



CODE OF PRACTICE 31

**THE SAFE STORAGE AND USE OF
CYLINDERS ON MOBILE WORKSHOPS
AND SERVICE VEHICLES**

REVISION 5: 2020

British Compressed Gases Association

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PREFACE

The British Compressed Gases Association (BCGA) was established in 1971, formed out of the British Acetylene Association, which existed since 1901. BCGA members include gas producers, suppliers of gas handling equipment and users operating in the compressed gas field.

The main objectives of the Association are to further technology, to promote safe practice and to prioritise environmental protection in the supply, use, storage, transportation and handling of industrial, food and medical gases, and we produce a host of publications to this end. BCGA also provides advice and makes representations on behalf of its Members to regulatory bodies, including the UK Government.

Policy is determined by a Council elected from Member Companies, with detailed technical studies being undertaken by a Technical Committee and its specialist Sub-Committees appointed for this purpose.

BCGA makes strenuous efforts to ensure the accuracy and current relevance of its publications, which are intended for use by technically competent persons. However, this does not remove the need for technical and managerial judgement in practical situations. Nor do they confer any immunity or exemption from relevant legal requirements, including by-laws.

For the assistance of users, references are given, either in the text or Appendices, to publications such as British, European and International Standards and Codes of Practice, and current legislation that may be applicable but no representation or warranty can be given that these references are complete or current.

BCGA publications are reviewed, and revised if necessary, at five-yearly intervals, or sooner where the need is recognised. Readers are advised to check the Association's website to ensure that the copy in their possession is the current version.

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TERMINOLOGY AND DEFINITIONS

Cylinder	A transportable pressure receptacle of a water capacity not exceeding 150 litres.
Flame supervision device	Cuts off the fuel supply to a gas appliance automatically and immediately if for any reason the flame goes out or becomes unstable. Sometimes referred to as a 'flame failure device'.
Goods vehicle	Motor vehicle with at least four wheels designed and constructed for the carriage of goods.
May	Indicates an option available to the user of this Code of Practice.
Mobile workshop	Vehicles where cylinders or substances are carried for specific work processes either on or in near proximity to the vehicle.
Shall	Indicates a mandatory requirement for compliance with this Code of Practice and may also indicate a mandatory requirement within UK law.
Should	Indicates a preferred requirement but is not mandatory for compliance with this Code of Practice.
Special site service vehicles	Vehicles which are designed with permanent cylinder installations which supply appliances or equipment fitted within them, for example, to provide cooking, heating or lighting facilities at remote locations.

CODE OF PRACTICE 31

THE SAFE STORAGE AND USE OF CYLINDERS ON MOBILE WORKSHOPS AND SERVICE VEHICLES

1. INTRODUCTION

Some goods vehicles are used as mobile workshops or provide a specialist capability, where there is a specific requirement to carry / use a gas. For this purpose, a wide variety of gas cylinders are transported on goods vehicles to provide a gas source for use on equipment within the goods vehicle or some outstation work activity. These activities include repair work, site testing, heat processes, refrigeration, catering, personnel site comfort, welfare facilities, etc. Examples of the gases involved include oxygen (O₂), acetylene (C₂H₂), liquefied petroleum gas (LPG), refrigerant gases, nitrogen (N₂) and speciality gases.

A number of serious accidents have historically occurred involving gas cylinders during carriage or when in use on mobile workshops and site service vehicles. Fatalities, injuries and serious damage, have resulted from:

- fire and / or explosions;
- asphyxiation from escaping gas, which accumulates within the confines of a closed vehicle during transit or when parked;
- unsecured cylinders, that have moved during transit;
- the incorrect use of equipment or appliances.

Many of these events could have been prevented if more care had been taken in the initial design and construction of the vehicle and its subsequent operation. Operators should ensure that vehicles are, and continue to be, fit for the purpose intended, and are regularly inspected. The personnel involved in vehicle selection, design, operation and maintenance shall be suitably competent and adequately trained.

The Health and Safety Executive (HSE) provides advice and guidance on workplace transport safety. This guidance concentrates on three specific areas:

- safe site (design and activity);
- safe vehicle;
- safe driver.

For further information refer to the HSE website: www.hse.gov.uk/workplacetransport, HSE HSG 136 ^[12], *A guide to workplace transport safety*, and HSE INDG 199 ^[13], *Workplace transport safety. A brief guide*.

All parties shall ensure they have adequate insurance to cover their activities and that they use their gases and look after their gas cylinders and associated equipment in a safe and responsible way.

This code of practice is intended for use in conjunction with current guidance and information produced by the Health and Safety Executive (HSE) and other related bodies and trade associations.

