



BRITISH COMPRESSED GASES ASSOCIATION

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CODE OF PRACTICE 50

The carriage of gas cylinders on vehicles

2023



Department
for Transport



CODE OF PRACTICE 50

THE CARRIAGE OF GAS CYLINDERS ON VEHICLES

2023

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Website:
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ISSN 2398-9440

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.

This document has been prepared by BCGA Technical Sub-Committee 4. This document replaces BCGA Guidance Note 27: Revision 2: 2017. It was approved for publication at BCGA Technical Committee 169. This document was first published on 10/10/2023. For comments on this document contact the Association via the website www.bcgga.co.uk.

JOIN US: BECOME A BCGA MEMBER

The British Compressed Gases Association (**BCGA**) is the leading UK Trade Association representing the interests the industrial, food and medical gases industries, whose members include manufacturers and suppliers of bulk liquid and cylinder gases, cylinders, vessels, tanks, pipework, systems, related equipment and providers of specialist safety, health, quality, inspection and training services.

There are currently three categories of BCGA Membership designed to reflect the needs of the gases industry. These are:

Full Membership

For companies or individuals who have any practical involvement in the manufacture, mixing, handling, sales, distribution, storage or transportation of industrial, food and medical related gases or equipment.

Associate Membership

For companies or individuals who have no practical involvement (as noted in Full Membership), and is therefore for designers, consultants, training providers, academics, interested individuals involved with the industry, other associations or simply those that regularly use gases in their work environment.

Start-up Scheme

The start-up scheme is designed to support young companies, who are in the early years of their business, working in the gases industry.

As a member you'll have access to a wide variety of benefits and services to help you develop your company including:

- Certificate of Membership;
- Information about all the latest news and updates in our industry;
- The opportunity to influence oncoming regulation and guidance produced by Government;
- The opportunity to be involved in developing standards (BS EN ISO) for our industry;
- The opportunity to shape the future direction of our industry;
- Technical advice;
- Interaction with other members;
- The right to attend any of our Technical Sub-Committees;
- Access to all BCGA publications;
- The opportunity to be involved in writing BCGA publications;
- Being able to attend the BCGA Conference at Member rates;
- Appropriate listings on the BCGA website;
- Use of BCGA logo.

Becoming a BCGA member couldn't be easier. Simply download and fill in the membership application and turnover declaration forms on our website, under '**Membership**'.

If you have any questions email: admin@bcga.co.uk

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* Throughout this publication the numbers in ^[1] brackets refer to references in Section 13. Documents referenced are the edition current at the time of publication, unless otherwise stated.

Where websites and webpages have been cited, they are provided for ease of reference and are correct at the time of publication. The location of a website and webpage, and their

contents, cannot be guaranteed. BCGA is not responsible for the content of referenced websites.

TERMINOLOGY AND DEFINITIONS

Consignor	The entity, for example, the individual or company, responsible for placing the load onto the vehicle.
Cylinder	A pressure receptacle of a water capacity not exceeding 150 litres.
Driver	The individual responsible for driving the vehicle.
Employer	The entity that employs individuals under a relevant contract and sets employment terms to perform any required work activities.
May	Indicates an option available to the user of this Code of Practice.
Operator	The entity, for example, the individual or company, responsible for the movement of the load on the road.
Pressure receptacle	A transportable receptacle intended for holding substances under pressure including its closure(s) and other service equipment and is a collective term that includes cylinders, tubes, pressure drums, closed cryogenic receptacles, metal hydride storage system, bundles of cylinders and salvage pressure receptacles.
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.

CODE OF PRACTICE 50

THE CARRIAGE OF GAS CYLINDERS ON VEHICLES

1. INTRODUCTION

Gases are hazardous. For transport, gases need to be packaged correctly to ensure they are safe for transport. Gas cylinders are commonly used and many thousands are transported every day without incident. To ensure gas cylinders are safe for transport there is specific legislation in place, as well as supporting guidance. This Code of Practice references the appropriate legislation and sets out best practice for the carriage of gas cylinders.

All vehicles and their Drivers operating on the public highway, shall comply with the *Road Traffic Act* ^[1]. The *Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations* ^[5] sets the legal framework for the transport of dangerous goods in Great Britain for work purposes, implementing the *Agreement Concerning the International Carriage of Dangerous Goods by Road* (ADR) ^[8].

ADR ^[8] provides a legal framework for dangerous goods carriage through compliance with standards for packaging and labelling, and appropriate construction and operating standards for the vehicles and crew. Gases are classified as Class 2 dangerous goods.

These Regulations are in force to protect everyone either directly involved, or who might become involved in the carriage of dangerous goods (such as members of the emergency services and the public), as well as the environment.

The information in this Code of Practice also provides useful safety advice for private individuals who are exempt from the provisions of ADR ^[8] when they are carrying small quantities of gas cylinders for personal, domestic, leisure or sporting use.

The content of this publication is in line with advice from the *Department for Transport* (DfT).

2. SCOPE

This Code of Practice provides guidance on safely transporting gas cylinders in compliance with the *Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations* ^[5]. It includes a method for calculating the threshold level for a small load exemption based on the quantity of gas cylinders being carried.

Where there may be a demand to transport cylinders which may not be in accordance with the requirements of the *Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations* ^[5] further advice is available in BCGA GN 36 ^[28], *Guidance for the use, inspection and transport of cylinders with various design codes*.

Whilst the information in this document may be used when transporting liquefied petroleum gas (LPG) cylinders, further advice is available within Liquid Gas UK Code of Practice 27 ^[39], *The carriage of LPG cylinders by road & hazard information labelling requirements*.

