



## **TECHNICAL INFORMATION SHEET 41**

### **CYLINDERS PROVIDED FOR THE RETURN OF WASTE OZONE DEPLETING SUBSTANCES, FLUORINATED GASES AND ANHYDROUS AMMONIA**

#### **Background**

This document provides guidance to users of ozone depleting substances (ODS), fluorinated gases (F gases) and anhydrous ammonia (NH<sub>3</sub>) in the use of cylinders provided for the return of these gases for either preparation for re-use or disposal.

A variety of these gases are in use, typically in the refrigeration, air conditioning, electrical and fire suppression industries. These gases are harmful to the environment and consequently regulations have been enacted to manage and control their use.

The Regulations for ODS and F Gases include:

- SI 2015 No. 168, *The Ozone-Depleting Substances Regulations 2015*
- SI 2015 No. 310, *The Fluorinated Greenhouse Gases Regulations 2015* (as amended)

These Regulations require that users prevent and minimise any emissions of these gases, and that before disposing of products or equipment they recover these gases.

The Regulations require that all persons involved in the handling and recovery of ODS and F gases shall have specific training and qualifications. For the recovery of anhydrous ammonia specific training is required. In this document these persons are referred to as the 'Users'.

This document excludes the use of salvage cylinders, which are specialist containers used for the recovery of damaged or leaking gas cylinders.

#### **Recovery of ODS, F Gases and anhydrous ammonia**

To allow for the recovery of these gases, gas supply companies provide a range of 'recovery' cylinders; which remain the property of the gas supply company. These cylinders will be supplied in a nominally empty, clean condition ready for the user to decant their recovered gases.

Examples of typical recovery cylinders are displayed in Figure 1.

Once the gases have been recovered the cylinder is returned back to the gas supplier as hazardous waste following the mandatory waste 'duty of care' process. The gas supplier will then take appropriate action to either prepare the gases for re-use or safely dispose of the gases.

#### **Cylinders for recovery of ODS, F gases and anhydrous ammonia**

Gas suppliers provide a variety of sizes of cylinders. For ODS and F Gases, typically the valve will be fitted with a valve outlet to BS 341, Part 3, *Transportable gas container valves. Valve*

outlet connections, No. 6, some may be dual port. For anhydrous ammonia the valve outlet is typically a BS 341, Part 3, No. 10.

To assist in the identification of a cylinder as a recovery cylinder they are often painted with a coloured yellow band. The contents are identified as 'Recovery', 'Recovered Refrigerant' or similar.

The gas supplier will attach a product identification label to each cylinder (this is additional to the marking and labelling requirements necessary to comply with the *Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations*). This will identify the various products with which the cylinder can be filled and the maximum quantity of product allowed (by weight). Some cylinders will be designated only for a specific product, such as sulphur hexafluoride (SF<sub>6</sub>) or anhydrous ammonia. Other cylinders may have the capability to hold several products, however, in use these are to be filled with only a single product before being returned to the gas supplier.

**NOTE:** For ODS and F Gases the gas supplier's product identification label will indicate the maximum fill level for a particular recovered product. This is a de-rated weight and is typically 75 % of the normal 'virgin' fill weight maximum limit.

### Gas supplier responsibilities

Suppliers / owners of the recovery cylinder are responsible for:

- providing a recovery cylinder in a condition where it is ready to be used to recover a gas;
- inspecting each recovery cylinder prior to dispatch to the user;
- carrying out an inspection when the recovery cylinder is returned, including weighing the received product, and dealing with any discrepancies as quickly as possible;
- ensuring the waste duty of care is followed for the returned gas, including:
  - waste is transferred by an authorised waste carrier;
  - Consignment Note paperwork, completed by the user, is fully completed;
  - recovery cylinders are stored at sites with a relevant waste licence or exemption;
  - recovered gas is recorded or disposed of at licenced facilities.



**Figure 1:** Typical recovery cylinders

### User responsibilities

For ODS and F Gas recovery each individual user shall have a current qualification to carry out recovery operations, as required by the Regulations.

No specific legal certification is required to carry out recovery operations for anhydrous ammonia.

The user is responsible for decanting the recovered gases into the recovery cylinder.

When recovering a gas the user shall have all the necessary procedures, training, risk assessments and equipment to provide a safe system of work in place. The following checks are to be carried out.

Prior to starting the recovery operation check that:

- the product (gas) being recovered has been accurately identified;
- the quantity of product to be recovered is known;
- a recovery cylinder, which is suitable for the product with which it will be filled, and decanting equipment is available;
- there is sufficient capacity in the cylinder to recover the product. If not, make available additional recovery cylinders;
- the recovery cylinder is nominally empty, or if it already contains some product then this is compatible with (the same as) the product being recovered;
- the cylinder(s) is in-date for its periodic inspection and test.

