THE SAFE USE AND STORAGE OF GAS CYLINDERS

Accidents involving gas cylinders can cause serious injury or even death. The legal term for gas cylinders is transportable pressure receptacles or transportable pressure vessels.

Uses of gas cylinders
Gas cylinders are a convenient way to transport and store gases under pressure. These gases are used for many different purposes including:

- chemical processes;
- soldering, welding and flame cutting;
- breathing (e.g. diving, emergency rescue);
- medical and laboratory uses;
- dispensing beverages;
- fuel for vehicles (e.g. fork-lift trucks);
- extinguishing fires;
- heating and cooking;
- water treatment.

The main hazards are:

- impact from the blast of a gas cylinder explosion or rapid release of compressed gas;
- impact from parts of gas cylinders that fail, or any flying debris;
- contact with the released gas or fluid (such as chlorine);
- fire resulting from the escape of flammable gases or fluids (such as liquefied petroleum gas);
- impact from falling cylinders;
- manual handling injuries.

The main causes of accidents are:

- inadequate training and supervision;
• poor installation;
• poor examination and maintenance;
• faulty equipment and / or design (e.g. badly fitted valves and regulators);
• poor handling;
• poor storage;
• inadequately ventilated working conditions;
• incorrect filling procedures;
• hidden damage to cylinder

All gas cylinders must be designed and manufactured to an approved specification to withstand everyday use and to prevent danger. They must be periodically examined at appropriate intervals to ensure that they remain safe in service. To reduce the risks of failure you need to know, and act on, the following precautions.

Training
Anyone who examines, refurbishes, fills or uses a gas cylinder should be suitably trained and have the necessary skills to carry out their job safely. They should understand the risks associated with the gas cylinder and its contents. In particular:

• new employees should receive training and be supervised closely;
• users should be able to carry out an external visual inspection of the gas cylinder,
• and any attachments (e.g. valves, flashback arresters, and regulators), to determine whether they are damaged. Visible indicators may include dents, bulges, evidence of fire damage (scorch marks) and severe grinding marks, etc.

Periodic examination
If you own or fill gas cylinders, you must ensure that they have been examined at the appropriate intervals to make sure that they are safe for continued use. The law requires that all gas cylinders are examined and tested by the relevant inspection body, in accordance with relevant regulations and at the appropriate intervals and permanently marked by a relevant inspection body to show the date of the last periodic examination.
Repair
The law prohibits modifications (with the exception of neck thread cutting) or major repairs to the body of seamless gas cylinders or cylinders that have contained acetylene.

Filling
Anyone carrying out the filling of gas cylinders should wear suitable personal protective equipment as appropriate. This may include safety shoes, protective overalls, gloves, and ear and eye protection. Before filling a gas cylinder check that:

- from the markings on the cylinder, it has been properly examined by a relevant inspection body and is still within its due test date;
- it shows no sign of damage, external corrosion, falsification (defacing) of markings or illicit repairs that may affect integrity;
- it is suitable for the gas/fluid with which it is to be filled;
- from the markings on the cylinder, the safe operating limits are established;
- valves, fittings and regulators (where fitted) are:
  - correctly fitted and not leaking;
  - not damaged and in good working condition;
  - suitable for their intended purpose;
  - not contaminated, e.g. with incompatible lubricants

If any of the above conditions are not met, then the cylinder must not be filled.

After filling a gas cylinder check that:

- it is within its safe operating limits, it is not overfilled or overpressurised. In the event of inadvertent overfilling, any excess gas must be removed in a safe manner and the cylinder checked for further fitness for service;
- the cylinder’s valves, fittings and regulators are not leaking, for example by using special equipment, such as ‘sniffers’ or manometers. If appropriate, the simple method of using a soapy water solution can be adopted.

Handling and use
Use gas cylinders in a vertical position, unless specifically designed to be used otherwise. Securely restrain cylinders to prevent them falling over. Always double check that the cylinder/gas is the right one for the intended use. Before connecting a gas cylinder to equipment or pipework make sure that the regulator and pipework are suitable for the type of gas and pressure being used.
When required, wear suitable safety shoes and other personal protective equipment when handling gas cylinders. **Do not** use gas cylinders for any other purpose than the transport and storage of gas. **Do not** drop, roll or drag gas cylinders. Close the cylinder valve and replace dust caps, where provided, when a gas cylinder is not in use.

Where appropriate, fit cylinders with residual pressure valves (non-return valves) to reduce the risk of back flow of water or other materials into the cylinder during use that might corrode it (e.g. beer forced into an empty gas cylinder during cylinder change-over).

**Lifting**
Use suitable cradles, slings, clamps or other effective means when lifting cylinders with a hoist or crane. **Do not** use valves, shrouds and caps for lifting cylinders unless they have been designed and manufactured for this purpose. Gas cylinders **should not** be raised or lowered on the forks of lift trucks unless adequate precautions are taken to prevent them from falling.

**Transport**
Fit suitable protective valve caps and covers to cylinders, when necessary, before transporting. **Caps and covers help prevent moisture and dirt from gathering in the valve of the cylinder, in addition to providing protection during transport.** Securely stow gas cylinders to prevent them from moving or falling. This is normally in the vertical position, unless instructions for transport state otherwise. Disconnect regulators and hoses from cylinders whenever practicable. **Do not** let gas cylinders project beyond the sides or end of vehicles (e.g. fork-lift trucks).

**Storage**
Store gas cylinders in a dry, safe place on a flat surface in the open air. If this is not reasonably practicable, store in an adequately ventilated building or part of a building specifically reserved for this purpose. Gas cylinders containing flammable gas should not be stored in part of a building used for other purposes. Protect gas cylinders from external heat sources that may adversely affect their mechanical integrity.

Gas cylinders should be stored away from sources of ignition and other flammable materials. Avoid storing gas cylinders so that they stand or lie in water. Ensure the valve is kept shut on empty cylinders to prevent contaminants getting in. Store gas cylinders securely when they are not in use. They should be properly restrained, unless designed to be freestanding.

Gas cylinders must be clearly marked to show what they contain and the hazards associated with their contents. Store cylinders where they are not vulnerable to hazards caused by impact, e.g. from vehicles such as fork-lift trucks.
The five main sets of Regulations covering gas cylinders are:

The Transportable Pressure Vessels Regulations 2001 (SI 2001/1426)

The Carriage of Dangerous Goods (Classification, Packaging and Labelling) and Use of Transportable Pressure Receptacles Regulations 2004 (SI 1996/2092), as amended (CDGCPL2 Regulations)

The Gas Cylinders (Pattern Approval) Regulations 1987 (SI 1987/116) (Pattern Approval Regulations) for EEC-type cylinders cover the design and manufacture of EEC-type cylinders (under European Directives 84/525/EEC, 84/526/EEC and 84/527/EEC) for both the domestic and EU markets.

The Pressure Vessels (Verification) Regulations 1998 (SI 1988/896) (Verification Regulations) cover the initial examination and verification of EEC-type cylinders (under European Directives 84/525/EEC, 84/526/EEC and 84/527/EEC) for both the domestic and the EU markets.

The Pressure Equipment Regulations 1999 (SI 1999/2001) (PE Regulations) cover within their scope the design, manufacture and initial integrity of cylinders used in breathing appliances and portable fire extinguishers, together with valves and other accessories used with these gas cylinders which have a direct safety function. For periodic examination these cylinders are governed by the requirements of the CDGCPL2 Regulations.

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