Gases being transported in an emergency vehicle, for example, an ambulance or fire engine, or the carriage of medical oxygen by patients who need it for their treatment during the journey, or medical and para-medical staff where it is carried as part of a 'ready to use' set, are outside the scope of this Code of Practice. However, there is still a requirement to carry cylinders

safely and securely, and to prevent leakage. Advice is available in BCGA Leaflet 13 ^[36], *Medical oxygen in a vehicle*.

3. GENERAL REQUIREMENTS

Gases and their containers are classified as dangerous goods. The carriage of dangerous goods shall comply with the *Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations* ^[5] and ADR ^[8]. Everyone involved in the carriage of dangerous goods, in the course of their work, shall have the necessary competence to enable them to carry out their responsibilities and duties, including compliance with their legal duties and to ensure the safety of the dangerous goods during loading, unloading and carriage.

In terms of the division of responsibility for the vehicle and its load, there are three key duty holders under these Regulations:

- the Operator;
- the Driver;
- the Consignor.

Depending on the exact composition of the transport chain, all three of these roles may be filled by one individual, or there may be multiple Consignors if, for example, a vehicle load is changed at various sites.

The Operator of the vehicle shall ensure there is appropriate insurance cover for the vehicle. The Operator should advise the Insurance provider that the vehicle is used for the carriage of dangerous goods.

Whilst the Driver is responsible, when in charge of the vehicle, for the safety of the vehicle and any load being carried from a road safety and a general safety perspective, there are also legal duties on the vehicle Operator and on the Consignor(s) of the dangerous goods (for placing the load on the vehicle). Advice is available in BCGA GN 35 ^[27], *Vehicle selection and transport management*.

All persons involved in the carriage of dangerous goods shall have received appropriate training in the hazards, properties and dangers of the dangerous goods. Each gas cylinder shall have a product identification label which identifies its contents, as well as basic safety information on the hazard(s) associated with the product. Detailed information shall be available in the Safety Data Sheet, including advice on transportation. For additional advice refer to the gas supplier.

NOTE: A Safety Data Sheet is not required for medical gases.

For all journeys, all persons involved shall ensure compliance with the basic legal and safety requirements in Section 4.

BCGA Technical Information Sheet 49 ^[33], *Risk assessment considerations for activities involving compressed gas cylinders within the workplace*, can assist when identifying and managing the hazards associated with gas cylinders.

Gases in cylinders may be in compressed, liquefied or dissolved form. The cylinders may vary in weight, size and shape. These physical characteristics mean that cylinders can be

unstable and present potential manual handling hazards. Before carrying out any manual handling activities the Employer shall ensure appropriate risk assessment has been carried out and suitable handling aids and competence standards are in place, for further information refer to Section 10.2.

All persons involved in the carriage of dangerous goods have to comply with the full requirements of ADR ^[8] unless:

- the activity is exempt (as detailed in ADR ^[8], Clause 1.1.3), for example, when private individuals carry dangerous goods, which are packaged for retail sale and are intended for their personal or domestic use or for their leisure or sporting activities. However, there is still a requirement to transport the dangerous goods safely, including taking measures to prevent leakage;
- the quantity of dangerous goods being carried meets the criteria of a small load exemption (ADR ^[8], Clause 1.1.3.6. *Exemptions related to quantities carried per transport unit*). This requires that certain essential safety requirements are followed in line with Section 5.

When loading a vehicle, the Operator, Consignor and Driver shall determine whether the load being carried is above or below the small load exemption threshold level. One way to determine the threshold level is to perform the threshold quantity calculation (refer to Section 6).

A nominally empty cylinder containing residual gas (empty unclean) shall be treated as a full cylinder for all safety and legal purposes and is subject to all relevant legislation provisions.

Additional advice is available from the *European Industrial Gases Association* (EIGA) through their series of Transport Safety Information Leaflets and from Safety Leaflet 3 ^[18], *Safe transport of gas*.

Dangerous goods may be carried by transport modes other than road, including multi-modal journeys. Where dangerous goods are being transported by modes other than road, compliance is required with:

- for rail: with the *Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations* ^[5] which implement the Convention concerning International Carriage by Rail (COTIF) Appendix C Regulations; *The International Carriage of Dangerous Goods by Rail*, (RID) ^[9].
- for air: with the *International Civil Aviation Organization* (ICAO), Technical Instructions ^[11]. In practice, this requires compliance with the *International Air Transport Association* (IATA), *Dangerous Goods Regulations* ^[12].
- for sea: with the *International Maritime Organisation* (IMO), *International Maritime Dangerous Goods* (IMDG) Code ^[10].

4. BASIC LEGAL AND SAFETY REQUIREMENTS

All persons involved in the transport of gas cylinders shall comply with these basic legal and safety requirements:

Competence. All persons shall have the necessary competence (including knowledge, skills and experience) to carry out their job safely. They shall receive appropriate information, instruction, training and supervision. This should include induction and refresher sessions, as required. It is the duty of the Employer to ensure their persons are competent. It is recommended that a training programme with a competency assessment is carried out under a formalised system. Records shall be kept of the information, instruction, training and supervision provided and of the competence level achieved.

General recommendations for the training of personnel are described in EIGA 23 ^[14], *Safety training of employees*. BCGA GN 23 ^[26], *Gas safety. Information, instruction and training*, provides guidance on the minimum knowledge required for the safe interaction of personnel with industrial, food and medical gases.

Drivers shall be competent to drive the vehicle and be familiar with the general requirements for the carriage of dangerous goods. ADR ^[8], Chapter 1.3, requires that all persons involved in the carriage of dangerous goods shall be trained in the requirements governing the carriage of such goods appropriate to their responsibilities and duties. The training shall include:

- the properties and hazards of each gas and its container.

