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Code of Practice 401

Issue 1 April 2022

Safety in the Storage, Handling and use of Propane Gas in Small Portable Appliances

Amendment Summary

ISSUE NO. DATE	DESCRIPTION
Issue 1 **April 2022**	First Issue in new document template format. This was previously Chapter 2 of CP401- Mains Practice General. However, all other Chapters in the CP are now archived so CP401 has been renamed to cover subject matter of Chapter 2. References to archived CP431 removed. Reference to maintenance and inspection procedures in CP684 added. Prepared by: P Howell Approved by: Policy Approval Panel and signed on its behalf by Steve Cox, DSO Director

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1 Introduction

This Code of Practice replaces EPD 132 "Safety in the Storage and Use of Propane Gas in Small Portable Appliances" and CP 61 "The Safe and Economic Use of Liquid Petroleum Gas (Propane)" and updates the requirements of "Safety in the Storage and Use of Propane Gas in Small Portable Appliances". It does not, however, attempt to be a complete guide to the storage, handling and use of highly flammable liquids and liquefied petroleum gases. Further information on such aspects should be obtained from Engineering Recommendation G32/1 Part 2 "Guide to safety in the storage, handling and use of highly flammable liquids and liquefied petroleum gases", and appropriate sources as necessary.

2 Scope

This chapter contains the practices adopted by Electricity North West to ensure safety in the storage, handling and use of propane gas in small portable appliances.

3 Characteristics of Propane Gas

Propane exists as a gas at normal atmospheric temperatures and pressures but is normally stored, in a liquid phase, in containers under pressure. As a liquid, propane occupies only about 1/250th of the space that it occupies as a gas.

- Propane is extremely flammable when mixed with air, even at quite low concentrations. The explosive limits of propane/air mixtures are from about 2% to 10% by volume.
- A small volume of liquid propane will expand to a large volume of gas, the ratio being about 275:1. This means that a dangerous situation arises if any quantity of liquid propane is spilt.
- Propane gas is about one and a half times heavier than an equivalent volume of air. Leaking gas will, therefore, tend to accumulate in pits, trenches and similar low-level situations, where it may travel some distance from its point of release.
- Propane gas is non-toxic but has anaesthetic properties when inhaled in large quantities. Moderate concentrations may induce nausea and headache. A particular danger, if the gas accumulates in confined and poorly ventilated places, is that it could displace the air to such an extent as to cause asphyxiation.
- Propane gas has no natural smell, but a distinctive odour is added to propane in manufacture to enable detection by smell, well before any vapour/air mixture reaches the lower explosive limit.
- Approved detectors for flammable gas will satisfactorily detect propane gas but if they have been calibrated for natural gas their response to propane will be less accurate.
- Propane gas is carried in steel containers as a liquid under a pressure which varies between 4 bar (60 lbs/sq in) and 11 bar (160 lbs/sq in) depending upon the ambient temperature.

For further details on the characteristics of propane gas refer to Engineering Recommendation G32/1.

4 Hazards and Precautions

No risk of an explosion of a propane gas container will exist unless the temperature of the container is allowed to rise to such a level that the internal pressure of the container exceeds 69 bar (1000 lbs/sq in).

In order to ensure that pressures approaching these figures are not attained no container should be stored or used under such circumstances that it is subjected to artificial heat or direct sunshine to such an extent that the container feels uncomfortably hot to a firm application of the palm of the hand.

Contact with liquid propane can cause cold burns or in extreme cases cold burns can be caused by contact with heavily frosted containers.

The pressure regulator, attached to the outlet from the container, reduces the variable pressure from the container to some constant lower pressure dependent on the type of regulator.

A full working pressure can be maintained at the appliance until the container is virtually empty, and the only accurate way of checking the amount of gas remaining in a container is by weighing. An approximate guide can be obtained by gently rocking the container and listening for the liquid propane swishing about internally.

One of the effects of the combustion of propane gas is the production of carbon monoxide. It is therefore essential that furnaces, radiators, lights and similar equipment should only be used in the open. It is recognised that blow torches must be used inside substations and in similar enclosed or confined situations, and when such work is being carried out it is imperative that appropriate measures are taken with regard to ensuring adequate ventilation, particularly at the working position.

For further details of the hazards and precautions associated with propane gas refer to Engineering Recommendation G32/1.

5 Legal Requirements

The legal requirements for the handling and storage of propane gas are covered in various HSE documents and Regulations which are listed in Engineering Recommendation G32/1. These documents must be complied with at all times when handling and storing propane gas containers.

6 Training

No person may handle and/or operate propane gas cylinders and equipment unless that person is adequately trained and competent in the use of such equipment.

Where propane is stored in portable cylinders all persons concerned with the storage should be familiar with the following:

(a) The physical characteristics of propane.