2. SCOPE

Details the design, construction and operation of goods vehicles which are used as mobile workshops or provide a specialist capability, where there is a specific requirement to use a gas. It covers the safe carriage of gas cylinders and the safe installation of gas equipment on such vehicles. It provides guidance on safe use on or with work activities associated with such vehicles and the competence of operators to ensure high levels of safety awareness and operational safety.

The scope includes vehicles which have a facility for a cylinder to be carried for use with equipment within or adjacent to that vehicle, for example, mobile site facility vehicles, site catering units or other specialist vehicles using flammable gases which fall within the scope of this definition.

Exclusions from this Code of Practice are:

- compressed or liquefied gas systems for vehicle propulsion;
- vehicles designed and used solely for conveyance of gas cylinders;
- vehicles designed and constructed for the carriage of passengers, which do not have a separate load area, refer to BCGA Guidance Note (GN) 27 ^[16], *Guidance for the carriage of gas cylinders on vehicles*;
- vehicles used by emergency services, where there is a requirement to administer gas to a patient during the journey. However, measures shall be taken to ensure that such transport is carried out in complete safety.

The LPG Trade Association (Liquid Gas UK) provide additional guidance for specialist vehicles where LPG is used, for example, for road surfacing activities.

3. PROPERTIES OF GASES

Each individual gas cylinder will have a label which identifies its contents, the label also provides basic safety information on the hazard(s) associated with the product. The label is the primary method of identifying the contents. The Safety Data Sheet for that product provides detailed information on the hazards associated with the product. For specific safety information and / or advice contact your gas supplier, equipment manufacturers, etc.

The gas pressure within a cylinder is usually much greater than atmospheric pressure; consequently, even a small leak can produce a large volume of gas in a short time. Liquefied

gases leaking from the liquid phase will vaporise and expand to form a gas volume which will be several hundred times greater than the original liquid volume.

The boiling point of many liquefied gases at atmospheric pressure is below 0 °C. If exposed skin comes into contact with these cold liquids it will produce a cold burn. Cylinders or sensitive materials, which may be affected or damaged by cold, should be separated or protected.

Gases carried in service vehicles may be inert, odourless, colourless and not readily detectable by human senses, most will be asphyxiants. Some, for example, LPG, are heavier than air and will accumulate in low-lying areas, whilst others, such as hydrogen, are lighter than air and will rise. Concentrations of (asphyxiant) gases can build up in unventilated workplaces, for example, during welding, purging, evaporation, leakage, process exhaust and in refrigeration processes, etc.

For further information on:

- asphyxiation, refer to Section 3.1;
- flammability, refer to Section 3.2;
- oxidants, refer to Section 3.3;
- toxic effects, refer to Section 3.4;
- multiple hazard gases, refer to Section 3.5.

BCGA GN 11 ^[15], *The management of risk when using gases in enclosed workplaces*, provides further guidance.

A workplace risk assessment shall be completed before handling or using gas cylinders and, where there is residual risk, the use of appropriate personal protective equipment should be assessed and be available for use where foreseeably required.

In addition, the *Control of Substances Hazardous to Health (COSHH) Regulations* ^[6], requires that a formal risk assessment is carried out which concentrates on the hazards and risks from hazardous substances in your workplace. This shall take account of the Workplace Exposure Limits for relevant substances. Refer to BCGA GN 11 ^[15].

3.1 Asphyxiation

Ambient air is primarily composed of two gases; nitrogen at approximately 78 % and oxygen at approximately 21 %. Changes to the air composition can result in a potentially hazardous atmosphere. Human senses cannot detect different compositions of oxygen and nitrogen in the atmosphere. With the exception of oxygen, any gas or vapour present in high concentrations in the air will act as an asphyxiant by displacing air or otherwise reducing the oxygen concentration below the level needed to support life. This is one of the principal hazards associated with inert gases, such as nitrogen, argon (Ar) and carbon dioxide (CO₂).

Operators shall not enter any enclosed area or confined space where there is the potential for a leakage of such gases to have occurred, unless a risk assessment has been completed and appropriate controls have been implemented.

3.2 Flammability

Some gases form flammable mixtures when mixed with the air or with other substances; fires and explosions will result if these mixtures or substances are ignited. Flammable gases include acetylene, butane (C₄H₁₀), propane (C₃H₈) and hydrogen (H₂). These gases and mixtures can also present fire and explosion risks within confined spaces.

Flammable gases are also asphyxiants, refer to Section 3.1.