NOTE: Information is provided on the product identification label, on the Safety Data Sheet and can be obtained from the gas supplier;

- the safe handling of gas cylinders, refer to Section 10.2;
- security training, in compliance with ADR ^[8], Chapter 1.10;
- emergency procedures, including the use of fire control equipment. Refer to Section 11.

Inspection before loading a vehicle. Each cylinder shall be inspected by the Consignor before it is loaded onto a vehicle to ensure it is safe for transport. The inspection shall include the following checks:

- Damaged cylinders. Check the cylinder and its valve is in a good condition; it is clean, with no obvious damage or corrosion. Damage or corrosion to a gas cylinder or its valve might impair its safety. Cylinders that have been involved in a fire, shall not be transported. Seek advice from the gas supplier to determine a safe way of returning these cylinders;
- Cylinder valves. Check that the valve is closed. Cylinders should not be transported with additional equipment attached to the valve outlet; disconnect regulators, hoses, etc. Where available, fit suitable protective valve caps and covers to cylinders before transporting;

NOTE: Caps and covers provide protection during transport and may assist with gas containment, they also help prevent contamination, for example, from moisture and dirt, entering the valve outlet of the cylinder.

- Leaks. Check there are no leaks. Leaks are likely to originate from the valve area. Leaking cylinders shall not be transported;
- Inspection and test. Check the gas cylinder is in date for its (periodic) inspection and test. The date the last test was carried out is marked on the cylinder shoulder. The

next test date may be indicated by the use of plastic cylinder test date rings fitted between the valve and the cylinder. For examples of cylinder test date rings refer to BCGA TIS 6 ^[30], *Gas cylinder identification. Label and colour code requirements*;

Gas cylinders should only be transported if they are in-date for their (periodic) inspection and test. Cylinders may be transported after the expiry of the time-limit for the purposes of performing inspection or disposal, including the intermediate carriage operations.

NOTE: Cylinders may continue to be used on expiry of the inspection and test date.

- Product identification labels. Labels shall be attached to all cylinders by the Owner. Usually these are located on the shoulder of the cylinder. These identify the contents and provide safety advice. The labels are produced in accordance with contemporary legislation, and shall not be removed or defaced by unauthorised persons. For an example of a product identification label, refer to BCGA TIS 6 ^[30];

A nominally empty cylinder may be carried with obsolete or damaged labels for the purpose of returning the cylinder back to the gas supplier.

NOTES:

1. Product identification information may be reproduced on the body of the cylinder. This is common practice in the LPG industry.
 2. Cylinders may be colour coded. The use of colours is not mandatory, but can provide a useful guide to the contents. For advice on the use of colour codes refer to BCGA TIS 6 ^[30].
- Certification, retest and filling marks. These shall be legible.

Non-refillable cylinders. Non-refillable cylinders shall be carried in an outer packaging, such as a box or a crate, or in shrink-wrapped or stretch-wrapped trays in compliance with ADR ^[8], 4.1.6.9. Further information is available in BCGA TIS 28 ^[31], *Non-refillable cylinders*.

Selection of vehicles. Gas cylinders should be transported in open vehicles, open containers or trailers. Where, despite this recommendation, a non-open vehicle is considered, its use shall be subject to a risk assessment to assess if suitable controls can be provided, such as the inclusion of a gas tight bulkhead separating people, for example, the Driver, vehicle crew, passengers, etc., from the load. Unventilated enclosed spaces, including those which gases could enter, shall be avoided.

Toxic gases shall not be carried in a closed vehicle unless specifically designed for the purpose.

Gas cylinders can be heavy. Ensure the vehicle or trailer is suitable for the load and capable of taking the intended weight within the manufacturer's declared limits. This will help ensure suitable load compatibility, handling and braking.

For advice on the choice of vehicle, refer to BCGA GN 35 ^[27].

Ventilation. Good ventilation is required in all areas where gas cylinders are stowed, hence the recommendation to use open vehicles.

In all enclosed spaces, the use of roof ventilators along with floor and side vents may increase the quantity of ventilated air. Their use shall be based on risk assessment. This may be

sufficient in some cases to adequately ventilate a specific space, subject to the necessary controls. The risk assessment shall take into account ventilation requirements prior to any persons entering the vehicle, not just whilst the vehicle is in transit. Ventilation inlet and outlet vents shall not be located near any potential sources of contamination or excessive heat, for example, fuel tank breathers, engine exhaust systems, etc.

Where gas cylinders are stowed in an enclosed space, the vehicle design shall ensure that an adequate free airflow is available to all internal spaces when the vehicle is stationary. If a vehicle is parked, left stationary or unattended, extreme care shall be taken before any person re-enters the vehicle or uses an ultrasonic, radio frequency or other remote control device. The vehicle shall be fully and safely ventilated before anyone enters, or uses an access device, and the engine shall not be started until ventilation is completed.

NOTE: Modern vehicle designs tend to have good sealing arrangements and are less likely to benefit from natural ventilation through leakage than older vehicle types.

If an unventilated vehicle is used, despite the advice of this Code of Practice, one of the safety controls to be considered is marking of the cargo door(s) with the following notice:

**WARNING
NO VENTILATION
OPEN WITH CAUTION**

NOTE: The letters are to be a minimum of 25 mm high.

Gases used for cooling or conditioning. Where dry ice (UN 1845, Carbon dioxide, solid) or other gases are in use for cooling or conditioning, Consignors and Employers shall comply with the requirements of ADR ^[8], 5.5.3.

Secure cylinders. Cylinders shall be restrained so that they cannot move during transport. Where practical, cylinders should be secured in an appropriate pallet. They shall not project beyond the sides or ends of the vehicle.

