

## **ORPHANED GAS CYLINDERS IN THE WASTE AND RECYCLING INDUSTRIES**

This guidance has been developed by the Waste Industry Safety and Health (WISH) Forum to help control safety and health risks in the waste management industry associated with orphaned gas cylinders. The Health and Safety Executive (HSE) was consulted in the production of this publication. It endorses the sensible, proportionate, reasonable and balanced advice to owners on managing the risk from this guidance during the waste-related activities as set out in the guidance.

### **Contents**

- Summary
- 1. Introduction
- 2. The risks
- 3. Assessment of cylinders on receipt
- 4. Safe storage
- 5. Handling cylinders
- 6. Location of stores
- 7. Construction of enclosures
- 8. Cylinder retrieval schemes
  - 8.1 LPG cylinders
  - 8.2 Other industrial gases
  - 8.3 Civic amenity sites
  - 8.4 Collection procedures standards
- 9. Site procedures
- 10. Information, instruction and training
- 11. Worker consultation and engagement
- 12. Reporting and investigating accidents and dangerous occurrences
- Further reading
- Disclaimer and WISH
- Further information

## Summary

Gas cylinders can present considerable risks to operators if they are not handled and stored properly. They also represent a significant explosion risk if they are inadvertently processed in crushers or fragmentisers.

This guidance is about eliminating or reducing the risk of serious injury associated with the handling, storage and disposal of unwanted or unidentifiable gas cylinders ('orphaned' cylinders) that may appear in the waste stream.

It is particularly relevant to the metals recycling industry and those who operate civic amenity sites and is primarily aimed at managers, supervisors and operators who work in these waste management and recycling activities.

The advice is relevant to a range of gas cylinders that may be encountered – compressed gases at high pressure, liquefied gases such as LPG which are at lower pressures and those cylinders that may contain toxic substances, eg chlorine. It is also applicable to fire extinguishers which can contain small internal CO<sub>2</sub> cylinders under high pressure.

The guidance also includes important advice on the arrangements currently available to arrange for retrieval of unwanted gas cylinders.



## 1. Introduction

The guidance applies to a wide range of gas cylinders, including compressed gases at high pressure, liquefied gases such as LPG which are at lower pressures and those cylinders that may contain toxic substances, eg chlorine and fire extinguishers which can contain small internal CO<sub>2</sub> cylinders under high pressure. It does not include advice on the safe use of gases. You can get this from other sources (eg HSE's website and gas suppliers).

## 2. The risks

2.1 Cylinders containing gases (or which are apparently empty but in fact still contain some original content) commonly appear in the waste stream, especially at civic amenity sites and metal recyclers. They are not wanted by the waste and recycling management industry, and instead of being returned to the supplier, they are sometimes disposed of because:

- They are empty and are deliberately discarded as too troublesome to return
- They have ended their normal or useful life
- They may be damaged and therefore not returnable to the supplier
- The owner/supplier cannot be identified
- The cylinders have a residual value and are to be processed as scrap

2.2 Due to actual or perceived difficulties in returning cylinders, it is common that gas cylinders may be hidden in loads of scrap or end-of life vehicles (ELVs). They may also be an integral component of dual fuel cars. These cylinders can present considerable explosion risks where scrap vehicles are processed in crushers or fragmentisers.

2.3 Gas cylinders should be collected from receiver sites regularly (see paragraphs below about collection). It may take some time for small civic amenity sites or small metals recyclers to build up enough to warrant a collection run.

2.4 Unless properly handled, orphaned gas cylinders are a safety risk because their contents can be:

- Pressurised – presenting the risk of the violent release of their contents; if a valve is knocked off (intentionally or by accident) or damaged it could present a 'missile hazard'
- Flammable, such as propane, butane or acetylene, eg if an acetylene cylinder is mishandled it can generate heat spontaneously and present an explosion hazard
- Toxic (such as chlorine)

2.5 In addition, gas cylinders can present other risks:

- The release of inert gases in confined spaces can displace oxygen and cause asphyxiation
- Contact with the cold gas as it escapes from the cylinder can damage the skin

## 3. Assessment of cylinders on receipt

3.1 All cylinders should be examined on receipt to assess their condition (eg to check if they are damaged and/or leaking), to identify their ownership and if possible the contents. The route for disposing of the cylinder can then be determined. Segregate damaged cylinders from others and make appropriate arrangements for storing them before collection. General text, such as explanation of what the section is about and which does not require a sub-section number or similar.

