



CODE OF PRACTICE 16

**THE MOVEMENT OF STATIC GAS
STORAGE TANKS BY ROAD**

Revision 4: 2013

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 enhance safe practice, and to prioritise environmental protection in the supply and use of industrial 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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CONTENTS

Section		Page
	TERMINOLOGY AND DEFINITIONS	1
1.	SCOPE	2
2.	PREPARATION FOR CONVEYANCE	3
2.1	Permission	3
2.2	Competent person responsibilities	3
2.3	Preparation of the site	3
2.4	Preparation of the tank	3
3.	REMOVAL / CRANAGE OF TANK	4
3.1	The legislative framework for lifting	4
3.2	Contracts and the type of lifting operation	5
3.3	Practical guidance on lifting tanks	6
4.	LOADING OF THE VEHICLE	7
4.1	Vehicle requirements and load placement	7
4.2	Securing the load	7
4.3	Compliance with DfT code “Safety of loads on vehicles”	7
5.	RESPONSIBILITIES	8
5.1	The tank owner	8
5.2	The crane operator	8
5.3	The haulage operator	8
6.	REFERENCES *	9

* Throughout this publication the numbers in brackets refer to references in Section 6. Documents referenced are the edition current at the time of publication, unless otherwise stated.

TERMINOLOGY AND DEFINITIONS

Crane operator	The company responsible for the crane used in the lifting operation.
Cryogenic liquid	For the purposes of this document cryogenic liquid is liquid oxygen, nitrogen, argon, helium or carbon dioxide.
May	Indicates an option available to the user of this Code of Practice.
Shall	Indicates a mandatory requirement for compliance with this Code of Practice.
Should	Indicates a preferred requirement but is not mandatory for compliance with this Code of Practice.
Static storage tank	A tank, together with its associated pipework and fittings, designed to store liquefied gas as a static installation. Such tanks are not normally designed to be transported when containing any liquefied gas.

CODE OF PRACTICE 16

THE MOVEMENT OF STATIC GAS STORAGE TANKS BY ROAD

1. SCOPE

The movement on public roads of tanks designed for static storage of liquid nitrogen, liquid oxygen, liquid argon, liquid helium and liquid carbon dioxide.

This code only applies to the movement of tanks which are not designed or approved to appropriate transport regulations.

This code may also be used to move tanks which have previously contained flammable, toxic or reactive gases, provided that adequate measures have been taken to purge the tank with an inert gas such that the hazard is no longer present. In this instance a certificate of cleanliness, or purge certificate, should always be provided.

The movement of the subject tanks by road is controlled by the general requirements of the Health and Safety at Work Act (1) and its subsidiary regulations which require risk assessment, risk control measures, training and information so that a safe system of work is operated. The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations (4) implement the European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR) (5), which provides a framework for dangerous goods to be carried internationally in road vehicles subject to compliance with standards for the packaging and labelling of the dangerous goods, and appropriate construction and operating standards for the vehicles and crew. Gases are classified as Class 2 dangerous goods. ADR (5) does not apply so long as the tank is empty and uncleaned, i.e. it contains residual gas.

ADR (5), Section 1.1.3.1 states:-

“The provisions laid down in ADR do not apply to:

- (f) The carriage of uncleaned empty static storage vessels which have contained gases of Class 2, groups A, O or F, ... subject to the following conditions:
 - All openings with the exception of pressure relief devices (when fitted) are hermetically closed;
 - Measures have been taken to prevent any leakage of contents in normal conditions of carriage; and
 - The load is fixed in cradles or crates or other handling devices or to the vehicle or container in such a way that they will not become loose or shift during normal conditions of carriage.”

The expression “uncleaned, empty” is not defined in ADR (5) but its meaning could be inferred for the gases in the scope of this Code of Practice.