Certain cylinders should only be carried and restrained in a vertical position, for example, liquefied gases which incorporate a relief device, such as LPG. This action will ensure the valves are uppermost allowing the relief device to connect with the vapour space inside the cylinder. For cylinders containing a dissolved gas, such as acetylene, a vertical orientation shall always be maintained which will prevent the escape of the liquid (acetone) in the event of a leak.

Where cylinders are transported horizontally (laid flat), they shall be laid parallel to or at right angles to the longitudinal axis of the vehicle (or container); however, those situated near the forward transverse wall shall be laid at right angles to that wall.

Short cylinders of large diameter (≥ 30 cm) may be stowed longitudinally with their valve-protecting devices directed towards the middle of the vehicle (or container).

NOTE: Other items in the vehicle should also be secured such that they do not come into contact with gas cylinders during the journey.

Temperature. No-one shall stow gas cylinders in areas where they will be affected by sources of excessive heat.

Ignition sources including smoking. All parties shall avoid any ignition sources. For example, enforce appropriate policies and operating discipline such as no smoking, no naked lights, no electronic cigarettes (or similar devices), etc., including during loading and unloading.

Fire extinguisher. Appropriate fire control equipment shall be carried in accordance with ADR ^[8], 8.1.4. Fire extinguisher(s) shall be kept in a serviceable condition, in-date for test, protected against the effects of the weather and be easily accessible to the vehicle crew. Vehicle crew members shall be competent to use the fire extinguisher(s).

Cleanliness. The areas on or within a vehicle where gas cylinders are stowed should be clean. Whether in transport or in use, do not allow gas cylinders to come into contact with dirt, pooled water, hydrocarbons, such as fuel, oil, grease, lubricants or other chemicals which could adversely affect a gas cylinder.

When the journey is complete. If enclosed vehicles are used, despite the recommendation of this Code of Practice, the gas cylinders should be immediately unloaded. No-one shall leave cylinders in an unventilated space. No-one shall park a vehicle loaded with gas cylinders in an enclosed area, for example, a garage, warehouse, etc.

Once removed from the vehicle, gas cylinders shall be located in a secure store in accordance with BCGA CP 44 ^[23], *The storage of gas cylinders*.

5. SMALL QUANTITIES

Gases may legitimately be transported in small quantities, for example, where one or two cylinders are transported for work activities. This still requires compliance with the Regulations, including ADR ^[8], and the basic safety and legal requirements detailed in Section 4.

A small quantity may meet the requirement of a small load exemption (under ADR ^[8] 1.1.3.6) which, if below the threshold, enables an exemption from some of the requirements within ADR ^[8], but still requires that certain essential safety requirements shall be followed.

To determine whether the load being carried is above or below the small load exemption threshold level, perform the threshold quantity calculation, refer to Section 6.

Documentation. For a small load exemption, Drivers do not need to carry documents with information on the load they carry (as detailed in Section 7.1), but in the event of an accident it may assist the emergency services if the Driver is able to provide appropriate information.

It may be useful for the Driver to have available the gas supplier's contact information. This will allow the Driver (or the emergency services) to contact the gas supplier and seek advice in the event of an incident, refer to Section 10 for advice on personal safety.

NOTE: The product Safety Data Sheet will have detailed information on each gas and the gas supplier.

Despite there being no strict legal requirement to carry the prescribed documentation, Consignors and Drivers are recommended to have it to hand in any case.

Fire extinguisher. A single fire extinguisher with a minimum capacity of 2 kg dry powder (or equivalent) shall be carried, in accordance with ADR ^[8], 8.1.4.2.

Vehicle hazard labels. For a small load exemption, do not display placards (250 mm hazard diamond) or orange plates on a vehicle. It is not necessary to label the vehicle, but the use of hazard labels (100 mm hazard diamond) can assist the emergency services. Once the dangerous goods are removed from the vehicle, all hazard labels shall be removed.

Ventilation. Where (against recommended advice) gas cylinders are carried inside a vehicle, in the same space as people, then a suitable and sufficient risk assessment and appropriate controls shall be implemented. These may include having the windows, sun-roof, etc. open to allow air to circulate. The vehicle ventilation system should be set to allow fresh air to enter (rather than to recirculate). The ventilation fan should be set to provide a high flow of air. Use appropriate atmospheric monitoring equipment, advice for this is available in BCGA CP 52 ^[24], *The management of risks from gases in the workplace*. The risk assessment shall take into account how the vehicle will be confirmed as safe, prior to persons entering the vehicle. All vehicle occupants shall receive appropriate information and instruction on the actions to take for health and safety in the event of an incident (refer to Section 11).

BCGA Leaflet 1 ^[34], *The carriage of small quantities of gas cylinders*, sets out the legal and basic safety requirements for transporting small quantities of gas cylinders on a vehicle whilst at work and provides sound advice if transporting gas cylinders for personal use.

BCGA Leaflet 17 ^[37], *Information for customers collecting gas cylinders*, provides advice for customers collecting gas cylinders from a gas supplier.

6. THE THRESHOLD QUANTITY CALCULATION

To calculate the threshold level of a load, carry out the following actions:

- Determine what **transport category** the gas being transported is in. Refer to Section 6.1.
- Determine the quantity of gas being carried for each category and translate this into **Points**. Refer to Section 6.2.
- **Use the correct calculation** for the load to identify whether it is above or below the threshold level. Refer to Section 6.3. If below the threshold level, comply with Section 5. If above the threshold level, comply with the full requirements of ADR ^[8], refer to Section 7. A worked example is set out in Section 6.4.

6.1 Transport categories

All gases have been assigned by ADR ^[8] into transport categories according to their hazardous properties. Table 1 shows the transport categories together with the corresponding hazard labels and provides examples of some of the gases in each category.

If there are two hazard labels, the label on the left hand side will indicate the primary category. For gases not listed and mixed gases, read the contents label on the cylinder and check the hazard label to determine the relevant category. Refer also to the Safety Data Sheet.