3.3 Oxidants

Several gases, such as oxygen, are classified as oxidants. They do not burn on their own, but are capable of intensifying a fire and of vigorously supporting combustion. Materials which do not burn readily in air may burn easily (and their ignition resistance will be lower) in an oxidizing atmosphere. Materials, which are stable in atmospheric air such as the vehicle fuels, diesel and petrol, may ignite explosively in contact with (a stream of) compressed oxygen or compressed air.

3.4 Toxic effects

Gases, such as sulphur dioxide (SO₂), ammonia (NH₃) or carbon monoxide (CO), which are classified as toxic and where exposure can directly affect health, for example, through damage to the respiratory system.

3.5 Multiple hazard gases

In practice, all gases present multiple hazards, for example, pressure hazard, hazards associated with the containment package (for example, manual handling hazards) along with the hazards associated with the contained substance. Some gas substances have more than one intrinsic hazard. Carbon monoxide, for example, is flammable, toxic and asphyxiating. Special gas mixtures for welding may present multiple hazard risks.

Users shall be aware of the properties and associated hazards of all the gases they are using as well as the information in the product Safety Data Sheet and any application and safety information provided by the gas suppliers.

4. CARRIAGE OF GAS CYLINDERS BY ROAD

Cylinders containing gases, which are filled or transported in the UK, come within the scope of *The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations* [7]. These Regulations implement the provisions of the *European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR)* [8]. Gases are classified as Class 2 dangerous goods. ADR [8] provides a framework for dangerous goods to be carried nationally and internationally in road vehicles subject to (amongst many other requirements) compliance with standards for the packaging and labelling of the dangerous goods, and appropriate construction and operating standards for the vehicles and crew.

NOTE: Gases contained in the special equipment of vehicles and necessary for the operation of this special equipment during transport (cooling systems, fish-tanks, heaters, etc.) are exempt from the requirements of ADR ^[8].

All vehicles shall comply with the *Road Traffic Act* ^[2], be road worthy and fit for purpose, refer to BCGA GN 35 ^[17], *Vehicle selection and transport management*.

All businesses that regularly handle (including the transport related activities of loading and unloading), process or transport dangerous goods shall appoint one or more dangerous goods safety adviser(s) (DGSA), refer to ADR ^[8], Chapter 1.8.

If the quantity of cylinders being transported is over the threshold level defined in ADR ^[8], then the vehicle is required to fully comply with ADR ^[8] and shall display placards and marks applicable to the dangerous goods being carried.

If the load is below the threshold level defined in ADR ^[8], then the vehicle is exempt from some requirements.

NOTE: To determine the threshold level and for further information on the carriage of gas quantities below the threshold level, refer to BCGA GN 27 ^[16].

A nominally empty cylinder containing residual gas (empty unclean) shall be treated the same under *The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations* ^[7] as a full cylinder and is therefore subject to all the relevant regulations.

ADR ^[8] requires that the vehicle crew have received appropriate training, carry certain documents providing safety information about the dangerous goods on the vehicle, and carry specific safety equipment in case of an incident, for example, fire extinguishers, wheel chocks, etc.

For the stowage of gas cylinders on a vehicle refer to Section 5.3.

5. DESIGN AND CONSTRUCTION OF VEHICLES

The vehicle design and construction shall conform to the *Road Vehicles (Construction and Use) Regulations* ^[3] in force at the time of construction. This is applicable for new vehicles, as well as for the refurbishment or modification of existing vehicles.

All goods vehicles are required to have a 'Vehicle Approval' from the *Driving and Vehicle Standards Agency* (DVSA), such as a 'Type Approval' or an 'Individual Vehicle Approval'. The approval process ensures that each vehicle meets relevant environmental and safety standards. If any modification work is carried out to the original vehicle manufacturer's design, then the owner of that vehicle shall check if a change to the Vehicle Approval is required. All goods vehicles have to be approved as 'complete' or 'completed' vehicles before they can be registered.

The owner of the goods vehicle shall ensure that where the vehicle is modified from the original design and construction that any changes do not present a potential danger when the vehicle is used.

During the (change of) design of a vehicle the hazards and properties of (all) the gases which are to be carried / used shall be taken into account, including for the location of gas cylinders, equipment and the routing of pipework, especially with regard to the location of existing electrical components, wiring and other items with their own hazardous properties, for example, oils, greases and fuels. Refer to Section 3.

Goods vehicles shall be maintained in a safe and in a roadworthy condition at all times.

Where gases and associated supply equipment are carried the load area shall be separated from the driver / passenger compartment. Where there is not a separate external load space, a gas tight partition bulkhead shall be fitted to all goods vehicles to separate the load area from the driver / passenger compartment. This bulkhead shall prevent a flow of gas (from a gas leak or other foreseeable event) moving into the driver / passenger compartment. Where practical, the bulkhead should be of suitable strength to protect the driver / vehicle crew from possible impact from cylinders or equipment if they become unshipped.