(b) The fundamentals of fire-fighting and fire-control with particular reference to fires involving liquefied petroleum gas (propane).

(c) The correct use of any fire-fighting equipment provided.

The training requirements laid down in Engineering Recommendation G32/1 Part 2, must be complied with at all times.

7 Storage of Propane Containers

Engineering Recommendation G32/1 must be complied with at all times when storing propane cylinders and the following shall be adopted as standard practice within Electricity North West's area:

7.1 Storage of Propane Containers in Depots

All storage areas shall be secure and shall be prominently marked with warning notices of Approved design which shall include a prohibition on smoking.

Containers shall never be stored below ground level.

Any building or area used for storing containers shall preferably be detached and shall be of fire resistant construction. If the storage area is a compartment in a larger building, the materials used in its construction shall be fire resisting. If containers are stored outside, they shall preferably be protected by a roof and stand on firm, dry, hard standing and must be protected from direct sunlight.

Storage buildings or areas must have adequate low-level ventilation and be sited away from drains into which leaking gas could percolate.

No direct lighting shall be provided in an enclosed storage area unless this is of certified flameproof type. No heating shall be provided, and all storage areas shall be remote from any naked flame.

All practicable precautions shall be taken to eliminate sources of the production of inadvertent sparks in the vicinity of the storage area.

Containers must be stored with the valve uppermost to ensure that, in the event of leakage, liquid propane is not released.

The design and construction of all propane cylinder storage areas shall be subject to the approval of Electricity North West's Civil Engineer.

Under normal conditions a gas container is seldom completely empty of gas although the internal pressure may approximate to the atmospheric. If a container is left in this condition with the valve open, air can diffuse into the container to produce a highly explosive mixture. **All** valves must therefore be kept closed at all times when not in actual use.

Full and empty cylinders should be stored apart and preferably in separate enclosures.

7.2 Storage of Propane Containers on Site

The quantity of propane stored on site shall not exceed one day's requirements and shall be stored following the requirement of Engineering Recommendation G32/1.

Under normal conditions, containers not in use shall not be left inside shacks, tents, substations or other buildings not specifically designated as storage areas. Where circumstances render this not to be practicable

then such special precautions shall be taken as to ensure that no danger will arise. Such precautions shall include obtaining the permission of the person responsible for the safety and security of the location. Containers may never be left in domestic premises.

When it is necessary to leave gas containers on site unattended (e.g. overnight or at weekends), the valve must be firmly closed to prevent leakage, and all appliances, including the pressure regulator, removed. The container should then be locked in such a manner as to prevent, so far as is reasonably practicable, operation of the container valve or other unauthorised interference.

8 Handling and Transportation

Engineering Recommendation G32/1 must be complied with at all times when handling and transporting LPG equipment and the following shall be adopted as standard practice within Electricity North West's area:

- Where manual handling of containers and/or equipment is expected a suitable and sufficient assessment of risks must be carried out in accordance with the Manual Handling Operations Regulations 1992.
- When handling containers and equipment in cold conditions, gloves must be worn to protect from frost damage to hands.
- When manually handling containers and equipment, the guidelines for lifting and lowering shown in the Health and Safety Manual Handling Operations Regulations 1992 must not be exceeded.
- Containers shall only be conveyed with their valves securely closed so as to prevent leakage. Containers in transit must be carried with the valves uppermost and should be supported, either by straps or by partitioned racks, in such a manner that they cannot be dislodged.
- Containers shall be so conveyed as not to project beyond the sides or ends of the vehicle, and adequate means shall be taken to prevent containers falling off the vehicle.
- Containers carried in closed vans shall be transported in a separate, secure, ventilated enclosure of Approved Design. Such vehicles shall display a statutory notice of approved design and a safety poster conforming to the requirements of Appendix A.
- The valves of containers shall be protected against damage, either by the design of the container, or by the provision of a stout metal cap or metal cover, securely attached to the body of the container. The metal cap or cover shall be so made that it is nowhere in actual contact with any part of the valve or valve body. Every valve cap or cover shall be provided with a vent of such size as to prevent any gas pressure inside the cap or cover.
- Personnel must not travel in that section of a vehicle in which gas containers are present.
- Propane cylinders carried on craftsmen's trailers shall be secured on outside storage racks which provide adequate protection against mechanical damage and interference with valves. Where the size of the cylinder does not permit this, it shall be securely stowed and protected in an upright position inside the trailer. The inside storage area shall be ventilated as described in Engineering Recommendation G32/1.

9 Equipment

All Propane Cylinders and equipment must be:

(a) Obtained from an Approved manufacturer in accordance with Electricity North West Specifications ES400 L3.

(b) Maintained in good order.

(c) Authorised by Electricity North West in accordance with Electricity North West Specifications ES400 L3.