Transport category 4 refers to an empty cylinder. ADR ^[8], Clause 1.1.3.5 states that "... Classes 2 ... are not subject to the conditions of ADR if adequate measures have been taken to nullify any hazard." For a cylinder to be categorised as transport category 4, it shall contain no gas other than ambient air at atmospheric pressure. A nominally empty cylinder still contains residual gas (and shall be treated as a full cylinder) and will therefore come under transport category 1, 2 or 3 as appropriate.

Transport category	Hazardous property	UN Division	Examples of gases in category
1	Toxic	2.3	N/A
2	Flammable	2.1	Acetylene, hydrogen, propane, propylene.
3	Asphyxiant	2.2	Argon, carbon dioxide, compressed air, helium, nitrogen
	Oxidizing		Oxygen
4	Empty cylinders		



Transport category 1



Transport category 2



Transport category 3



Table 1: Transport categories.

6.2 Points

To determine the quantity of the gas in a cylinder the following rules apply.

Compressed gases	=	Water capacity of cylinder in litres
Liquefied gases	=	Nett mass of gas in kg
Dissolved gases	=	Nett mass of gas in kg

The water capacity is the amount of water the cylinder can theoretically carry, i.e. its basic volume or capacity.

The nett mass of the gas is the total mass of the gas contained in the cylinder, this excludes the mass of the cylinder and cylinder valve.

Each litre or kg carried represents a 'Point'. The Point is used in each load calculation.

6.3 The calculation

The calculation performed will depend on whether gases are transported from one category or a combination of categories.

For a load containing one transport category only:

$$\text{Points per cylinder} \times \text{Number of cylinders} = \text{Total load Points}$$

From Table 2 identify which limit applies to the load carried.

Transport category	Hazard label	Gas	Point limit
1	2.3	Toxic	20
1	2.3	Ammonia (UN 1005), Chlorine (UN 1017)	50
2	2.1	Flammable	333
3	2.2	Asphyxiant and Oxidizing	1000
4		Empty cylinders	Unlimited load exemption

Table 2: Point limits

For mixed loads:

For each category of gas carried there is an associated calculation. This calculation shall be performed for individual categories of gases; the Points for each category shall then be added together. There are five steps:

Step 1. Calculate the total of toxic gas Points (T Points)

$$\text{Points per cylinder} \times \text{Number of cylinders} \times 50 = \text{T Points}$$

Toxic gases are regarded as the most potentially hazardous gases, so the quantity allowed is only a fiftieth of the amount allowed for asphyxiant or oxidising gases. In mixed loads the toxic gas quantity is multiplied by 50 before it is added to the other categories.

Ammonia (UN1005) and chlorine (UN1017) have a special concession to be multiplied only by 20 (not 50).

Step 2. Calculate the total of flammable gas Points (F Points)

$$\text{Points per cylinder} \times \text{Number of cylinders} \times 3 = \text{F Points}$$

Flammable gases are considered more potentially hazardous than asphyxiant or oxidising gases so one third of the amount may be carried. To calculate for mixed loads, the flammable gas quantity is multiplied by 3 before it is added to the other gases.

Step 3. Calculate the total of asphyxiant / oxidant gas Points (A Points).

$$\text{Points per cylinder} \times \text{Number of cylinders} = \text{A Points}$$

Step 4. Calculate the total load Points value

$$\text{T Points} + \text{F Points} + \text{A Points} = \text{Total Points for mixed load.}$$

Step 5. Check whether the total is below or above 1000. If the total Points for a load is below 1000 then this meets the small load exemption threshold level and compliance is required with Section 5. If above 1000 Points, no small load

exemption applies and full compliance with ADR ^[8] is required. Section 7 has more information.

6.4 Example calculation

The load is one large propane cylinder (47 kg), one small argon / carbon dioxide cylinder (10 litres) and 2 large oxygen cylinders (50 litres).

This information is set out in Table 3.

The total number of points does not exceed 1000, therefore this load is below the small load exemption threshold level. Comply with Section 5.

Product	Cylinder size	Number of gas cylinders (a)	Points per cylinder (b)	Transport category	Multiplying factor (c)	Total Points (a) x (b) x (c)
Propane	47 kg	1	47	2	3	141
Argon / Carbon dioxide	10 litre	1	10	3	1	10
Oxygen	50 litre	2	50	3	1	100
Total points for load carried:						251

Table 3: Worked example.

7. FULL COMPLIANCE WITH ADR

For the carriage of dangerous goods above the small load exemption quantity threshold, all provisions of ADR ^[8] apply.

As well as the basic legal and safety requirements detailed in Section 4 there are several specific requirements for full compliance with ADR ^[8] without exception. These include:

- having the appropriate documentation, refer to Section 7.1;
- vehicle placarding and marking, refer to Section 7.2;
- additional equipment for specific types of dangerous goods, refer to Section 7.3;
- training commensurate with a person's responsibilities and duties, refer to Section 7.4;
- the appointment of a safety advisor, refer to Section 7.5;
- unauthorised passengers are prohibited on vehicles transporting dangerous goods;
- smoking is prohibited inside the vehicle and in the vicinity during loading and unloading;

- the vehicle engine shall be shut-off during loading and un-loading, unless it is necessary for the actual process;
- the vehicle crew shall not open any cylinder valves during the transport journey.