The installation of the associated pressure systems / equipment on the vehicle shall be carried out by competent gas installers to meet all statutory legislation, design codes, British Standards, Industry documents, etc. Installed pressure systems should be readily accessible for periodic examination, inspection and maintenance, as well as for removal (if required), refer to Section 6.2.

For information on installing pipework refer to:

- BS EN 1949 ^[10], *Specification for the installation of LPG systems for habitation purposes in leisure accommodation vehicles and in other vehicles.*
- BS 5482 ^[11], Part 2, *Domestic butane and propane gas burning installations. Installations in caravans and non-permanent dwellings.*
- BCGA CP 4 ^[14], *Gas supply and distribution systems (excluding acetylene).*
- Liquid gas UK CP 22 ^[20], *Design, installation and testing of LPG piping systems.*

For the storage of gas cylinders, refer to Section 5.3.

For large ‘walk-in’ load compartments or containments, the doors should be capable of being opened from the inside (unless another method of allowing emergency egress is provided). These doors should have an appropriate device installed to allow them to be secured in the open position (for when access / egress is required).

Control of ignition sources. Where flammable or oxidising gases are being carried designers and operators should assess the risk of operating any equipment which may be a source of ignition. Electronic security fobs shall not be used, as the electrical / electronic energy from such a device and its receiver may be sufficient to ignite gases or vapours present in the vehicle.

Ventilation. Enclosed spaces which gases could enter should be avoided. In any event any enclosed spaces shall have adequate ventilation. The use of roof ventilators (preferably a roof spinner) along with floor and side vents will increase the quantity of ventilated air within an enclosed space. The use of forced (powered) ventilation should be considered.

Ventilation inlet and outlet vents shall not be located near any potential sources of contamination or excessive heat, for example, engine exhaust systems, fuel tank breathers, etc. The design shall ensure that an adequate free airflow is available to all internal spaces when the vehicle is stationary.

NOTE: Modern vehicle designs tend to have good quality sealing and are less likely to benefit from natural ventilation as experienced with some older types of vehicle.

The use of atmospheric monitoring equipment should be considered, refer to BCGA GN 11 [15].

For the carriage of solid carbon dioxide (dry ice) refer to Section 5.4.

5.1 Mobile workshops

Mobile workshops may contain gas cylinders or substances for specific work processes either on or in near proximity to the vehicle. These processes could involve welding, testing, laboratory functions, messing and washing, etc.

Unless specific design provision are included to ensure that it can take place safely, hot work (for example, welding, cutting, burning, etc.) or cold work should be performed remotely from and outside the vehicle.

Conduct a risk assessment for any hot work (or cold work) proposed to take place on or in the vehicle. The risk assessment shall take into account:

- the suitability of the proposed activity in the specific work environment;
- competence of those involved;
- specific hot / cold work considerations (nearby features which may be affected by temperature, heat ranges, heat dissipation, cooling times, risk of fires, injury risks etc.);
- ventilation, including requirements for forced air ventilation;
- atmosphere monitoring requirements (for example, with appropriate gas detector(s));
- those nearby (including equipment, structures, vehicles, etc.) who may be affected;
- requirements for dynamic risk assessment and review, in response to local circumstances and events;
- emergency plans, for example, fire management, location and availability of extinguishers, exit routes, etc.

5.2 Special site service vehicles

Special site service vehicles are designed with permanent cylinder installations which supply appliances or equipment fitted within them, for example, to provide cooking,

heating or lighting facilities at remote locations. The gas generally used on such vehicles is LPG.

Where LPG is in-use refer to publications provided by Liquid Gas UK, for example, Liquid gas UK Code of Practice (CP) 24 ^[21], Part 3: *Use of LPG Cylinders: Use of LPG for commercial catering events, street food and mobile catering.*

For installed cylinders, the cylinder operating valve shall be readily accessible, to allow operation and to enable the gas source to be isolated from the distribution system.

For emergency shut-off, a single actuated valve should be provided adjacent to the gas source.

Appliances shall be manufactured to the appropriate legislation and standards and be installed in accordance with the manufacturers' instructions. Each appliance:

- should have a gas isolation valve which will isolate it from the gas supply;
- shall be fitted with a suitable flame supervision device.

Gas fuelled appliances shall not be lit during transit. Where appliances are required for use then an alternative method for providing power should be used, for example, an electrical supply from the vehicle system or a battery.