## 4. Safe storage

4.1 Store cylinders safely:

- Keep the number of stored cylinders as low as possible, ensuring that the storage cage safe capacity is not exceeded. Regular disposal is required and the risk assessment should state the maximum number of cylinders to be stored at any one time
- Store cylinders of similar content together for easier collection
- Remember that 'empty' cylinders still contain gas and remain a hazard. Only 'treated' cylinders can be regarded as being completely empty of gas
- Cylinders should not be stacked
- Store cylinders upright with seals and protection caps in place, where provided
- Orphaned gas cylinders in the waste and recycling industries
- Safeguard damaged and narrow-based cylinders against the risk of falling by fitting securing chains in the enclosure
- Other materials should not be stored with gases, especially if flammable or corrosive  
Examples include:
  - Paints, oils, fuel, varnishes and timber preservatives
  - Card, paper and wood products
  - A wide range of corrosive liquids
  - Batteries.

4.2 Since some of the cylinders are likely to contain flammable gases (eg LPG) the receiving site's safety measures should include the following arrangements.

## 5. Handling cylinders

5.1 Handle cylinders safely:

- Always ensure that the valve is closed and no gas is escaping
- Ensure that a cylinder handling assessment has been considered, or install a mechanical cylinder lift for loading cylinders at the collection point
- Never lift a cylinder by its valve equipment or valve guard – always use the cylinder handling ring, if provided
- When moving cylinders any distance, use a suitable cylinder trolley
- Never lift a cylinder with a magnet or chain sling. If ropes or lifting straps are used, only lift one cylinder at a time
- Never roll cylinders along the ground. This damages identification marks and valves
- Never subject cylinders to impact

## 6. Location of stores

- 6.1 Locate the cylinders as far away from buildings, boundaries and where work is regularly carried out as is reasonably practicable. This separation distance should be no less than three metres minimum, but a greater separation distance is desirable and may become necessary when larger inventories are kept.
- 6.2 Store cylinders away from heavily travelled areas, so there is no risk of passers-by introducing sources of ignition (eg from lighted cigarettes, electrical equipment etc) to the area where gases could potentially be leaking.
- 6.3 Store cylinders away from, or ensure they are protected against damage from, moving vehicles.
- 6.4 Keep cylinders in an area of the site where a cylinder collection vehicle and driver can safely identify, lift and load the cylinders.
- 6.5 Make sure that no significant reduction of natural ventilation (eg by trees, vine creepers and other vegetation, surrounded by buildings etc) can occur, so gases can dissipate if there is a leak.

- 6.6 Make sure there are no fixed sources of ignition (eg naked flames, unprotected electrical lighting and equipment) nearby.
- 6.7 Store cylinders away from combustible materials (eg trees, vegetation, timber fences etc) so that if there is a fire, the gas cylinders will not be affected. If weed killers are used to keep down vegetation, do not use sodium chlorate, because it can create a fire hazard.
- 6.8 Store cylinders away from drains, potholes, sumps etc, as they can hold and accumulate gases which are heavier than air.
- 6.9 Do not store them near doors and fire exits. If there is an incident, all escape routes must be easily accessible.