NOTE: Recovery cylinders should be returned to the gas supplier before their periodic inspection and test date expires.

During and post fill checks:

- the quantity of product filled into the cylinder is within the maximum fill limit allowed;
- the contents of the cylinder are accurately identified on the gas supplier's product identification label;
- the quantity of product in the cylinder is accurately identified on the gas supplier's product identification label;
- the marking and labelling requirements for compliance with the *Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations* correctly identify the product in the cylinder;
- on completion of a fill the cylinder valve is closed and the cylinder assembly is checked to ensure there are no leaks.

Preparation for shipment:

- complete hazardous waste transfer notes and provide to the gas supplier;
- ensure a correct description of the waste is provided to the gas supplier so that the *Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations* can be complied with;
- list the relevant European Waste Code (EWC).
  - Refrigerants: EWC code 140601\* Chloroflourocarbons, HCFC, HFC
  - SF<sub>6</sub>: EWC code 160504\* (ADR: UN 1080; Hazard code: H14)
  - Anhydrous ammonia: EWC code 160504\* (ADR: UN 1005)

## Storage

Gas cylinders shall be stored in a dedicated store, refer to BCGA CP 44, *The storage of gas cylinders*, taking due regard of the properties of each type of gas.

Sites storing returned recovery cylinders with recovered gas shall have a waste management licence or register for a waste exemption. For information on exemptions, refer to:

- England and Wales: The Environment Agency (EA). Waste Exemption S2, *Storing waste in a secure place*, (up to 18 tonnes ODS or HFC).  
<https://www.gov.uk/guidance/waste-exemption-s2-storing-waste-in-a-secure-place>
- Scotland: The Scottish Environment Protection Agency (SEPA).  
<https://www.sepa.org.uk/regulations/waste/activities-exempt-from-waste-management-licensing/>
- Northern Ireland: The Department of Agriculture, Environment and Rural Affairs (DAERA). <https://www.daera-ni.gov.uk/topics/waste>

Sites storing waste anhydrous ammonia for a period greater than 12 months require a waste management licence.

NOTE: When a site stores more than an aggregate quantity of 50 000 kg of hazardous substances (including these types of gases), the *Control of Major Accident Hazards Regulations* (COMAH) shall be consulted, as it may apply.

## Other uses

As well as being used to recover product, recovery cylinders can be used to temporarily store product, for example, when equipment requires maintenance, product may be removed, stored in a recovery cylinder until maintenance is complete, then returned back into the equipment.

NOTE: Any product removed from equipment may contain contaminants, such as oil. Until the cylinder has been prepared for re-use (by the gas supplier) the cylinder should not then be used to contain any other product.

## Problems that occur

Examples of common bad practice include:

- the user overfills the cylinder, exceeding maximum fill limits;
- more than one product is put into the cylinder;
- an incorrect product is put into the cylinder;
- the user converts a virgin gas cylinder into a recovery cylinder without authority;
- the product is not correctly identified on the gas supplier's product identification label;
- the quantity of product inside the cylinder is incorrectly marked on the gas supplier's product identification label;
- the contents are not correctly identified, therefore not compliant with the marking and labelling requirements of the *Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations*;
- the contents are not correctly identified when carried as hazardous waste;
- the user keeps the cylinder on their premises for an extended period.

The consequences are that:

- an overfilled cylinder can result in internal pressures exceeding cylinder design limits. This will weaken the mechanical properties of the cylinder. Sudden failure of a cylinder can result in serious injury or fatality. This may impact on personnel transporting, handling and emptying cylinders, who would not expect a cylinder to be incorrectly filled;
- mixed product will invalidate maximum fill levels;
- mixed product may not be able to be reused, resulting in unnecessary disposal;
- cylinders containing recovered product may also contain some contaminants. These contaminants may cause long term corrosion problems inside the cylinder;
- incorrectly filled or products that are incorrectly identified will not comply with the *Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations*;
- recovery cylinders returned as waste, i.e. for disposal, have to be returned as hazardous waste. Incorrect information will result in non-compliance with the hazardous waste Regulations, waste duty of care and the *Environmental Protection Act 1990*.

### **Cylinder return**

The user of a recovery cylinder has a duty of care to ensure the cylinder is correctly filled, is accurately marked and labelled, has the appropriate hazardous waste consignment documentation and, in all respects, is safe and legal for transportation back to the gas supplier.

Suppliers / owners of recovery cylinders (gas suppliers) will only accept a recovery cylinder for return where the cylinder has not been over-filled, it is correctly marked and labelled and the associated paperwork is completed accurately.

### **For more information:**

UK Legislation

[www.legislation.gov.uk](http://www.legislation.gov.uk)

British Standards Institute (BSI)

[www.bsigroup.co.uk](http://www.bsigroup.co.uk)

British Compressed Gases Association (BCGA)

[www.bcga.co.uk](http://www.bcga.co.uk)