Adequate ventilation to the vehicle interior shall be provided, taking account of the properties of each gas, refer to Section 3. Interior ventilation should be equally divided between high and low level with ventilators of fixed and non-adjustable type. Where the interior is divided into compartments the ventilation requirements shall apply to each compartment.

Where a fuel gas is to be burned, the ventilation shall be adequate to allow for complete combustion of the fuel. Where practical, balanced flue appliances should be installed.

The use of atmospheric monitoring equipment, for example, to monitor for carbon monoxide when burning a gas, should be assessed.

5.3 Gas cylinder storage

For carriage, in order of preference, gas cylinders should be transported:

- (i) on an open vehicle or open trailer attached to the vehicle;
- (ii) in an enclosed vehicle, where the load is separated from the driver and passenger compartments by a gas tight partition bulkhead. The load space shall be well ventilated.

Mobile workshops and service vehicles shall not be designed such that gas cylinders are transported in the same space as people.

Gas cylinders will require replacement on a regular basis. The vehicle design and the location of the cylinders shall allow safe means for the movement of cylinders on and off

the vehicle, taking into account the use of mechanical handling aids, manual handling, etc.

Gas cylinders should be located in a dedicated compartment or containment area. This area should be constructed to provide a minimum of 30 minutes' fire resistance in accordance with BS 476 ^[9]. Separate compartments may be necessary depending on the properties of the gases being carried, i.e. compressed gases, flammable, corrosive, etc.

Individual gas cylinders (whether in-use, empty or spare) shall be secured into a dedicated stowage. The stowage shall be secured to suitable 'strong points' on the vehicle. The stowage shall be designed such that the cylinder can be locked into position and will not move during the journey (taking into account the increased forces created, for example, during breaking, acceleration, turning, etc.) or when in service. The stowage should allow the cylinder to be positioned in the manner recommended by the Gas Supplier, usually this will be vertically upright with the valve at the top.

LPG, and other liquefied and dissolved gases, for example, acetylene, shall always be in a vertical position (with the valve at the top).

NOTE: There are specific exemptions. When in use some cylinders are designed to be positioned horizontally, for example, LPG cylinders providing a fuel for fork lift trucks.

The cylinder stowage shall be located such that:

- the cylinder and valve do not project beyond the sides, top or ends of the vehicle;
- the cylinder and / or valve will not come into contact with any objects during the journey that may cause damage or may be the cause of a gas leak;
- it is not near 'hot' equipment on the vehicle, for example, engines, exhausts, etc.;
- it is located away from sources of ignition;
- cylinders are segregated from other dangerous goods and any items which may impact on the gas cylinders, or cause them to become contaminated, for example, by paints, oils and greases.

Each cylinder stowage should be identified with the name of the gas contained in the gas cylinder.

For LPG cylinders, also refer to Liquid Gas UK CP 27 ^[22], *The carriage of LPG cylinders by road & hazard information labelling requirements*.

5.4 Carriage of solid carbon dioxide

Where carbon dioxide in solid form (dry ice) will be regularly carried the vehicle should be designed for this purpose with protection provided to prevent damage to the vehicle structure.

In all cases, dry ice in its unpackaged form shall not be allowed to come into direct (or close indirect) contact with the metal structure of a vehicle or container; as its cold temperature may cause embrittlement of the metal. Measures shall be taken to provide adequate insulation between the dry ice and the vehicle or container to protect surrounding structures. A minimum of 30 mm separation shall be provided, for example, by using suitable low heat conducting materials such as timber planks, pallets, etc.

Where dry ice is to be placed around packages, measures shall be taken to ensure the packages remain in their original position after the dry ice has dissipated (through sublimation). The dry ice will sublime and carbon dioxide gas will be released. Any packaging and the surrounding area shall permit the release of this carbon dioxide gas.

5.5 Access to gas cylinder compartments

Access to all cylinder compartments shall be safe and should be from the outside of the vehicle.

The location of any emergency shut-off valves shall be clearly indicated. Each emergency shut-off valve shall be operable from outside of the compartment and shall be safely operable. Operating instructions, which shall be clear and legible, shall be located next to each emergency shut-off valve.

Appropriate warning signs and hazard labels should be displayed in a visible location, for example, on the external side of the gas cylinder compartment, on doors, etc. These shall be positioned so they can easily be seen by persons working near, accessing, opening or entering the compartment.

ADR ^[8] requires that where dangerous goods, for example, dry ice, nitrogen refrigeration systems etc., are used for cooling or conditioning purposes in a space that is not-well ventilated, the Warning Sign in Figure 1 shall be displayed, along with the appropriate identification of the coolant / conditioner being used.

Due to the potential asphyxiation hazard, signage should indicate a specified time lapse between opening doors and entering an enclosed compartment.