ADR (5), Section 1.1.3.2 states:-

“The provisions laid down in ADR do not apply to the carriage of:

- (c) Gases of Groups A and O (according to [2.2.2.1]), if the pressure of the gas in the receptacle or tank at a temperature of 20 °C does not exceed 200 kPa (2 bar) and if the gas is not a liquefied or a refrigerated liquefied gas. This includes every kind of receptacle or tank, e.g. also parts of machinery and apparatus.”

To ensure compliance with ADR (5) static storage tanks shall only be transported empty of liquid product and with an internal pressure less than 2 bar.

2. PREPARATION FOR CONVEYANCE

2.1 Permission

Permission has to be obtained from the owner of the tank before any lifting operation is planned or takes place. When such permission is sought the competent person for the lifting operation shall be determined.

2.2 Competent person responsibilities

For the purpose of this document the competent person is the person responsible for the lift operations. This is not to be confused with other competent person roles such as a competent person for the Construction (Design and Management) Regulations (CDM) (3).

2.3 Preparation of the site

Before any static tank is moved the site should be surveyed for possible hazards by the competent person responsible for the craneage / lifting operation (see Section 3). Particular attention shall be paid to overhead power cables, ground conditions and underground services. These should be verified in conjunction with the site owner / user.

2.4 Preparation of the tank

2.4.1 Transfer tank contents into a tanker to a degree which is practicable. (Check purity of tank contents and tank history to avoid contamination of tanker).

2.4.2 Vent residual liquid product to atmosphere via an ambient vaporiser or other safe means.

2.4.3 Continue venting until valve(s) are venting gas only and residual gas pressure is below 2 bar gauge. (Do not allow pressure to fall below the minimum pressure required to maintain purity of contents).

2.4.4 Close all valves on the tank and the customer installation.

2.4.5 Vent all connecting lines to atmospheric pressure.

- 2.4.6 Complete tank inspection procedure to ensure that all tank fittings are in safe condition and leak tight.
- 2.4.7 Where necessary ‘tag’ all customer installation valves and break all connecting lines back to the tank valves. Disconnect and remove all valves and pipework that could come into contact with the tank during the lifting operation. Ensure that all tank outlets are hermetically closed except the pressure relief devices.
- 2.4.8 There may be instances where all valves and equipment will be removed from a tank. In this case the tank will contain residual gas at atmospheric pressure and may need to vent excess pressure from the vaporisation of solid or liquid residues – for example the sublimation of dry ice. All orifices should be blanked to prevent contamination and due consideration should be given to a requirement to provide pressure relief.
- 2.4.9 In compliance with ADR (5) all marking and labelling referring to the contents shall be covered or removed during the carriage.
- 2.4.10 A certificate of cleanliness, or purge certificate, may be required to be provided by the owner of the tank to confirm that the tank contains only a residual quantity of inert gas and that it does not represent a hazard for transport. Where required, a copy is to be given to the haulier for carriage with the tank.

NOTE: Where the tank contains oxygen, and there is the potential for gas release, additional precautions may be required to control any fire risk associated with oxygen enrichment.

3. REMOVAL / CRANAGE

3.1 The legislative framework for lifting

The lifting of the tank is covered by The Lifting Operations and Lifting Equipment Regulations (LOLER) (2). In particular, the lift shall be organised, planned and executed in accordance with LOLER (2), Regulation 8, which states:

(1) Every employer shall ensure that every lifting operation involving lifting equipment is:-

- a) properly planned by a competent person;*
- b) appropriately supervised; and*
- c) carried out in a safe manner*

(2) In this regulation “lifting operation” means an operation concerned with the lifting or lowering of a load

The Health and Safety Executive (HSE) publish Approved Code of Practice L113 (6), *Safe Use of Lifting Equipment*, which explains the duties relating to establishing the strength and stability of lifting equipment, its positioning and installation, and the general organisation of lifting operations. The following guidance on LOLER (2), Regulation 8 given in HSE L113 (6) shall be followed:

210 The person planning the operation should have adequate practical and theoretical knowledge and experience of planning lifting operations.

211 The plan will need to address the risks identified by the risk assessment and identify the resources required, the procedures and the responsibilities so that any lifting operation is carried out safely

212 The plan should ensure that the lifting equipment remains safe for the range of lifting operations for which the equipment might be used.