There are a range of publications which provide information for the carriage of gases. These include:

- EIGA 52 ^[15], *Load securing of Class 2 receptacles*, provides information for transporting individual gas cylinders, bundles, pallets of gas cylinders and cryogenic receptacles;
- BCGA CP 16 ^[19], *The movement of static gas storage tanks by road*;
- BCGA CP 29 ^[20], *Battery-vehicles and multiple-element gas containers. Design and operation*;
- BCGA CP 31 ^[21], *The safe storage and use of cylinders on mobile workshops and service vehicles*;
- BCGA CP 38 ^[22], *In-service requirements for refrigerated gas transportable pressure equipment*;
- BCGA GN 35 ^[27].

7.1 Documentation

At the start of each journey the Driver shall have in his possession:

- A transport document, with specific information on each dangerous substance being carried, as prescribed in ADR ^[8], Clause 5.4.1. This shall be kept for at least 3 months after the journey.
- Instructions in Writing, as specified in ADR ^[8], Clause 5.4.3. All four pages of the Instructions in Writing are required.

NOTE: Copies of the Instructions in Writing can be obtained from:

1. UK Department for Transport:
<https://www.gov.uk/government/publications/adr/adr-instructions-in-writing>
 2. United Nations Economic Commission for Europe (UNECE):
http://www.unece.org/trans/danger/publi/adr/adr_linguistic_e.html
- A current ADR ^[8] licence for the class of dangerous goods being carried and the mode of carriage (packages).
 - A means of photo identification. In the UK this may be a current ADR ^[8] licence or an ADR ^[8] Driver training photo card. This combines the requirement to provide the Drivers training certificate.

A certificate of approval for the vehicle carrying the dangerous goods may be required in accordance with ADR ^[8], Clause 9.1.3.

The gas supplier can provide all the necessary information for their products, including a Safety Data Sheet. It is useful for the Driver to have the gas suppliers' contact information. This allows the Driver (or the emergency services) to contact the gas supplier and seek advice in the event of an incident, emergency or concern. Refer to Section 10.

7.2 Vehicle placarding and marking

There are specific requirements for placards, marks and plate markings for carriage in Great Britain. Compliance is required with *The Carriage of Dangerous Goods and the Use of Transportable Equipment Regulations* ^[5], Schedule 1.

If transporting dangerous goods to other countries, compliance with the vehicle placarding and marking requirements of ADR ^[8] shall apply.

An orange plate shall be displayed at the front and rear of the vehicle in accordance with ADR ^[8], Clause 5.3.

Dangerous goods marking shall be removed or covered up if the vehicle is not carrying any dangerous goods.

NOTE: If covers are used they shall be effective for 15 minutes of fire engulfment.

7.3 Equipment

A range of additional equipment shall be carried on the vehicle. This will include any emergency equipment specified in the *Instructions in Writing*, taking note of the exemptions allowed in the footnotes, as described in Section 7.1.

Fire control equipment

All vehicles shall carry fire extinguishers as detailed in ADR ^[8], Clause 8.1.4. There are specific requirements for:

- vehicles with loads which meet the small load exemption, refer to Section 5;
- vehicles up to and including 3.5 tonnes gross vehicle weight.
- vehicles between 3.5 and 7.5 tonnes gross vehicle weight.
- vehicles above 7.5 tonnes gross vehicle weight.

NOTE: Whilst a dry powder extinguishant is common and is quoted as an example, an equivalent capacity for other suitable extinguishing agents may be used.

At least one wheel chock of a size suited to the weight of the vehicle and to the diameter of the wheels.

Two self-standing warning signs. Temporary warning signs which are compliant with the *Traffic Signs Regulations and General Directions* ^[6].

Portable lighting apparatus for each member of the crew, which shall not exhibit any metal surface liable to produce sparks.

Personal Protective Equipment. ADR ^[8] requires for each member of the vehicle crew, a warning (high visibility) vest, overall or jacket, a pair of protective gloves and eye

protection. If transporting Class 2.3 gases, an emergency escape mask shall also be available. For guidance on personal protective equipment refer to Section 10.1.

7.4 Training

All persons involved in the carriage of dangerous goods shall be trained commensurate with their responsibilities and duties.

Drivers of vehicles carrying dangerous goods shall have completed an approved training course, passed an approved examination and been issued an ADR ^[8] Training Certificate.

7.5 Dangerous goods safety adviser

Every organisation involved in the transport related activities of filling, packaging, loading or unloading dangerous goods for carriage shall appoint a safety adviser(s). The safety adviser is commonly referred to as the *Dangerous Goods Safety Adviser* (DGSA). The duties of a DGSA are set out in ADR ^[8], Chapter 1.8.

BCGA GN 45 ^[29], *Dangerous goods safety adviser*, provides advice on this topic.

8. ROADSIDE INSPECTIONS

The Police and the *Driver and Vehicle Standards Agency* (DVSA) routinely carry out roadside inspections on vehicles, their cargo and crew. Working with guidance from the DfT and the *Health and Safety Executive* (HSE) they are looking for breaches of legislation. Offenders may be prosecuted. Typically, they will be checking that:

- transport legislation has been complied with, including for the general condition of the vehicle;
- the vehicle is correctly placarded and marked for the carriage of dangerous goods;
- documentation is complete and available, refer to Section 7.1, and that the load matches the documentation;
- the load quantity and weight is appropriate for the vehicle and is evenly balanced across the load space;
- all goods are correctly identified;
- all goods are in a reasonable and safe condition; there is no obvious damage and no leaks;
- the load is secure;
- all additional equipment, for example, fire extinguishers, chocks, etc., is available and the Driver has the appropriate competence for their use.

The Inspectors will satisfy themselves that the Driver has received appropriate training, understands the hazards and knows what to do in an emergency.