For further information on the carriage of dry ice refer to BCGA TIS 7 ^[18], *Guidelines for the safe transportation, storage, use and disposal of dry ice products*.



Figure 1:
Coolant / conditioning
warning mark

5.6 High pressure systems

High pressure connections on cylinders or installations should be located external to the vehicle. Suitable safety devices (non-return valves, flashback valves, flame arrestors, etc.) should be fitted as necessary to cylinder equipment and manifold / pipework systems. All relief devices should be arranged to vent to a safe location off the vehicle, taking account of the possible presence of persons, crew, maintenance technicians (including vehicle mechanics), etc. The vent pipe should be labelled and identified, if required to meet the requirements of safety in all foreseeable circumstances.

5.7 Fire control equipment

ADR ^[8] requires that one, or more, fire extinguisher(s) is carried on all vehicles carrying dangerous goods. The fire extinguisher(s) shall be kept in good working order, be in-date for testing, be protected against the effects of the weather and be easily accessible to the vehicle crew. The crew shall be competent in their use.

In addition to the ADR ^[8] requirement, the workplace fire safety risk assessment may require the provision of other fire-control equipment. This might include fire extinguishers of different quantity, capacity and type suitable for use in fires involving the gases and substances intended to be carried. Other fire protection equipment, for example, fire blankets, alarm systems, sprinkle systems, etc., should also be considered.

Emergency procedures shall be in place and drivers / vehicle crew shall be trained in the correct actions to take in the event of an incident or emergency.

6. IN-SERVICE REQUIREMENTS

Drivers should be made aware of the effects that the carriage of gas cylinders and other equipment may have on vehicle weight distribution.

There shall be no smoking (including the use of electronic cigarettes) and no naked flames allowed either within or close to the vehicle during transit, or when loading or unloading the vehicle. Burners on appliances shall not be alight during transit, alternative provisions for a power supply should be provided, refer to Section 5.2.

Before the start of the journey:

- check each gas cylinder is secure in its stowage;
- all cylinder valves shall be closed. There may be specific exemptions, for example, in emergency vehicles, for cooling systems or when transporting livestock, such as live fish;
- once closed, cylinder valves shall be checked for leaks (gas tightness). Check for leaks with an approved leak detection fluid;
- all equipment should be disconnected at the cylinder valve outlet. If the cylinder is not connected, then suitable protective valve caps and covers should be fitted, where supplied, to both the cylinder valve outlet and the associated equipment inlet;

NOTE: In addition to providing protection during transport, caps and covers help prevent contaminants, such as moisture and dirt, from gathering in the openings.

Where it is necessary to have equipment connected to a gas cylinder (refer to the exemptions listed above) then the cylinder shall be secured as detailed in Section 5.3. All equipment connected to the cylinder shall itself be secured such that it cannot impose undesirable forces on the cylinder, hose or its valve during the journey;

- to prevent gas leakage from associated pressure systems and equipment, every item downstream of the gas cylinder should be safely depressurised and any gas safely released, with the area thoroughly ventilated on completion.

If a vehicle is parked, left stationary or unattended, extreme care shall be taken before any person re-enters the vehicle. The vehicle shall be fully ventilated before anyone enters and the engine shall not be started until ventilation is completed. The location of the vehicle should not be near sources of ignition, for example, areas where the public may be smoking!

For vehicle equipment operation, refer to Section 6.1.

For vehicle equipment maintenance, refer to Section 6.2.

6.1 Vehicle equipment operation

Clear operating instructions, relevant safety information and statutory notices shall be available or posted in or on the vehicle, for operators and users. This, in combination with other information, instruction, training and supervision provided by the Employer shall ensure the crews safety, the safety of others and the safety of the vehicle.

Appliances shall be operated in line with their manufacturer's instructions.

Before use, check that all the connections are tight. Open the cylinder valve slowly and gradually while you re-pressurise the gas system. Check for leaks with an approved leak detection fluid.

WARNING: Any equipment which uses a naked flame, for example, catering equipment, shall not be left unattended when in use.

The use of carbon monoxide atmospheric monitoring equipment is strongly recommended where combustion is taking place.

After use, close all valves and, as applicable, ensure all flames are extinguished. Check for leaks from the gas cylinder / valve with an approved leak detection fluid. Every item downstream of the gas cylinder should be safely depressurised and any gas safely released, with the area thoroughly ventilated on completion. Isolation valves should be placed in the closed position.

6.2 Vehicle equipment maintenance

Planned maintenance programmes, in compliance with *The Provision and Use of Work Equipment Regulations* (PUWER) ^[4], shall be designed and implemented for the installations and equipment provided with the vehicles, including items fitted inside. Suitable written maintenance records shall be kept.

