.1.5 In cases involving inhalation, remove the contamination source and move the injured person to fresh air. Ensure airways are clear. A qualified person should give oxygen through a face mask if breathing is difficult
- 3.1.6 Eyes: Immediately wash with clean luke warm water for 15 minutes.

**Note:** Record the incident in line with your internal company incident reporting system. For other advice, the Poisons Information Centre may be contacted on 13 11 26 (in Australia).

## 4.0 Installation requirements

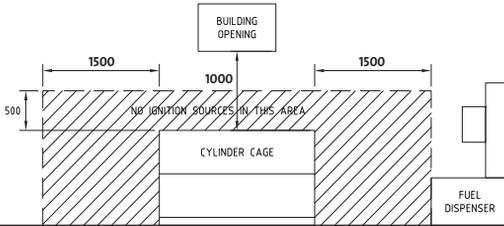
### 4.1 Cylinder cages

The cylinder cage at your site has been positioned to ensure that it meets all Australian Standard and legislative requirements. If anything changes at your site that could make a cage location no longer comply, please contact your Origin Account Manager for assistance.

**The main requirements covering the cage location are as follows, the cage must be:**

- located outdoors;
- located at least 1m from any opening;
- located at least 1m from the hose reach of an LPG decanting cylinder;
- located at least 1.5m horizontally or 0.5m vertically from any ignition source;
- located at least 1.5m from any pit, drain, basement, public place or dispenser for any type of fuel;
- located at least 5m from any tank containing LPG (note a 190kg or 210kg cylinder is not a tank);
- located at least 3m from any above ground tank containing dangerous goods other than LPG;
- located at least 0.5m away from any accumulation of combustible materials;
- located at least 2m from any structure limiting degrees past any cage; and
- located clear on at least two sides from any wall, solid display or other item that could restrict air flow.

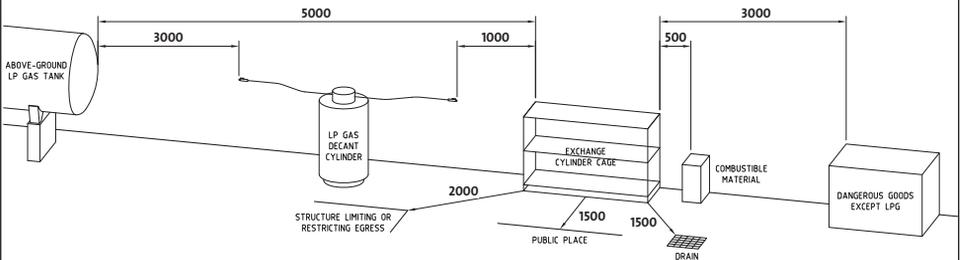
## HAZARDOUS ZONE ELEVATION



## POSSIBLE IGNITION SOURCES

- Air conditioners
- External power points, junction boxes and switches
- Electrical meter boxes, switches and fuse boxes
- Telecom pits
- Barbeques
- Incinerators
- Electric motors
- External hot water services
- Flue outlets including coaxial flues
- Satellite reception dishes

## CLEARANCE DISTANCES



Where the aggregate water capacity of cylinders stored exceeds 1000 litres (but less than 12,000 litres) a dry powder type extinguisher with a rating of 2A 60b(E) (9kg) or a fire hose reel is required.

Every individual cylinder cage shall be provided with signs and notices that are clearly visible and readily distinguishable from any advertising signs attached to the cage.

The following signs and notices shall be prominently displayed on the front of the cylinder cage:

- A dangerous goods class label.  
**Note:** This label should be 250mm square.
- A warning notice reading: "FLAMMABLE GAS – NO SMOKING".
- Any additional signage that may be specified by State Placarding Requirements



**FLAMMABLE GAS – NO SMOKING**

## 5.0 Emergency procedures

### 5.1 LPG leak

- 5.1.1 If the leak is from a cylinder valve, shut the valve if possible.
- 5.1.2 Isolate electricity and ignition sources.
- 5.1.3 Keep bystanders and vehicles away.
- 5.1.4 No smoking – no naked flames.
- 5.1.5 No engine to be started.
- 5.1.6 Keep upwind of leak.
- 5.1.7 Use fire hose on fog pattern in the area of vapour cloud down wind of leak to disperse gas cloud. Do not spray water on to the cylinder as this may increase the leak.

### 5.2 LPG fire

- 5.2.1 Raise the alarm and keep bystanders and vehicles away.
- 5.2.2 Isolate electricity and ignition sources. Do not start any engines.
- 5.2.3 Do not extinguish the fire unless by doing so you can safely shut off fuel supply to the fire.

In any LPG fire, flames should not be extinguished unless by doing so the fuel supply can be turned off using a dry chemical fire extinguisher. If the fire is extinguished and the supply of fuel is not turned off, a greater fire potential may be created.

- 5.2.4 Evacuate the local area and phone emergency services on 000.
- 5.2.5 Telephone Origin on 1800 808 526.

## 6.0 Approximate capacities of cylinders for LPG (information)

The approximate masses and volumes (water capacities) of LPG cylinders are provided for information in the table below.

### Approximate capacities of cylinders for LPG

| <b>Nominal mass of LPG<br/>in cylinder<br/>kg</b> | <b>Approximate volume<br/>(water capacity) of cylinder<br/>L</b> |
|---|--|
| 3   | 7  |
| 4.5   | 11   |
| 5   | 13   |
| 9   | 22   |
| 10  | 26   |
| 13.5  | 32   |
| 15  | 36   |
| 18  | 44   |
| 45  | 108  |
| 90  | 200  |
| 190   | 454  |
| 210   | 499  |

## 7.0 How to contact Origin

Customer service e-mail Postal address

**134 GAS (134 427) or call your account manager  
enquiry@originenergy.com.au  
GPO Box 1199, Adelaide SA 5001**



LPG orders Telephone Website

**133 LPG (133 574)  
originlpg.com.au**

## Emergencies or leaking gas 1800 808 526

Your Origin Representative: \_\_\_\_\_

Origin Representative phone number: \_\_\_\_\_

Date: \_\_\_\_\_

Origin Energy Retail Ltd ABN 22 078 868 425  
Sun Retail Pty Ltd ABN 97 078 848 549

### Privacy

To find out more about how Origin collects, uses, holds and discloses your personal and credit information see our privacy statements at [www.originlpg.com.au/privacy](http://www.originlpg.com.au/privacy).

### Disclaimer

The information in this booklet is intended as a quick reference guide to operators who have been instructed in the safe handling of LPG. The user releases Origin Energy Retail Ltd from and agrees to indemnify Origin Energy Retail Ltd in respect of, any third party claims, actions, suits, demands, costs and expenses for damage or injury to persons or property arising directly or indirectly out of the handling of LPG or associated equipment by you or any of your contractors whether caused by the negligence of Origin Energy Retail Ltd, the user or any other person, or the breakdown failure, operation, misdelivery or nondelivery of the equipment or any other matter. Any warranty, condition, description or representation whether express or implied as to the description, state, quality, merchantability or fitness of the equipment or LPG for the purpose for which it is supplied to you is excluded to the extent that Commonwealth, State and Territorial laws permit.

'Portable Cylinder Exchange - LPG Guideline' LPG-BUS-HSE-GUI-0031 v3 05/15

LPG877.1 v3 05/15