Storage and Handling of Gases in Cylinders

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Document no. SMS-06-SW-0196	**Job title/description** Storage and handling of gases in cylinders
Review date	**References** OHS Regulation 2001 Chapter 6 and 6a WorkCover Code of Practice for Storage and handling of dangerous goods 2005 AS4332 – 2004 The storage and handling of gases in cylinders AS1596 – 2002 The storage and handling of LP gas

Responsible supervisor *Insert name in BLOCK letters*	**PPE and precautions**	**Competencies or qualifications**	**Licences or permits required**

Tools and equipment required

IF CONTROL MEASURES ARE NOT SUITABLE AND MAJOR CHANGES ARE NEEDED, CONDUCT A RISK ASSESSMENT AND DEVELOP NEW CONTROLS ACCORDING TO SMS-06-PR-DRAFT WORKPLACE RISK MANAGEMENT.

General	Applies to industrial gases such as acetylene, oxygen, argon and LPG. Applies to the transport of small (ie less than 25L water capacity, or 1xE size) gas cylinders in work vehicles. **Does not apply to storage in tanks or storage of cylinders over minor quantities**. The following hazards exist from storage and handling of gas in cylinders: • physical demands of manual handling and moving cylinders • cylinders falling • explosive rupture of the cylinder • fire • reactivity (including decomposition of other materials); and • creation of an oxygen-enriched atmosphere or unsafe atmosphere, particularly in confined spaces • Material Safety Data Sheets must be available in the workplace where cylinders are stored, used and handled.
Handling gas cylinders	The following precautions must be taken when moving cylinders: • valves must be closed and valve protection devices (where provided) must be in place • a suitable trolley or lifting device must be used for moving cylinders in an upright manner, with cylinders securely restrained, and in a manner that cannot cause damage to valves or regulators (where applicable) • cylinders must not protrude horizontally from any device used for their movement except where being lifted by forklift trucks for loading or unloading purposes • cylinders must not be dropped or rolled over the side of trucks • care must be taken to ensure cylinder valves are not damaged Empty or partially full cylinders must be assumed to be full and handled accordingly at all times.
Transporting small gas cylinders in vehicles	• Cylinders of flammable gas (eg LPG, propane or acetylene) must not be left in the boot of a car or in an unventilated van. • Cylinders must be restrained to prevent movement and kept upright if containing a flammable gas, except where specifically designed (forklift LPG cylinders). • The restraint must be strong enough to prevent movement in the event of a collision. • Where tradespersons need to transport cylinders of gases as part of their regular job, a specific ventilated cabinet or compartment should be installed in their vehicle. • Where utility vehicles are used, any gas cylinders must be secured against theft and movement during transport.