NOTE: The requirements of the *Pressure Systems Safety Regulations* ^[5] do not apply. Vehicles used on a public road are excluded under Schedule 1, Part 1.

Planned inspections are a vital part of *PUWER* ^[4] and a preventative maintenance programme. These may include pre-use, daily or other periodic safety checks carried out by drivers, other crew members and specialists with regular maintenance inspections based on time or mileage. Action shall be taken to rectify any safety faults and a formal

assessment shall be made to determine whether or not the equipment requires removal from service pending fault rectification.

Drivers should be provided with a list of the daily checks to be signed off at the start of each shift. This should be managed to ensure the checks are carried out properly.

Records of all safety inspections and maintenance carried out shall be kept for a minimum of 15 months.

7. INFORMATION, INSTRUCTION, TRAINING AND SUPERVISION

The driver and vehicle crew shall comply with the *Road Traffic Act* ^[2]. Vehicle crew should be competent to operate a vehicle safely and shall receive appropriate information, instruction and training for the vehicle(s) and equipment that they use, including its inventory and any specific characteristics. Adequate equivalent briefings shall be given to all other personnel working on, or operating these vehicles.

All drivers within the scope of ADR ^[8] shall have security awareness training, refer to ADR ^[8], 1.10.

Competence should include basic knowledge of the gases being carried on the vehicle, their implications for safety as well as the actions to take in an emergency. Training records should be kept and re-training carried out in line with a structured programme, for example, from time to time, following an incident, when changes are made, when crew members change, when new vehicles are adopted, etc.

Drivers of vehicles within the scope of the *Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations* ^[7] and ADR ^[8] shall receive appropriate training, including for:

- a) Vehicles carrying gas quantities above the threshold level defined in ADR ^[8], to be fully compliant with the requirements of ADR ^[8], including have attended a training course and successfully completed an examination, both approved by the UK Competent Authority (Department for Transport). The examination shall be appropriate to the class or classes of goods which are to be carried on the vehicle. Upon successful completion of the examination the driver shall hold a Driver Training Certificate as required in ADR ^[8].
- b) Vehicles carrying gas quantities below the threshold level defined in ADR ^[8]: Product hazards and emergency action, knowledge of the *Health and Safety at Work etc. Act* ^[1] and requirements of the *Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations* ^[7] and ADR ^[8].

Clear instruction and information should be provided and displayed to ensure the safety of the vehicle and occupants at all times whether in transit or at the work location. This shall include:

- emergency procedures;

- any necessary information in relation to safety equipment, for example, fire extinguishers;
- any necessary information in relation to egress routes or arrangements, refer to Section 5.1;
- any special instructions or information for operation of specific parts of the vehicle and equipment, for example, workshop equipment, laboratory, heating or cooking appliances, etc.

In all cases, the relevant Instructions in Writing as defined in ADR ^[8], Section 5.4.3, shall be carried whenever a journey in scope of ADR ^[8] takes place.

Other people, such as employees (not directly involved with the vehicle), contractors and members of the public, may have access to the workplaces where these vehicles operate or where they may be located. Access to the vehicles should be restricted to those authorised to access or use the vehicle. Where necessary suitable vehicle and traffic management arrangements should be put in place, such as:

- the control of pedestrian access;
- the separation of people from vehicles;
- the control of vehicle movements;
- the control of activities on-site;
- specific site, inventory and vehicle security plans.

8. EMERGENCY PROCEDURES

The correct location of cylinders, the correct assembly of equipment and their correct operation (as detailed in this code) will all contribute to minimising the risk of an incident involving gas cylinders.

Vehicles, by definition, contain fuels (petrol, diesel, LNG, etc.). The operator shall ensure that a regularly reviewed Fire Safety Risk Assessment is in place for the vehicle and all associated workplaces (including mobile workplaces). Adequate fire control measures shall be in place (including appropriate fire control equipment), particularly where flammable and oxidising gases are in use.

8.1 Incidents involving gas escapes

The leakage of product from cylinders or their fittings may occur. The User shall have in place a procedure for managing leaks. If a gas leak occurs in the presence of a competent operator, and if it is safe to do so, they should stop it by turning off the cylinder valve, then thoroughly ventilating affected spaces.

8.2 Incidents resulting in a fire

If a gas leak ignites then operators should follow the guidance derived from their fire risk assessment and the procedures developed from the assessment.