A pressure regulator shall be attached directly to the container valve at all times when the container is in use. Direct connection of a hose or appliance to the container is forbidden except in the case of certain very small capacity integral units specifically designed for the purpose, and in which the gas container is intended to be held in one hand.

All hoses shall be manufactured in accordance with BS4089:1999 "Specification for hoses and hose assemblies for liquefied petroleum gas". Armoured hose must never be used in the vicinity of exposed live metal, e.g. open type M.V. boards, live M.V. cable cores.

Only manufacturers' hose clips, specially designed for use with propane gas equipment, shall be used. Jubilee clips and similar makes are not suitable for the high pressures and small bores encountered with this equipment.

The use of LPG lighting, space heating and cooking equipment must conform to Engineering Recommendation G32/1 and BS 5482: Part 2: 1977 "Code of Practice for domestic butane and propane gas burning installations in caravans and non-permanent dwellings".

10 Inspection and Maintenance

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All equipment shall be inspected and maintained in accordance with CP 684, Section 9.4.1

11 Fire and Safety Precautions

All Electricity North West personnel must be aware of the fire and safety precautions applicable to LPG equipment before they are allowed to store, handle or use LPG cylinders and equipment.

The following shall be adopted as standard practice within Electricity North West's area:

- **NEVER** use a naked flame to test for a suspected gas leak. Propane has a distinctive smell. The sense of smell, or the application of soapy water, shall be used to detect the source of leakage.

- Gas containers shall not be taken into confined spaces such as joint holes, manholes, small workspaces, etc, but are to be placed in the open, preferably down wind of the working area, to facilitate the safe dispersal of any accidental escape of gas.

- If it is suspected that a leakage of gas has occurred in the vicinity of a low level confined space such as a joint hole or manhole, all naked lights must be immediately extinguished, and the hole should be pumped out or bailed out with a bucket. This procedure may look peculiar, but it is the one recommended by gas equipment manufacturers.

- Personnel using, or in the vicinity of, propane must have immediate access to extinguishers to put out minor fires, e.g. paper, oily rag etc, to prevent any propane being set alight accidentally.

- In the event of the outbreak of fire in which liquefied petroleum gas (propane) cylinders are or may be involved, the Fire Brigade shall be called immediately and, provided there is no immediate risk to personnel, prompt action must be taken to control the fire.

- If immediate control of the outbreak of fire is considered impracticable and there is a likelihood of gas explosion, all personnel and all members of the public must be warned to evacuate the area and steps shall be taken to prevent persons or vehicles entering the danger area until the Fire Brigade and/or Police assume control.

12 Documents Referenced

DOCUMENTS REFERENCED	
Engineering Recommendation G32/1	Guide to safety in the storage, handling and use of highly flammable liquids and liquefied petroleum gases
BS 5482: Part 2: 1977	Code of Practice for domestic butane and propane gas burning installations in caravans and non-permanent dwellings
BS4089:1999	Specification for hoses and hose assemblies for liquefied petroleum gas
The Health and Safety (Safety Signs and Signals) Regulations 1996	Safety Signs and Signals
CP684	The Use, Maintenance and Inspection of Ancillary Engineering Equipment
ES400 L3	Specification for Propane Gas

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Appendix A – Statutory Notice of Approved Design and Safety Poster Requirements

All pictorial signs used to indicate that smoking is prohibited and to caution against risk of explosion must conform to The Health and Safety (Safety Signs and Signals) Regulations 1996

Approved notice to be displayed at all locations where propane cylinders are stored:

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Approved notice to be displayed on all storage cabinets or storage spaces in vehicles:

The Safety Precautions Notice issued by the Electricity Council must also be prominently displayed at all locations where propane gas cylinders are stored or transported.

A copy of this notice is shown on next page.

ELECTRICITY COUNCIL NOTICE ON SAFETY PRECAUTIONS FOR LPG

liquefied petroleum gas

SAFETY PRECAUTIONS

Liquefied petroleum gas is stored in the cylinder as a liquid under pressure.
Even a small leakage can form a flammable or explosive mixture.
The gas is heavier than air and may collect at low level.

always keep cylinders upright with valves uppermost and wedge, lash or otherwise secure them to ensure that they cannot be knocked over

store in a cool place away from flammable materials, preferably in a locked ventilated store

handle cylinders and equipment with care

use a spanner to tighten cylinder valve connections

make sure connections are tight and the hose is sound

before opening cylinder valve close valves on connected appliance

turn off gas at cylinder allow gas to burn out before shutting burner valve

use only in well ventilated situations and allow at least 3 metres between cylinder and burner or other heat sources

before changing cylinder close cylinder valve hand tight

trace leaks only by smell or by brushing on soapy water

never
store or leave cylinders below ground level

never
apply heat to a cylinder

never
change cylinders near a naked flame

never
test for leaks with naked lights

never
tamper with pressure regulator setting, nor alter any other equipment.

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