212 Where two or more items of lifting equipment are used simultaneously to lift a load, a written plan should be drawn up where appropriate and applied to ensure safety.

Users of this Code of Practice are strongly advised to consult HSE L113 (6) before planning a lift, this is supported by HSE guidance given in HSE INDG 290 (7), *Lifting equipment at work. A brief guide*. Additional best-practice recommendations for the in-service inspection, thorough examination and testing of cranes and lifting equipment is given in BS 7121 Part 2 (9), *Code of practice for safe use of cranes. Inspection, testing and examination*.

3.2 Contracts and the type of lifting operation

There are three common forms of lifting operation:

- (i) A contract lift using a crane.
- (ii) A non-contract lift using a crane.
- (iii) Lifting not using a crane, e.g. forklifts, lorry loaders.

For a contract lift the crane company provides an Appointed Person to manage and supervise the lift from initial survey through to completion. The hirer is responsible for providing all necessary information relating to the tank being lifted. The lifting operation is covered by the crane companies insurance. The hirer needs to agree with the Appointed Person the full range of the responsibilities associated with the lift operation. Some responsibilities will also lie with the site owner where the tank is being lifted at a third party owned site.

NOTE: During the contract lift the full on-hook value, i.e. the value of the tank being lifted, is not necessarily covered by the crane companies insurance, unless specific provision has been made in the contract.

For a non-contract lift, where the company owns its own crane or hires a crane, such as a Construction Plant–hire Association (CPA) crane hire, for the lifting operation, the

company / hirer is fully responsible for all aspects of the lift in accordance with LOLER (2) including plant, equipment and third party insurance liabilities.

When lifting not using a crane, the responsibility for a safe lift is likely to be shared between multiple parties. The tank owner should satisfy himself that all aspects of the lift are in accordance with LOLER (2) including plant, equipment and third party insurance liabilities.

3.3 Practical guidance on lifting tanks

The following points are offered as additional practical guidance on lifting tanks:-

- 3.3.1 The competent person responsible for the planning and control of the lifting operation shall be given the weight of the tank to be lifted and sufficient information to allow the maximum radius of the lift to be established. Appropriate lifting equipment can then be selected. The weight of the tank to be lifted shall be given to the lifting equipment operator before the lift commences.
- 3.3.2 The tank and any other equipment forming the load must not exceed the safe working load of any lifting equipment in the desired configuration or the crane at any radius used during the lifting operation. The competent person shall ensure that the lifting equipment is adequate for the size and weight of the tank being lifted, is in good condition and certified as required under LOLER (2). All lifting equipment certificates should be available for inspection prior to a lift taking place.
- 3.3.3 Where adequate integral lugs or points are provided for the purpose of lifting the tank, these should be used. All lifting points should be inspected for damage / corrosion before commencing the lift.
- 3.3.4 It is preferable to lift the tank using a single crane. When more than one crane has to be used the lifting operation should be carefully planned and supervised by a person familiar with the special requirements of such an operation. The use of more than two cranes is not recommended.
- 3.3.5 The crane should be positioned on firm ground. It shall be level within the crane manufacturer's specified limits, and capable of supporting the weight of the crane and load.
- 3.3.6 The tank should be free of any restraint during lifting. Slings and any other lifting tackle should be positioned so that snagging of valves and fittings cannot occur during lifting and damage to any insulation on the vessel or pipework is minimised. If necessary, pipework should be protected during these operations.
- 3.3.7 When there is a need to use a "spreader bar" then this and its associated shackles should be rated for the full tank load.
- 3.3.8 Where fork lift trucks or the vehicle tail lift are used in the lifting operation their use should be considered as part of the risk assessment.

4. LOADING OF THE VEHICLE

4.1 Vehicle requirements and load placement

Vehicles and vehicle platforms or beds must be suitable for the type of load to be carried, be clean, in good condition and generally free from oil, grease, ice, etc. Tanks should be placed correctly on the vehicle, having due regard to its loaded stability.