9. GAS FUELLED VEHICLES AND FUEL LABELS

The Alternative Fuel Labelling and Greenhouse Gas Emissions (Miscellaneous Amendments) Regulations ^[7], have a requirement for road vehicles that are fuelled by an alternative fuel, such as hydrogen (H₂), LPG, compressed natural gas (CNG) and liquefied natural gas (LNG), for that alternative fuel to be identified by a label at the refuelling point. Examples of these labels are displayed in Figure 1. Gases carried as a source of fuel for a vehicle and their labels, are separate from and are not concerned with the carriage of dangerous goods legislation.



Figure 1: Alternative fuel labels

10. PERSONAL SAFETY

For guidance on:

- personal protective equipment, refer to Section 10.1;
- handling cylinders safely, refer to Section 10.2.

10.1 Personal protective equipment

A work activity risk assessment shall determine the requirement for the use of hazard controls, including, where necessary, for personal protective equipment (PPE).

Only after all other levels of control have been determined to be ineffective in controlling risks to a reasonably practicable level, should PPE be considered as a control.

Even with PPE, if the risk is not reduced to as low a level as is reasonably practicable, then the activity should not proceed.

HSE L25 ^[13], *Personal Protective Equipment at Work*, provides guidance on the *Personal Protective Equipment Regulations* ^[3]. EIGA 136 ^[16], *Selection of personal protective equipment*, provides guidance for selecting and using PPE at work.

Where PPE is required, a PPE assessment shall be carried out in accordance with the *Personal Protective Equipment Regulations* ^[3]. This shall be carried out by competent persons.

The selection of PPE shall be appropriate for the hazard, task, location and individuals.

PPE shall be provided by the Employer, along with the necessary information, instruction, training and supervision for its use. The Employer shall ensure that employees wear any PPE required.

Cleaning and maintenance (including its replacement) shall be included in the PPE management system. Suitable storage shall be provided for PPE when it is not in use.

The effectiveness of the PPE shall be reviewed periodically.

Emergency situations may require different or additional PPE.

Users shall take into account the requirements of other applicable Regulations, such as the *Control of Substances Hazardous to Health (COSHH) Regulations* ^[4], in relation to assessing risks, along with any relevant equipment publications, manufacturers information and the product(s) Safety Data Sheet.

NOTE: Any equipment that has a personal protective function is classified as PPE, for example, a personal atmospheric monitor.

There are specific requirements for PPE detailed in the *Instructions in Writing*, refer to Section 6.1.

Advice on working in a variety of different weather conditions is available in BCGA TIS 45 ^[32], *Guidance for the protection of vehicle crew working in all weather conditions*.

10.2 Cylinder handling

Gas cylinders can be awkward objects to handle safely due to their shape, weight, size and instability. Manual handling activities are a common cause of injury at work. Before any manual handling activities are carried out, the *Manual Handling Operations Regulations* ^[2] require that an assessment of manual handling operations is conducted and that any controls identified are implemented. Only those persons who have the necessary competence (including knowledge, skills and experience) shall handle gas cylinders.

The risk assessment should determine how the gas cylinders are loaded onto, and unloaded from, the vehicle.

Gas cylinder movements shall be controlled at all times, for example, they shall not be dropped from the vehicle onto the floor.

BCGA Guidance Note 3 ^[25] *Gas cylinder. Manual handling operations*, defines the principles of safe practice for handling and moving cylinders and provides a basic understanding of the *Manual Handling Operations Regulations* ^[2] relating to gas cylinders. Additional advice is available in BCGA Leaflet 18 ^[38], *Information for customers handling gas cylinders*.

11. ACTIONS IN THE EVENT OF AN INCIDENT

There are a number of foreseeable incidents which can be prepared for, these include:

- a gas leak, refer to Section 11.1;
- an incident involving the vehicle, refer to Section 11.2;
- a fire on the vehicle where cylinders are involved, refer to Section 11.3.

In the event a serious incident takes place during loading, filling, carriage or unloading of dangerous goods, the incident shall be reported to the Competent Authority, in the UK the DfT, within one month of the date of the incident taking place, by the loader, filler, carrier, unloader or Consignee, respectively, in accordance with ADR ^[8], 1.8.5.

DfT provide a form for reporting incidents at:

<https://www.gov.uk/government/publications/dangerous-goods-incident-reporting-form>

11.1 Suspected cylinder leak

If the Driver suspects that there is a leak from a cylinder, take the following immediate actions:

- if driving, stop and park the vehicle as soon as practical, preferably in a safe place, away from naked flames and flammable substances. Turn off the ignition;
- if it is an enclosed vehicle, increase the ventilation. Open all doors, windows, luggage areas etc.;
- as far as is practical, do not allow sources of ignition in the vicinity of the vehicle, for example, smoking, electrical and electronic devices, etc.;
- check the cylinder valve(s). If open, close the cylinder valve immediately (if safe to do so);
- if there is a leak of liquefied gas, do not touch the liquid as it is hazardous and, for example, may result in cold burns;
- if the cylinder continues to leak, and it is safe to do so, remove the leaking cylinder from the vehicle and place in a safe, well-ventilated area. Follow your emergency instructions and consider notifying the emergency services;
- if the leak cannot be stopped, do not return a leaking cylinder into the vehicle;
- for enclosed vehicles, ensure that the vehicle has been adequately ventilated before re-loading and re-entering the vehicle to continue the journey.

NOTE: A cylinder will hold a finite amount of gas. One option may be to wait until all the gas has vented and the cylinder is empty before proceeding with the next steps.

If additional help is required, contact the gas supplier for advice. For this to be practicable the Driver will require to be in possession of the gas supplier's contact phone number (or will need to know where to obtain this information).

NOTE: If using mobile phones stay clear of the vehicle and / or a leaking cylinder.

11.2 Vehicle incident

In the event of an incident requiring contact with the emergency services, the attending personnel should be advised that the vehicle is carrying dangerous goods. They will want to know:

- what products are being carried on the vehicle;
- how many cylinders are being carried and their size;
- their position within the vehicle.

