



COMPRESSED GAS CYLINDERS

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Related Item: Compressed Gas Safety Fact Sheet

<http://capsnet.usc.edu/EHS/SafetyFactSheets/documents/EHSFactSheet0506.pdf>

1.0 PURPOSE

The purpose of this program is to ensure that employees handling compressed gases are adequately trained in the inherent hazards of the cylinders and their contents, as well as proper handling, storage, and use.

2.0 APPLICABILITY AND SCOPE

This policy applies to normally encountered storage, handling, transport, and safe use of compressed gas cylinders in University laboratories and general work areas.

In addition to the work practices included in this program, hazardous gases may require additional controls and work practices including, but not limited to, the use of gas cabinets, gas monitors, emergency shutoffs, proper equipment design, leak testing procedures, and the use of air supplying respirators for certain highly toxic gases. The Department of Environmental Health and Safety (UPC 213-740-6448 / HSC 323-442-2200) can be contacted for assistance with these requirements and to provide assistance with the safe design of equipment which involves the use of hazardous gases.

3.0 APPLICABLE REGULATIONS AND STANDARDS

- California:
- Title 8, Section 3301 – Use of compressed air or gases
 - Title 8, Section 3304 – Miscellaneous use of compressed cylinder gas
 - Title 8, Section 3305 – Misuse of oxygen prohibited
 - Title 8, Section 4649 – Construction and marking of cylinders
 - Title 8, Section 4650 – Storage, handling, and use of cylinders
 - Title 8, Section 4657 – General (Safety Relief devices for compressed Gas containers)

4.0 HAZARDS

There are two types of hazards associated with the use, storage and handling of compressed gas cylinders: the chemical hazard associated with the cylinder contents (corrosive, toxic, flammable, etc.) and the physical hazards represented by the presence of a high pressure vessel in the laboratory.

5.0 RESPONSIBILITIES

Work supervisors and lab Principal Investigators are responsible for assuring that the requirements of this section are followed by all persons under their supervision who use or handle compressed gas cylinders.

6.0 STORAGE OF COMPRESSED GAS CYLINDERS

Gas cylinders should be properly secured at all times to prevent tipping, falling or rolling. Observe the following precautions for storage of cylinders:

- Inside of buildings, cylinders shall be stored in a well-protected, well-ventilated, dry location, at least 20 feet from highly combustible materials especially oil and grease, or near any other substance likely to cause or accelerate fire. Keep cylinders with oxidizing gases (e.g. oxygen) at a minimum of twenty feet from flammable gas cylinders or combustible materials. If this can not be done, separation by a non-combustible barrier at least 5 feet high having a fire-rating of at least one-half hour is required.
- Assigned storage spaces shall be located where cylinders will not be damaged by passing or falling objects, or subject to tampering by unauthorized persons.
- Cylinders should be stored in assigned places away from elevators, stairs, or exits.
- Cylinders should be stored in areas where they are protected from external heat sources.
- Cylinders must be secured at all times to a fixed location (a wall, lab bench, etc.), by chains, metal straps, or other approved non-flammable restraints of sufficient strength to prevent the cylinder from tipping over. Two restraints are required per cylinder located at one third and two-thirds the height of the cylinder.
- Cylinders must be segregated by hazard class. At a minimum, oxidizers (such as oxygen) must be separated from flammable gases, and empty cylinders should be isolated from filled cylinders.
- Cylinders shall not be kept in unventilated enclosures such as lockers and cupboards.

7.0 SAFE USE OF COMPRESSED GAS

Observe the following safe practices for safely working with compressed gases:

- Be sure all connections are tight. Use soapy water to locate leaks.
- Keep cylinders valves, regulators, couplings, hose and apparatus clean and free of oil and grease.
- Keep cylinders away from open flames and sources of heat.
- Use flashback arrestors and reverse-flow check valves to prevent flashback when using oxy-fuel systems.
- Cylinders shall be used and stored in an upright position.
- The cylinder valve should always be opened slowly. Always stand away from the face and back of the gauge when opening the cylinder valve.
- Cylinder valves not provided with fixed handwheels shall have keys or handles on valve spindles or stems while cylinders are in service. In multiple cylinder installations only one key or handle is required for each manifold.

- Fire extinguishing equipment should be readily available when combustible materials can be exposed to welding or cutting operations using compressed cylinder gases (Refer to Hot Work Program http://capsnet.usc.edu/EHS/FireSafety/Welding/documents/hotworkprogram_000.pdf).
- Compressed oxygen shall never be used:
 - To purge pipe lines, tanks, or any confined area.
 - To supply head pressure in a tank.
 - In pneumatic tools.
 - In oil preheating burners.
 - To start internal combustion engines.
 - For ventilation.
 - For "dusting" clothing.
 - In any other way as a substitute for compressed air.

8.0 TRANSPORTATION AND HANDLING

Observe the following precautions for transporting cylinders in order to prevent them from creating a hazard by tipping, falling or rolling:

- Cylinders must be stored and transported in the upright position.
- All cylinders which are designed to accept valve protection devices shall be equipped with such devices when the cylinders are not in use or connected for use.
- Unless cylinders are secured on a special truck or rack, regulators shall be removed and valve-protection devices, when provided for, shall be put in place before cylinders are moved.
- Compressed gas cylinders in portable service shall be conveyed by suitable trucks to which they are securely fastened, and all gas cylinders in service shall be securely held in substantial racks or secured to other rigid structures so that they will not fall or be knocked over.
- Cylinder valves shall be closed before moving cylinders and when not in use. Valves of empty cylinders shall be closed.
- Leaking regulators, cylinder valves, hose, piping systems, apparatus and fittings shall not be used. Cylinder valves shall not be tampered with nor should any attempt be made to repair them.
- Valve protection devices shall not be used for lifting cylinders.
- Cylinders shall never be used as rollers or supports, whether full or empty.
- Cylinders must not be placed near electrical equipment where they might form part of an electric circuit.
- Avoid use a cylinder's contents for purposes other than those intended by the supplier.
- Acetylene must never be brought into contact with unalloyed copper, except in a blowpipe or torch.

9.0 LABELING REQUIREMENTS

Ensure that the gas cylinder, when received from the manufacturer or USC Materials Management, clearly identifies its contents with proper labeling. Note: Color coding is not a suitable method to identify cylinder content. Mark empty cylinders EMPTY or MT. The numbers and markings stamped into cylinders shall not be tampered with.

10.0 TRAINING

Review cylinder safety precautions, and any additional safety information for your work area, with individuals authorized to work with compressed gases. Additional compressed gas safety training can be obtained through the Department of Environmental Health and Safety and as part of the University's Laboratory Safety Course.

11.0 PROGRAM APPROVAL AND REVIEW

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