

WHS Guidelines - Compressed Gases

1. Scope

These guidelines are applicable to all environments where compressed gases are used. The purpose of this document is to detail minimum requirements for transporting, storing and working with compressed gases, to list common hazards and mitigation strategies and to provide information to assist personnel when conducting risk assessments and developing proper and safe procedures and appropriate documentation.

2. Introduction

When conducting risk management activities, managers and WHS delegates should:

- Ensure that minimum requirements are in place
- Using the hazard summary table below and their experience and expertise, identify any other hazards in the environment and implement appropriate mitigation strategies

3. Definitions

Compressed gases will be defined here as cylinders in which a gas or mixture of gases is stored under pressure.

4. Minimum Requirements

- All compressed gas cylinders must be properly restrained, whether in use, being stored or being transported - this includes "empty" cylinders. Cylinders being stored or in use will be secured to a fixed structure. Cylinder restraints must be around the main cylinder body at a height that will prevent them from falling over.

5. Hazard Summary Table

Hazard	Possible consequences	Mitigation Options
Asphyxiation	Serious injury or death	<ul style="list-style-type: none"> - Relocation of gas cylinders to an external environment - Only minimum practical quantities of compressed gases be kept and used inside buildings - Improve ventilation - Install oxygen monitoring equipment - Do not ride in lift with compressed gas bottles
Toxic gasses	Serious injury or death	<ul style="list-style-type: none"> - Install gas monitoring devices

		<ul style="list-style-type: none"> - Relocation of gas cylinders to an external environment - Consider less toxic alternatives - Design processes to minimise risk of exposure - Have emergency procedures in place - Read and ensure MSDS are available for all gasses in use
Flammable gases	Explosion, fire, serious injury or death	<ul style="list-style-type: none"> - Ensure acetylene installations comply with AS4289 - 1995 - Ensure fire fighting equipment is available in the vicinity
Pressure vessel failure	Serious injury or death	<ul style="list-style-type: none"> - Ensure all cylinders are properly certified before use - Minimise accidental damage by properly securing cylinders during transport and use

6. Hazard Descriptions

(a) Asphyxiation

There is a risk of asphyxiation if oxygen is displaced by any gas. If the volume of gas released is sufficiently high relative to the volume of the room then asphyxiation could occur. Mitigate by relocating cylinders to remote location, using smaller cylinders, improvements to ventilation, and installing oxygen sensors.

Compressed gases must not be transported in occupied lifts, because of the danger of asphyxiation in the event of a leak, especially in the event of a lift breakdown. Appendix 1 provides instructions for transporting compressed gases in passenger lifts.

(b) Flammable and toxic gasses

The minimum concentration of a particular combustible gas or vapor necessary to support its combustion in air is defined as the Lower Explosive Limit (LEL) for that gas. Below this level, the mixture is too "lean" to burn. The maximum concentration of a gas or vapor that will burn in air is defined as the Upper Explosive Limit (UEL). Above this level, the mixture is too "rich" to burn. The range between the LEL and UEL is known as the flammable range for that gas or vapor.

Gases can also be toxic to human health. MSDS sheets define the toxicity and LEL and UEL levels. Where flammable and/or toxic gases are used indoors, a lower explosive limit sensor and gas-monitoring device should be installed.

In addition, always use non-spark tools and keep away from ignition sources.

Installations of oxygen and acetylene gas reticulation systems, must comply with AS 4289 – 1995. A copy is available with the School Safety Officer

(c) Pressure vessel failure

Improperly handled or damaged gas cylinders or valves/regulators can fail catastrophically, with the potential to cause serious injury or death. Ensure only properly certified cylinders are used and minimize accidental damage to cylinders by always properly restraining all cylinders to a fixed structure. Cylinders should only be transported using specialised equipment designed for the purpose.

7. General information

Restraint

All compressed gas cylinders must be properly restrained to a fixed structure, whether in use, being stored or being transported - this includes "empty" cylinders. Cylinders should be restrained around the main body and not around the neck, at a height that will prevent them from falling over.

Storage

Where possible, cylinders should be stored in, and used from secure locations outside of buildings - only minimum practical quantities of compressed gases should be kept and used inside buildings.

Transport

Transport of compressed gas cylinders should be conducted with equipment designed for the purpose. Trolleys should be fitted with straps or chains. The goods lift should be used where possible to move cylinders between floors. Personnel should not enter the passenger lift with a gas cylinder but should make use of "no entry signs" during transport (See appendix 1).

Environmental Monitoring & ventilation

Ensure that areas in which compressed gases are used are well ventilated. Monitor air quality for toxicity, oxygen concentration and lower explosive limit.



8. Appendix 1 – Procedure for using the Lift

Personnel should never travel in the lift with compressed gases.

To move compressed gases between floors, load into lift just inside the door and attach a sign:

**Compressed Gas
DO NOT ENTER LIFT
(Asphyxiation Hazard)**

Go to destination floor (preferably have another person waiting to receive) and unload lift.