## 7. Construction of enclosures

- 7.1 To prevent unauthorised access, storage enclosures should be no less than 1.8 metres high, of robust construction and lockable.
  - Store should have enough space to allow safe identification and handling of cylinders
  - The storage area should be well ventilated to dissipate gas if there is a leak
  - Any lighting should be suitable to use in a potentially flammable atmosphere. Alternatively, unprotected lighting can be provided at a suitable distance from the storage area. Further guidance is available on the HSE website at [www.hse.gov.uk/electricity/explosive.htm](http://www.hse.gov.uk/electricity/explosive.htm)
  - The storage area should display the warning sign 'Gas cylinders may contain highly flammable LPG or toxic gases' (or similar), and 'No smoking. No naked lights'
  - The enclosure should be clearly signed with instructions for safely storing and collecting cylinders, as well as the maximum number of stored cylinders allowable
  - A second exit from the compound should be provided, if the travel distance from any part to an exit is greater than 12 metres
  - Any materials used to create a lockable compound or 'cage' should be non-combustible. Timber should not be used
  - Wire mesh or metal paling cages constitute industry's most common cylinder stores They are non-flammable and maximise ventilation

## 8. Cylinder retrieval schemes

### 8.1 LPG cylinders

- 8.1.1 UKLPG ([www.uklpg.org](http://www.uklpg.org)) is the trade association for the LP Gas industry in the UK. UKLPG was formed by the merger of the LP Gas Association (LPGA) and the Association for Liquid Gas Equipment and Distributors (ALGED) in January 2008. UKLPG comprises all the major manufacturers and fillers of LPG in the UK, and sets standards for the industry.
- 8.1.2 Currently, UKLPG coordinates an LPG cylinder retrieval scheme, promoted by the British Metals Recycling Association (BMRA) and others.
- 8.1.3 A small number of major companies own around 90% of the UK inventory of gas cylinders and have made their own arrangements for recovering their cylinders.
- 8.1.4 The original owners of some LPG cylinders cannot be identified. They may be from foreign (non-UK) suppliers or be unidentifiable, with no markings indicating ownership. Calor Gas has volunteered to recover these cylinders through its collection company, Brookside Ltd.
- 8.1.5 Regional cylinder supply companies are encouraged by UKLPG to make appropriate arrangements for collecting their cylinders and the services offered by Synergy Asset Services are available for them to use if necessary. The cylinder retrieval arrangements in place for the major national companies are given below:

Parent company	Nominated collection company
Calor Gas Ltd <a href="http://www.calor.co.uk/about-calor/press-centre/cylinder-retrieval">www.calor.co.uk/about-calor/press-centre/cylinder-retrieval</a>	Brookside Ltd <a href="http://www.brooksight.co.uk">www.brooksight.co.uk</a> Tel: 0207 731 1221 Fax: 0207 731 4155
BP Gas <a href="http://www.bp.com">www.bp.com</a>	Synergy Asset Services Ltd <a href="http://www.synergyassetservices.co.uk">www.synergyassetservices.co.uk</a> <a href="http://www.cylinderrecycling.co.uk">www.cylinderrecycling.co.uk</a> Tel: 01304 827 277 Fax: 01304 827 287
Flogas	In-house collection by own staff and vehicles <a href="http://www.flogas.co.uk">www.flogas.co.uk</a>
BOC Industrial Gases UK	In-house collection by own staff. Tel: 0800 111 333 <a href="http://www.boconline.co.uk/en/index.html">www.boconline.co.uk/en/index.html</a>

- 8.1.6 If a cylinder is no longer needed, return it to a local dealer for the company owning the cylinder.
- 8.1.7 If it is not known which LPG company owns the cylinder, look at the table of LPG cylinder fillers on the UKLPG website at [www.uklpg.org/advice-and-information/cylinder-recovery](http://www.uklpg.org/advice-and-information/cylinder-recovery) .

## 8.2 Other industrial gases

- 8.2.1 Most industrial gas cylinders in circulation in the UK are the property of the main gas suppliers. They are supplied to gas users under a rental agreement, which requires the user to pay rental on the cylinder until its return for further use. So, the simplest and best way to deal with an unwanted cylinder of this type is to identify the owner and ask them to collect it.
- 8.2.2 Where it is not possible to identify the owner of the cylinder, it may be necessary to employ a specialist organisation with the technical and legal capability to collect and dispose of the cylinder. Safe disposal of industrial cylinders also requires great care. The British Compressed Gas Association (BCGA) leaflet *The Safe Handling of Gas Cylinders at Waste Facilities* outlines the procedure to follow (See further reading).

