

# Compressed Gas Cylinder General Safety

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**UNIVERSITY OF  
GEORGIA**

Office of Research  
*Research Integrity and Safety*

## **I. Purpose & Scope**

The purpose of this document is to outline how students, faculty, and staff should properly procure and safely use, handle, store, transport, and remove compressed gas cylinders. The scope of this document is designed to make all University of Georgia personnel aware of how to protect themselves from the hazards related to the use, handling, and storage of compressed gas cylinders.

## **II. Responsibilities**

### **A. Office of Research Safety**

- Ensure that gas cylinders are being used, handled, and stored safely.
- Provide hazard analysis for Principal Investigators and Lab Supervisors bringing in new hazardous gases to their lab areas as requested.
- Correct any issues and deficiencies regarding compressed gas cylinder safety as necessary.

### **B. Principal Investigators and Lab Supervisors**

- Follow all usage, handling, and storage guidelines as outlined in this document.
- Train other lab workers and students on the safety guidelines.
- Ensure all lab personnel are following the guidelines established by this document.
- Track and document the gas cylinders that are used within the lab. This should include type and quantity of each cylinder.

## **III. Procedures**

### **A. Procurement of gas cylinders**

- Before purchasing compressed gases, each researcher should determine if they have the minimum engineering requirements necessary for storage and use of the gas. Some gases require continuous ventilation while others may require minimum segregation from incompatible gases. Please contact the Office of Research Safety (ORS) for any questions about these requirements.

- When receiving a gas cylinder do not accept it until the following items are verified:
  - The contents are identified either by labels or stencils,
  - It contains the appropriate DOT label, and
  - It contains a valve protection cap (if so designed).
- **Do not remove any labels or other form of identification from any gas cylinder.**

#### **B. Proper storage of gas cylinders**

- Cylinders should be stored in a dry and well-ventilated area away from direct heat. Individual storage areas shall be evaluated in the lab area on a case by case basis. Laboratories using toxic or highly toxic compressed gases shall have a continuous mechanically vented storage area (e.g., a fume hood or gas cylinder storage cabinet) per the USG Board of Regents. Pyrophoric gases shall also be stored in such an area which must be equipped with a sprinkler system.
- Storage areas shall not exceed 125 degrees Fahrenheit (52°C), and cylinders shall be stored nowhere near any source of ignition and flammable and combustible materials. Oxygen and oxidizing gas cylinders shall not be stored within 20 feet of flammable gases or highly combustible materials unless separated by a non-combustible barrier.
- Indoor storage areas shall not block any elevator, gangway, stair well, evacuation route, or any other passageway. Outdoor storage areas shall be on an elevated, level, and covered platform to prevent deterioration from rain, snow, ice, and full sun exposure.
- Storage areas need to have applicable signs with quantities, hazards, and gases listed. To request these signs or for assistance with filling them out, contact ORS.
- Programmable oxygen level or toxic gas sensing devices may be needed in certain areas where specified by code (i.e., poorly ventilated areas, toxic gas storage areas). The warning for hazardous gas exposure provided shall be both visually and audibly distinguishable. If you suspect that your area may need a monitor of any kind, contact ORS.
- Cylinders should be individually secured and strapped to a permanent structure approximately 1/2 to 3/4 of the way up the cylinder to prevent them from falling or being knocked over.
- Cylinders should always be stored with the valves closed. Regulators must be removed from all cylinders that are not being actively used and the safety caps should be put in place. Regulators should be stored in a clean and dust free environment, and either labeled or clearly marked in some other way in order to easily identify the types of compressed gases for which they are intended to be used.
- Gas cylinders should be stored in accordance with their chemical and physical properties. Consult the Safety Data Sheet (SDS) provided by the vendor if questions arise about their storage.

