Guideline: Gas cylinder practices

Purpose
This guideline provides information for the safe handling and storage of gas cylinders within the University, including:

- Hazards associated with gas cylinders
- Acceptance of gas cylinders
- Storage of Gas cylinders
- Handling and use of gas cylinders

Guideline

Hazards associated with gas cylinders
1. Gas cylinders contain gases that are pressurised, liquefied or dissolved under pressure. Gas cylinders and their contents are potentially hazardous for numerous reasons. They are all hazardous due to the associated pressurised gas, but these gases may possess additional hazards, including being:
   - Flammable
   - Toxic
   - Corrosive
   - Asphyxiating
2. Due to these hazards, extra care is required to ensure that gas cylinders are used safely and in a manner that minimises the risks to health and safety of all. Thus the following instructions must be followed.

Acceptance of gas cylinders
3. At delivery, please inspect the cylinder. Do not assume that it is in excellent condition. Please ensure that:
   - It is the correct gas by inspecting the label. The label should be legible.
   - It has not been visibly damaged or affected by heat. All high-pressure cylinders should have a heat-deformation tag attached around the valve collar. If
this tag is deformed or not within the date specified – have the cylinder replaced by the supplier.

- Ultra high purity cylinders should have clean fittings, undamaged seats and threads and shrink wrapped.

**Storage of gas cylinders**

4. Gas cylinders should be stored in a designated gas storage facility. Gas cylinders may only be located in buildings if it is not reasonably practical to have the cylinder located at an outdoor location. A gas cylinder may only be located inside a building and connected for use following consultation with, and approval from, the ANU Work Environment Group.

5. No flammable or toxic gas cylinders are to be stored inside. A special toxic or flammable gas cylinder may only be located within a building and connected for use following consultation with, and approval from, the ANU Work Environment Group. These cylinders will need to be housed within a special ventilated gas storage cabinet with real-time gas monitoring. See: [gas sensor guidelines](#).

6. 50 L is the recommended maximum water capacity of a non–flammable/non–toxic gas cylinder in use, that may be located in a building and/or fire compartment. If additional gas cylinders are required a risk assessment approach must be applied with the assistance/approval of the Work Environment Group.

7. Check for heat, mechanical or chemical damage to the cylinder and its fittings

8. Gas cylinders must be protected from impact (by vehicles, machinery etc), chemicals and heat

9. Modern cylinders are plugged or PVC shrink wrapped for cleanliness. Keep this until the cylinder is connected.

10. Sources of ignition must be eliminated from areas storing gas cylinders.

11. Gas cylinders must not be stored with combustible materials. For example leaf litter must be regularly removed.

12. Gas cylinders must be stored in an upright position and secured by ropes, cables, chains or equivalent. Each cylinder must be secured individually.

13. Treat ‘empty’ cylinders as full. Ideally “empty” gas cylinders should be segregated from other cylinders and clearly labelled as being “empty”.

14. Gas cylinders must not be stored with other Dangerous Goods or chemicals.

15. Gas cylinders of differing dangerous goods classes must be separated by the distances indicated in the table below.
### Handling and use of gas cylinders

3. A gas cylinder trolley must be used when transporting gas cylinders. When situated on a trolley, each cylinder must be secured.

4. Where a gas cylinder is fitted with a safety cap, the cap must be used whilst transporting the cylinder.

5. All staff and students who handle or use gas cylinders should complete the [Compressed Gas and Cryogenic Safety training course](#) presented by the ANU Work Environment Group or local area training.

6. Solid, fully enclosed footwear must be worn in areas where gas cylinders are stored, handled or used. Other personal protective equipment may also be required as determined by risk assessment.

7. Compressed gas cylinders must only be operated when in an upright orientation.

8. Do not use oil or grease on a cylinder threads, regulators or any fitting.

9. Gas system parts must not be modified, tampered with, obstructed, removed, repaired or painted.

10. Check for leaks after connecting a gas cylinder to a gas system.

11. Close cylinder valves when not in use. Where toxic gases are to be used, the [Work Environment Group](#) should be consulted prior to their initial installation. These may also require active real-time gas monitoring – See: [gas sensor](#)

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guidelines.

12. When connecting the gas cylinder, ensure that the:
   • cylinder is secured correctly to its mounting bracket
   • cylinder and valve are inspected for damage. Do not connect a damaged cylinder.
   • plastic valve dust-plug or shrink wrap is removed. Brush or blow the valve if required to remove dirt. Use clean compressed oil-free air or nitrogen to blow out any loose particles (wear PPE). A clean, lint free rag may be used to clean the cylinder valve outlet, in particular, sealing surfaces. Do not ‘crack’ open the cylinder to clean the valve. Do not use cleaning cloths as they may leave oily residue or fibres.
   • valve outlet or regulator thread must be kept oil and grease free
   • ‘o’ rings, washers and seats are in good condition
   • Check the gas regulator to ensure it is appropriate for the gas and cylinder. Different thread exist for different gases.
   • regulator/connector is finger-tight, then apply a light nip with a spanner
   • regulator’s pressure-adjusting knob is in a free-moving (out) position before opening the cylinder valve spindle. Gradually increase pressure using the pressure adjusting knob of the regulator.
   • System is inspected for leaks (see below).
   • When you have finished using the cylinder or it is empty,
   • Close cylinder valve spindle, to hand tightness
   • Release pressure in the regulator

13. Gas systems should be designed to incorporate safety systems (eg flashback arrestors, flow control or flow restriction devices and pressure-relief valves).

14. Only tubing and materials that are compatible with the gases and pressures involved shall be used to connect gases from gas cylinders to equipment.

**Leak testing**

15. For additional information on leak testing please consult the gas cylinder or system manufacturer/installer or the Australian Standard.

| Once the regulator is connected | turn pressure-adjusting knob to increase pressure into the system |
Close cylinder valve | watch the gauges for a drop in pressure, indicating a leak
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If a drop in pressure is noticed | use water and a brush to locate the leak. Plain tap water or specialised leak-testing liquid may be used.
If a leak is detected | close cylinder valve and release pressure from regulator; check, clean and re-fit the affected part. Clean grooves and fit new ‘o’ rings if applicable. Use only the correct parts and seek knowledgeable help. If the leak cannot be rectified – DO NOT use the affected equipment – send for repairs
If no pressure drop is noticeable, there is no leak in the system | Use gas system. Check periodically for leaks

2. Do not assume that fittings you have not touched are leak free. Check all connections on manifolds, around gauges and fittings. Occasionally discolouration around the thread or joint may indicate problems. Be suspicious of stiff regulator adjusters as these may indicate a failed regulator.

3. Keep a log of cylinder usage. Unusual or excessive gas usage may indicate a fault or leak in the system.

**Additional information**

For more detailed information, see:

- Australian Standard 4332: The storage and handling of gases in cylinders
- Australian Standard 2243: Safety in laboratories
- [ANU Work Environment Group Gas Safety training course notes](#)
- Alternatively, contact the [ANU Work Environment Group](#).