4.2 Securing the load

Where necessary suitable saddles should be used. Where adjustable saddles are used, it is important to ensure that the correct wooden blocks are used for the size and diameter of the tank to be carried. The saddles shall be adjusted as the tank is being positioned when the lowest point on the radius of the tank contacts the saddle. The wooden blocks are wound in or out as appropriate to ensure that they are a snug fit against the radius of the tank.

4.3 Compliance with DfT code 'Safety of Loads on Vehicles'

Compliance with the guidelines laid down by the Department for Transport (DfT) Code of Practice *Safety of loads on vehicles* (8) is a requirement as follows:-

- 4.3.1 The transport company bears the responsibility to provide suitable vehicles and securing equipment.
- 4.3.2 It is the driver's responsibility to check and ensure that the tank is secure at all times.
- 4.3.3 Before a vehicle is loaded it should be checked to ensure that the load platform, anchorage points or twist locks as appropriate to the load to be carried, are sound and in good condition.
- 4.3.4 Whenever possible the tank should be placed in contact with the headboard. If the headboard is not designed to take such loading additional means of securing must be used.

NOTE: When loading a tank which contains insulation, such as perlite, it is common practice to position the tank with the base towards the headboard. This can assist in keeping the insulation in its correct location during the journey.

- 4.3.5 The combined strength of the load restraint system must be sufficient to withstand a force of not less than the total weight of the load forward and half the weight of the load backward or sideways.
- 4.3.6 Where the headboard complies with the requirements of the Department for Transport Code of Practice *Safety of loads on vehicles* (8) it should be capable of taking a forward load equal to half the rated payload of the vehicle. However where the load is higher than the headboard or where point loadings are applied most of the load should be taken by the lashings to the vehicle anchor points.

- 4.3.7 The anchor points fitted to the vehicle being used must be capable of taking the loads imposed by the tank to be carried and be positioned such that the angles of the lashings do not exceed 60 ° to the horizontal.

5. RESPONSIBILITIES

5.1 The tank owner

In addition to complying with Section 2, the tank owner is responsible for:

- 5.1.1 Informing the crane operator of the weight and dimensions of the tank.
- 5.1.2 Supplying information to the haulage contractor concerning the hazards that could be associated with the gas.
- 5.1.3 Ensuring that the tank is in a safe condition to be lifted, free of liquid, with all valves securely closed and all connecting lines disconnected.

5.2 The crane operator

The crane operator is responsible for complying with Section 3.1.

5.3 The haulage operator

The haulage operator is responsible for complying with Section 4, additionally:

- 5.3.1 Advising the driver of the potential hazards associated with the load.

6. REFERENCES *

	Document Number	Title
1		Health and Safety at Work etc. Act, 1974
2	SI 1998 No 2307	The Lifting Operations and Lifting Equipment Regulations 1998 (LOLER)
3	SI 2007 No.320	Construction (Design and Management) Regulations 2007
4	SI 2009 No. 1348	The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 (as amended).
5	ECE/TRANS/215	European Agreement concerning the international carriage of dangerous goods by road (ADR).
6	HSE Leaflet 113	Approved Code of Practice and Guidance. Safe use of lifting equipment.
7	HSE INDG 290	Lifting equipment at work. A brief guide.
8	DfT Code of Practice	Safety of loads on vehicles. <i>Available via HSE website –</i> www.hse.gov.uk/logistics/load-security.htm
9	BS 7121 Part 2	Code of practice for safe use of cranes. Inspection, testing and examination.

Further information can be obtained from:

Health and Safety Executive (HSE)	www.hse.gov.uk
Department for Transport (DfT)	www.gov.uk/government/organisations/department-for-transport
UK Legislation	www.legislation.gov.uk
British Standards Institute (BSI)	www.bsigroup.co.uk
British Compressed Gases Association (BCGA)	www.bcgga.co.uk
Construction Plant-hire Association (CPA)	www.cpa.uk.net

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