## 8.3 Civic amenity sites

- 8.3.1 If, despite your best efforts, you are still unable to trace the owner of the gas cylinder, some local authority civic amenity sites may offer a cylinder disposal service, where they may accept 'orphaned cylinders'. If so, they can store them safely before collection by their chosen contractor. You should contact local authorities for further information on whether they offer this service.

**Note: Cylinders should not be left at civic amenity sites without their prior agreement.**

## 8.4 Collection procedure standards

- 8.4.1 As discussed above, store gas cylinders awaiting collection in an organised way and in a safe designated area. Collection agents may not collect LPG or other cylinders stored inappropriately.
- 8.4.2 Where arrangements for routine collection by an approved agency from the UKLPG list ([www.uklpg.org/advice-and-information/cylinder-recovery](http://www.uklpg.org/advice-and-information/cylinder-recovery)) are in place, it is important to make sure that:



- A collection vehicle and driver can access the storage area safely, taking account of pedestrian walkways, operational site vehicle routes and site layout
- Collections are properly planned and agreed with the agency concerned
- A site plan clearly indicates where the collection point(s) is located
- The collection area is marked appropriately to identify a safe parking zone for a collection vehicle. It should be safe for a pedestrian driver to access both the main office for authorisation purposes, and the storage compound for physical collection of identified cylinders
- Collection agents should adhere to local site safety rules and wear appropriate personal protective equipment (eg protective footwear, gloves, hard hat and high visibility clothing)
- Collection agents should have a suitable form of identification and a safe working procedure for the collection activity, in particular any manual handling tasks involved
- Collection agents will leave a copy 'risk note' with the site manager, if there is any deviation from storage or collection standards. This note should state that no further collections will be made unless the risk has been verified as controlled. Commonly, this will relate to cylinders being stacked or packed badly, making collection unsafe
- For cylinders that are unusual, not identified or not able to be collected by an approved agent, consider specialist assessment and treatment so the cylinder can be recycled safely. Such cylinders (typically LPG) should be part of a recorded inventory and forwarded for treatment to a specialist provider. Often metal recycling companies will purchase such properly treated cylinders for shredding, but these will only be acceptable if they conform to the disposal standard contained in BS EN 12816: 2001 (0.5–150 litres) (see further reading), ie they have their valve removed and are clearly punctured. The consignment note should clearly state this.

## 9. Site procedures

- 9.1 Make regular checks of the storage compound (daily is advised, particularly just before collection) to make sure there have been no changes that affect the level of safety at the store.
- 9.2 A local procedure should clearly state how to collect and handle cylinders safely.
- 9.3 Devise and put in place an emergency procedure to deal with a gas leakage or fire. Contain this procedure as part of the site rules and give it to the collection agent, who should sign for receipt of it. The procedure should focus on evacuation. In most circumstances, and at most premises, you should evacuate if there is a substantial gas leakage.

9.4 Fire fighting should only be expected of suitably trained staff on fires away from the gas storage area. Fire fighting should not take place near gas cylinders. Inform the Fire and Rescue Service (FRS) immediately that gas cylinders may be involved, in any instance of a site fire.

9.5 Escape routes should be clearly marked and kept clear, and clearly shown on the site plan.

## 10. Information, instruction and training

10.1 Give workers enough information and training to carry out their duties safely and effectively. Waste and recycling activities involving compressed gas cylinders can expose workers to a range of risks and they should be inducted and trained on safe systems of work. It is particularly important to consider the training needs and supervision of:

- New recruits and trainees
- Young people who are particularly vulnerable to accidents
- People changing jobs, or taking on new responsibilities
- Workers for whom English is not their first language

10.2 For more specific advice, see the HSE leaflet *Health and safety training: A brief guide to employers* (See further reading).

## 11. Worker consultation and engagement

11.1 Involving and consulting your workers is essential in ensuring safe working practices in waste and recycling activities. Further information on worker involvement is available at [www.hse.gov.uk/involvement/index.htm](http://www.hse.gov.uk/involvement/index.htm) and in the HSE leaflet - *Consulting employees on health and safety: A brief guide to the law*. (See further reading).