Storage and Handling of Gases in Cylinders

Inspection of gas cylinders	Cylinders, their fittings and safety devices must be: • visually inspected prior to use for obvious damage and leaks • periodically inspected for leaks by applying soapy water and looking for bubbles • visually inspected to ensure it is marked as being tested at the correct intervals. Gas cylinders must be regularly tested. Dry gases must be tested every 10 years and liquid or corrosive gases more frequently (refer to the suppliers instructions). The last test date is stamped on the cylinder near the valve or on the collar, or on the footring of some small cylinders (eg LPG). If the last test date is outside the test period it must be replaced.
Use of gas in cylinders	Implement the following controls for all gases in cylinders: • only open or close the valves using appropriate equipment – do not use excessive force to try and stop leaks as this could further damage the cylinder valves • fit the gas-tight outlet cap or plug when not in use • only use cylinders where the contents are completely identifiable – do not rely solely on the colour • smoking is prohibited in all gas stores • gas must not be discharged directly from a cylinder to the atmosphere except in a controlled manner and for a specific purpose, eg for purging and depressurizing.
Cylinder storage of on site	Areas in which gas cylinders are kept must: • be away from any artificial sources of heat, eg radiators, boilers or steam pipes, except when there has been prior consultation with the cylinder supplier on the particular circumstances, and • be kept clear of combustible materials, vegetation and refuse (3m clearance), • be provided with adequate ventilation at all times, • have a flat concrete floor that drains away from the cylinders • be free from obstructions or obstacles that may restrict access to and egress from the storage area (ie although the cylinders must be secured against unauthorised access, the area surrounding the store should be readily accessible in an emergency) Cylinders that were delivered to site first must be removed from stores and used first (ie first in - first out). Empty cylinders awaiting pick-up/return must be collected and stored in the gas cylinder storage area of the compound but separated from full cylinders.
Oxygen/oxidising gases	Very high concentrations of oxygen can support violent combustion, even of metals. When heated, many materials that are considered non-combustible under normal conditions become combustible in the presence of oxygen – even steel and aluminium. When in contact with organic materials (eg wood, grease, oil, rubber, plastics etc) oxygen can create a risk of explosion and in some cases can detonate. Oxidising gases must be stored at least 3m away from flammable gases except where stored on a trolley as a set*. Oxygen must not be used as a substitute for compressed gas. Keep oxygen cylinders and fittings meticulously clean Oxygen must not be used where it could lead to an oxygen enriched atmosphere (eg confined space) except where appropriate precautions are taken, eg alarm.
Flammable gases	Flammable gases must not be stored under light fittings unless they are intrinsically safe and comply with AS/NZS2381.1. Hazardous areas surrounding stores containing flammable gases must be identified according to AS2430.1. Forklift trucks used in indoor flammable gas stores must comply with AS1915 or AS2359.
Acetylene	Acetylene must be kept upright. Open the valve slowly, as rapid opening can lead to static electricity sparks or solvent loss. Pure acetylene can decompose explosively as a result of contact with a hot body, static spark or compression (shock) heating. Handle carefully so as to not permit shocks – rough handling or heating due to shock may result in delayed explosion. Avoid copper and brass reticulation as acetylene can react explosively with these materials.

Storage on trolleys

Gas cylinders may be stored in trolleys as long as they are:

- secured (ie locked) in the trolley, and
- the trolley is:
  - separated from other Dangerous Goods stores by a minimum distance of 3m
  - located not less than 1m from any door, window, air vent or duct
  - positioned on flat ground such that it is well clear of vehicle movement and unauthorised personnel
  - not stored indoors, and
  - secured from unauthorised access.

Where LPG and oxygen are stored on a trolley:

- the aggregate capacity of the cylinders on the trolley must not exceed 160L
- the capacity of the LPG cylinder must not exceed 110L

Signage

Minor gas cylinder storage areas must have the following signs fitted:

- A warning sign to prohibit smoking and exclude sources of ignition, eg DANGER: NO SMOKING, NO IGNITION SOURCES
- A warning sign to restrict entry, eg RESTRICTED AREA, AUTHORIZED PERSONNEL ONLY

Signs must conform to AS1319.

Training

Training must be provided in:

- the nature of the work and safe methods of operation
- specific manual handling procedures
- properties and hazards of gases and cylinders being handled
- location of first aid equipment and first aid measures
- correct use, care and maintenance of PPE
- emergency actions for various scenarios, eg leak, fire, explosion.

Maximum storage capacity

The quantity of gases in cylinders in each storage depot must not exceed the following:

TABLE 1 MAXIMUM QUANTITIES OF GASES IN CYLINDERS

CLASS OF GAS	EXAMPLE	MAXIMUM CAPACITY WATER CAPACITY (L)*
2.1 Flammable gas	Acetylene	500L (ie not more than 10xG size cylinders)
2.2 Non-flammable, non-toxic gas	Argon	2000L (ie not more than 100xG size cylinders)
2.2 with Class 5.1 subsidiary risk	Oxygen	1000L (ie not more than 50xG size cylinders)
2.3	Anhydrous ammonia	50L (ie not more than 1xG size cylinder)
Mixed classes where quantity of each subclass is not exceeded		2000L (ie not more than 100xG size cylinders)

* Where quantities exceed those listed, the storage area may require additional provisions relating to emergency service manifests, segregation of cylinders, placarding, and fire protection. Those additional requirements will also rely on the class of gas. Refer to AS2022, AS1894, AS2927, AS3961, AS1596 and AS4332 for more information.

Additional controls