### C. Proper use and handling of gas cylinders

- Any cylinder with unknown or unmarked contents should not be used and be taken out of service immediately.
- All applicable PPE as referred to in the safety data sheet (SDS) of each individual cylinder should be donned while working with the cylinder.
- Only cylinders that are in use shall be kept in the laboratory unit. These include cylinders that are actively delivering gas to a laboratory operation or a single cylinder that is being kept on hand as a backup for the operation. When cylinders are not being used the main valve shall be tightened and the regulator should be promptly removed and replaced with a protective cap.
- Tags designating whether a cylinder is full, in use, or empty should be found on all cylinders. These tags can be [found here](#).
- Regulators should only be used for the type of cylinder for which they were made as they are incompatible with other types of cylinders. Cylinders without regulators or properly fitted regulators should never be used.
- Where permanent connection hoses and lines are in place for cylinder gases, they must be marked to identify the specific gas contained and the direction of flow per the USG Board of Regents.
- Teflon tape should never be used in connections as this can cause faults and leaks in the connection. Always use a wrench to properly tighten connections. Never tamper or modify connections of a cylinder or regulator.
- No open flame or hot work should take place around any cylinder under any circumstance to prevent an explosive atmosphere. Please contact a member of ORS if this type of work must be conducted around compressed gas cylinders.
- Leak detection should be performed by researchers when working with compressed gas cylinders, particularly those that present other hazards aside from simply being compressed gas (e.g., flammable, toxic, or corrosive). Primary methods for performing leak detection include one of the following methods:
  - A direct reading instrument or sensor
  - A liquid solution sprayed onto connections to see if bubbles appear. When using this method, it is imperative to make sure that the solution being used is compatible with the compressed gas being tested.
- If a leak is ever detected in a connection of a cylinder or the cylinder bottle itself then it shall be taken out of service immediately. If a leak is suspected in a flammable or toxic gas, evacuate the area immediately and inform the appropriate emergency response personnel.
- Never try to perform any self-repairs to connection or bottle leaks.

**D. Transportation of gas cylinders**

- While transporting cylinders they should be secured with a strap or chain and remain upright at all times.
- Protective caps need to be kept in place while moving cylinders for any purpose.
- Never roll cylinders on their sides as a transportation method.
- Never lift cylinders using the valve cap or stem.
- Cylinders should be transported using hand trucks. Stairs should never be used to transport cylinders of any size between floors. Only utilize elevators or lifts when transport between floors is necessary.
- Full and empty cylinders must be separated while transporting by vehicle.
- Different hazard class cylinders shall be separated while being transported by a vehicle.

**E. Removal of gas cylinders**

- Cylinders that are tagged as “EMPTY” should be removed from the lab area and picked up by the vendor in a timely fashion.
- Even when empty, compressed gases should still be separated and stored according to this document as they are still hazardous and can still contain a certain volume of gas in the canister.
- Small, disposable, empty lecture cylinders may be discarded in the lab trash after the valve stem has been removed. Small disposable lecture cylinders that are not empty may either be reacted off to render them empty, returned to the supplier or disposed of by a licensed gas cylinder disposal company. ESD shall be consulted prior to disposing of a cylinder using the preceding methods. Non-disposable cylinders must be returned to the supplier.

**F. Emergency Situations**

- Never try to handle the situation yourself if you have not had proper training or feel that you are in imminent danger at any time.
- During any leak or potential leak of hazardous gases that cannot be stopped by closing the cylinder on the container valve, immediately evacuate the area to avoid any exposure and inform the appropriate emergency response personnel. See emergency contacts below.

**G. Training**

- Lab personnel should be trained on the procedures set forth in this document during a lab opening, or if the types of compressed gases used in the lab is changing significantly.
- All new lab personnel should be trained on the procedures set forth in this document. Lab

personnel should be re-trained whenever there are deficiencies found in a lab's usage, handling, or storage of cylinders.

**IV. Contacts**

Office of Research Safety – 706-542-5288

Environmental Safety Division – 706-542-5801

Airgas Emergency Response Number (for use with emergency leaks from Airgas supplied cylinders): 800-523-9374

**V. References**

NFPA 45: Standard on Fire Protection for Laboratories, National Fire Protection Agency, 2015

NFPA 55: Compressed Gases and Cryogenic Fluids Code, National Fire Protection Agency, 2013.

Code of Federal Regulations, Occupational Health and Safety Standards, 29 CFR, 1910.101:  
Compressed Gases (General Requirements)

Design Criteria for Laboratories, 5<sup>th</sup> Ed., Board of Regents of the University System of Georgia, 2019