The general advice that can be offered is:

- assess if it safe to remain. If not, clear the area immediately and follow the ‘Key actions for dealing with gas cylinders involved in a fire’, below;
- work on a ‘people first’ basis, and get people clear and keep them away. Do not encourage people to tackle fires. Stay away and leave it to the experts;
- only attempt to attend the fire if it is safe to do so or if it is necessary to do so to facilitate escape;
- if your assessment says it is safe to attempt it, gas cylinder fires may sometimes be extinguished by turning off the cylinder valve and isolating the cylinder. If in doubt. Stay away from the fire.

Key actions for dealing with gas cylinders involved in a fire:

- **KEEP AWAY**, do not approach or attempt to move the cylinder or open the valve.
- Raise the alarm.
- Evacuate the immediate area and keep others away.
- Contact the Fire & Rescue Service.

Inform the Fire & Rescue Service of the gases involved, their location and the quantity of gas cylinders involved in the fire. Inform them of other gas cylinders that may be in the vicinity.

If it is safe to do so (that is it is safe to proceed without going anywhere near the fire, heat or fumes), cylinders which are not involved in the fire and which have not become heated, may be moved as quickly as possible to a place of increased safety. Make sure that cylinder valves are closed.

Do not approach the location of the fire until it has been declared safe to do so by the Fire & Rescue Service.

Contact your gas supplier to recover any heat-damaged or fire-damaged cylinders. Do not attempt to use any such cylinders.

For further information, refer to BCGA Leaflet 6 ^[19], *Cylinders in fires*.

9. SECURITY

Security measures or precautions shall be taken to minimise theft or the misuse of dangerous goods.

NOTE: The gas-containing element of your vehicle may only represent a minor aspect of your security vulnerabilities and considerations. Workshop and laboratory equipment, for example, may be much more attractive to thieves.

ADR ^[8], Chapter 1.10, has specific security requirements.

Security provisions shall be risk assessed and shall be applied at all times, especially during the times when the vehicle is in a public area or on a public highway.

Additional advice on security is available from the BCGA.

10. REFERENCES

Document Number	Title
1.	Health and Safety at Work etc. Act 1974
2.	The Road Traffic Act 1988 (as amended).
3. SI 1986 No. 1078	The Road Vehicles (Construction and Use) Regulations 1986 (as amended).
4. SI 1998 No. 2306	The Provision and Use of Work Equipment Regulations 1998 (PUWER)
5. SI 2000 No. 128	The Pressure Systems Safety Regulations 2000.
6. SI 2002 No. 2677	The Control of Substances Hazardous to Health Regulations 2002 (COSHH) (as amended).
7. SI 2009 No. 1348	The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations, 2009 (as amended).
8. ECE/TRANS/275	European Agreement concerning the international carriage of dangerous goods by road (ADR) (as amended).
9. BS 476: Parts 20-23	Fire tests on building materials and structures.
10. BS EN 1949	Specification for the installation of LPG systems for habitation purposes in leisure accommodation vehicles and in other vehicles.

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| 11. | BS 5482
Part 2 | Domestic butane and propane gas burning installations.
2. Installations in caravans and non-permanent dwellings. |
| 12. | HSE HSG 136 | A guide to workplace transport safety. |
| 13. | HSE INDG 199 | Workplace transport safety. A brief guide. |
| 14. | BCGA Code of
Practice 4 | Gas supply and distribution systems (excluding acetylene). |
| 15. | BCGA Guidance
Note 11 | The management of risk when using gases in enclosed workplaces. |
| 16. | BCGA Guidance
Note 27 | Guidance for the carriage of gas cylinders on vehicles. |
| 17. | BCGA Guidance
Note 35 | Vehicle selection and transport management. |
| 18. | BCGA Technical
Information Sheet 7 | Guidelines for the safe transportation, storage, use and disposal of dry ice products. |
| 19. | BCGA Leaflet 6 | Cylinders in fires. |
| 20. | Liquid Gas UK
Code of Practice 22 | Design, installation and testing of LPG piping systems. |
| 21. | Liquid Gas UK
Code of Practice 24
Part 3 | Use of LPG cylinders.
3. Use of LPG for commercial catering events, street food and mobile catering. |
| 22. | Liquid Gas UK
Code of Practice 27 | The carriage of LPG cylinders by road & hazard information labelling requirements. |

Further information can be obtained from:

UK Legislation	www.legislation.gov.uk
Health and Safety Executive (HSE)	www.hse.gov.uk
British Standards Institute (BSI)	www.bsigroup.co.uk
European Industrial Gases Association (EIGA)	www.eiga.eu
International Organization for Standardization (ISO)	www.iso.org
British Compressed Gases Association (BCGA)	www.bcgaco.uk
Liquid Gas UK (The UK LPG trade association)	www.liquidgasuk.org



British Compressed Gases Association

www.bcgga.co.uk