## 12. Reporting and investigating accidents and dangerous occurrences

12.1 There is a requirement under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR), to report specific types of accidents/incidents, including dangerous occurrences, to the relevant enforcing authority (usually HSE).

## Waste Industry Safety and Health Forum

12.2 RIDDOR applies to all work activities, but not all incidents are reportable. However, because all incidents involving fire and explosion could have potentially serious outcomes, it is recommended that all such incidents, including those that are non-RIDDOR-reportable and near misses should be reported to management and investigated. Investigations should aim to reveal the immediate and underlying causes, ensure lessons are learnt and remedial action is taken.

12.3 Further information about what must be reported and how to report it can be found at [www.hse.gov.uk/riddor](http://www.hse.gov.uk/riddor) and in the leaflet *Reporting accidents and incidents at work*. (See further reading)

## References and further reading

*The Safe Handling of Gas Cylinders at Waste Facilities* British Compressed Gas Association (BCGA)  
[www.bcgga.co.uk](http://www.bcgga.co.uk)

BS EN 12816:2010 *LPG equipment and accessories. Transportable refillable LPG cylinders. Disposal*  
British Standards Institution

*Health and safety training: A brief guide* Leaflet INDG345(rev1) HSE Books 2013  
[www.hse.gov.uk/pubns/indg345.htm](http://www.hse.gov.uk/pubns/indg345.htm)

*Consulting employees on health and safety: A brief guide to the law* Leaflet INDG232(rev2) HSE  
Books 2013 [www.hse.gov.uk/pubns/indg232.htm](http://www.hse.gov.uk/pubns/indg232.htm)

*Reporting accidents and incidents at work: A brief guide to the Reporting of Injuries, Diseases and  
Dangerous Occurrences Regulations (RIDDOR)* Leaflet INDG453 HSE Books 2012  
[www.hse.gov.uk/pubns/indg453.htm](http://www.hse.gov.uk/pubns/indg453.htm)

HSE's waste and recycling website at [www.hse.gov.uk/waste](http://www.hse.gov.uk/waste)

Guidance from HSE on transportable pressure equipment at [www.hse.gov.uk/cdg/pressure.htm](http://www.hse.gov.uk/cdg/pressure.htm)

Gas Safety Data Sheets from BOC Industrial Gases UK at [www.boconline.co.uk](http://www.boconline.co.uk)

*Cylinder recovery and disposal* British Compressed Gas Association (BCGA) [www.bcgga.co.uk](http://www.bcgga.co.uk)

*Gas Cylinder Identification Chart* Air Products 2004 [www.airproducts.co.uk](http://www.airproducts.co.uk)

*Small-scale use of LPG in cylinders* Chemical Information Sheet CHIS5 HSE Books 1999  
[www.hse.gov.uk/pubns/chis5.pdf](http://www.hse.gov.uk/pubns/chis5.pdf)

*Use of LPG in small bulk tanks* Chemical Information Sheet CHIS4 HSE Books 1999  
[www.hse.gov.uk/pubns/chis4.pdf](http://www.hse.gov.uk/pubns/chis4.pdf)

*The safe under pressure handbook* (or CD) available from BOC Industrial Gases UK at  
[www.boconline.co.uk](http://www.boconline.co.uk) , or you can order it by phone on 0800 111

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The Waste Industry Safety and Health (WISH) Forum exists to communicate and consult with key stakeholders, including local and national government bodies, equipment manufacturers, trade associations, professional associations and trade unions. The aim of WISH is to identify, devise and promote activities that can improve industry health and safety performance.

## Further information

This guidance is issued by the Waste Industry Health and Safety (WISH) Forum to help control safety and health risks. Following the guidance is not compulsory, unless specifically stated, and you are free to take other action. But if you do follow the guidance you will normally be doing enough to comply with the law. Health and safety inspectors seek to secure compliance with the law and may refer to this guidance. Some parts of the guidance represent good practice and may go further than the minimum needed to comply with the law.

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