The emergency services will ask for any appropriate documentation and may ask for the gas supplier's contact details. This they may use for specialist advice on the gas cylinders and / or to help with the recovery of cylinders which may have been damaged.

11.3 Key actions for dealing with cylinders in the event of a fire

Follow your emergency instructions. These will likely include:

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

If gas cylinders are directly involved in a fire, keep well clear until the *Fire and Rescue Service* arrive and then follow their instructions.

Inform the *Fire and Rescue Service* immediately of:

- what products are being carried on the vehicle;
- how many cylinders are being carried and their size;;
- their position on or within the vehicle.

Do not approach the vehicle or cylinders until the fire is out and the area has been declared safe by the *Fire and Rescue Service*.

Do not use any fire-damaged cylinders. Inform the gas supplier whenever a cylinder has been involved in a fire or if it is suspected that it has been affected by heat. The gas supplier will provide advice on what to do next, which will vary depending upon exact circumstances.

Contact numbers for the gas supplier are available on the product Safety Data Sheet.

For additional information refer to BCGA Leaflet 6 ^[35], *Cylinders in fire*.

12. SECURITY

All persons engaged in the carriage of dangerous goods shall take the measures necessary to minimise the theft or misuse of dangerous goods that may endanger persons, property or the environment.

The carriage of high consequence dangerous goods requires additional security measures. A security plan shall be adopted, implemented and complied with. For guidance refer to EIGA 173 ^[17], *ADR transport security guidelines*.

Security provisions shall comply with ADR ^[8], Chapter 1.10.

Advice on security can be obtained from the gas supplier and from BCGA.

13. REFERENCES

Document Number	Title
1.	The Road Traffic Act 1988 (as amended).
2. SI 2002 No. 2793	The Manual Handling Operations Regulations 1992.
3. SI 2002 No. 1144	The Personal Protective Equipment Regulations 2002.
4. SI 2002 No. 2677	The Control of Substances Hazardous to Health Regulations 2002 (COSHH).
5. SI 2009 No. 1348	The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 (as amended).
6. SI 2016 No. 362	The Traffic Signs Regulations and General Directions 2016.
7. SI 2019 No. 421	The Alternative Fuel Labelling and Greenhouse Gas Emissions (Miscellaneous Amendments) Regulations 2019.
8. UNECE	Agreement concerning the international carriage of dangerous goods by road (ADR) (as amended).
9. OTIF	The Convention concerning International Carriage by Rail (COTIF) Appendix C Regulations; The International Carriage of Dangerous Goods by Rail (RID).
10. IMO	International Maritime Dangerous Goods (IMDG) Code (as amended).
11. ICAO	Technical Instructions.
12. IATA	Dangerous Goods Regulations (as amended).
13. HSE L25	Personal Protective Equipment at Work.
14. EIGA 23	Safety training of employees.
15. EIGA 52	Load securing of Class 2 receptacles.
16. EIGA 136	Selection of personal protective equipment.
17. EIGA 173	ADR transport security guidelines.
18. EIGA Safety Leaflet 3	Safe transport of gas.
19. BCGA Code of Practice 16	The movement of static gas storage tanks by road.
20. BCGA Code of Practice 29	Battery-vehicles and multiple-element gas containers. Design and operation.

21.	BCGA Code of Practice 31	The safe storage and use of cylinders on mobile workshops and service vehicles.
22.	BCGA Code of Practice 38	In-service requirements for refrigerated gas transportable pressure equipment.
23.	BCGA Code of Practice 44	The storage of gas cylinders.
24.	BCGA Code of Practice 52	The management of risks from gases in the workplace.
25.	BCGA Guidance Note 3	Gas cylinder. Manual handling operations.
26.	BCGA Guidance Note 23	Gas safety. Information, instruction and training.
27.	BCGA Guidance Note 35	Vehicle selection and transport management.
28.	BCGA Guidance Note 36	Guidance for the use, inspection and transport of cylinders with various design codes.
29.	BCGA Guidance Note 45	Dangerous goods safety adviser.
30.	BCGA Technical Information Sheet 6	Gas cylinder identification. Label and colour code requirements.
31.	BCGA Technical Information Sheet 28	Non-refillable cylinders.
32.	BCGA Technical Information Sheet 45	Guidance for the protection of vehicle crew working in all weather conditions.
33.	BCGA Technical Information Sheet 49	Risk assessment considerations for activities involving compressed gas cylinders within the workplace.
34.	BCGA Leaflet 1	The carriage of small quantities of gas cylinders.
35.	BCGA Leaflet 6	Cylinders in fire.
36.	BCGA Leaflet 13	Medical oxygen in a vehicle.
37.	BCGA Leaflet 17	Information for customers collecting gas cylinders.
38.	BCGA Leaflet 18	Information for customers handling gas cylinders.
39.	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
Department for Transport (DfT)	www.gov.uk/government/organisations/department-for-transport
Driver & Vehicle Standards Agency (DVSA)	www.gov.uk/government/organisations/driver-and-vehicle-standards-agency
United Nations Economic Commission for Europe (UNECE)	https://unece.org/transport/dangerous-goods
International Civil Aviation Organization (ICAO)	www.icao.int
International Maritime Organisation (IMO)	www.imo.org
International Air Transport Association (IATA)	www.iata.org
Intergovernmental Organisation for International Carriage by Rail (OTIF)	https://otif.org/en/
British Standards Institute (BSI)	www.bsigroup.co.uk
British Compressed Gases Association (BCGA)	www.bcgga.co.uk
European Industrial Gases Association (EIGA)	www.eiga.eu
Liquid Gas UK	www.liquidgasuk.org



British Compressed Gases Association

www.bcga.co.uk