The transport, storage and use of compressed gas cylinders

RISK ASSESMENT: THE TRANSPORT, STORAGE AND USE OF COMPRESSED GAS CYLINDERS

Hazards

- Pressurised gas cylinders are very heavy - up to 80 kilos - and unstable objects and as such can present considerable danger to those handling them.
- They contain gas which may be toxic, asphyxiating or flammable and at high pressure.
- Apart from the chemical risk from these gases, serious physical damage can be caused by exposure to the full force of escaping gas - a cylinder pressure of 300bar is equivalent to two tons per square inch.
- Gas cylinder valves are very robust and difficult to break. However gas pressure regulators are much less robust and if damaged may allow the catastrophic escape of gas.

Risk

For an untrained person, the most probable source of injury is from incorrect fitting of the pressure regulator allowing the escape of gas (likely) or from a falling cylinder (unlikely). Resulting injuries may be moderate to severe.

Who is likely to be injured?

A falling cylinder or exposure to high pressure gas is likely to injure only the user of the cylinder however if equipment is blown apart by excessive pressure or toxic or asphyxiating gases escape the damage may be widespread within a laboratory or beyond.

Control Measures

- **Physical**: Cylinder trolleys to be supplied for transport. Secure racks for storing. Gas line installation may be undertaken only by trained staff: lines to be leak tested before commissioning and inspected/tested at suitable intervals thereafter.
- **Manual Handling**: It is important that users only of appropriate physique attempt to collect or to move these objects.
- **Siting**: Cylinders are to be kept in suitable racks or stations outside laboratories but where this is not possible they may be kept in suitable, secure racks within laboratories or, in exceptional circumstances, secured in cylinder trolleys.

**CYLINDERS MUST NEVER BE LEFT FREESTANDING.**

The number of gas cylinders at any site must be kept to a minimum.

Flammable/fuel gases such as Hydrogen or Methane must never be stored in the same rack/site as Oxygen: a separation of 3 metres or fire-resistant wall is required.

Training:

Newcomers must attend training at the beginning of the Session.

P.P.E.: Safety glasses or face shield should be worn when locating or removing the pressure regulator and when opening the spindle valve.

Suitable closed-toe shoes to prevent crushing when moving cylinders.

Operating Precautions

- The cylinder should be checked to ensure that it contains the expected gas by examining the label and (less reliable) the colour code.
- The cylinder must be transported on an approved trolley by pushing and not by pulling. If the trolley shows signs of wear or damage, it must be taken to the Mechanical Workshop where it may be repaired or replaced.
- The cylinder must be secured firmly in an approved location.
- CYLINDERS MUST NEVER BE LEFT FREESTANDING.
- The Pressure Regulator should be checked. Is it designed for the gas to be controlled?
  - The pressure rating: is it capable of coping with the pressure in the cylinder?
  - Is the regulator marked with a red line to indicate the maximum pressure to be applied to the experimental apparatus?
  - Is it damaged? Damaged regulators should be returned to the Mechanical Workshop for repair/exchange.
- Correctly fitting tools/spanners should be used when fitting regulators to avoid damage to the screw fittings.
- Oil or grease must never be used, especially on an Oxygen cylinder: the oil or grease may ignite or explode - and PTFE tape or jointing compound should never be used to attempt to seal leaks.
- **N.B. Flammable gas cylinders have a left hand thread.**
- A Teepol/water solution may be used to check for leaks around the regulator.
- The regulator should be turned to zero before opening the valve at the spindle - slowly and never by more than one turn - and when not in use, the valve closed at the spindle.
• Cylinders must **NEVER** be transported with their regulators in place.

**Remaining Risks**

These should be slight if the precautions outlined above are followed.

**Emergency Procedures**

- Escape of gas: If the gas escape is large, the procedure described in “What to do in case of.”
- For the escape of toxic materials should be followed:- even an inert gas can kill by asphyxiation.
- For small non-toxic leaks, a member of Staff should be informed, and the room ventilated, evacuated, sealed and secured.
- Warning: Hydrogen leaks from a high-pressure cylinder may ignite spontaneously.

- **Falling Cylinder:** If a cylinder falls over, no one should EVER attempt to catch it. It is much too heavy and will cause serious injury. It is also very robust and is unlikely to be damaged although it may make a loud noise. Competent help should be called to assist in setting it upright.

**References:** Refer also to the Risk Assessment “Use of Flammable, Explosive and Toxic Gases”.