



COMPRESSED GAS CYLINDER SAFETY POLICY

Responsible Official: Chief Operations
Officer

Responsible Office: Environmental Health and
Safety

Policy Purpose

This policy specifies the requirements for the safe handling and storage of compressed gas cylinders used to support ETSU campus operations.

Policy Statement

Compressed gas cylinders are used at ETSU primarily for academic, research and maintenance purposes. Compressed gases are typically stored under pressure in metal cylinders. These cylinders can present a variety of hazards due to their pressure and/or contents. Improper use, handling, storage, or transportation can cause injury, death, or physical damage to property.

Therefore, it is the policy of the ETSU Office of Environmental Health & Safety (EHS) to assist all ETSU departments in complying with gas cylinder safety requirements and regulations. This policy covers all ETSU employees, contractors, vendors, and visitors that handle and store compressed gas cylinders.

Authority: Focus Act § 49-8-203 et. seq; 29 CFR 1952.10 – State of Tennessee Occupational Safety and Health Standards; Federal Occupational Safety and Health Administration (OSHA) regulations in 29 CFR 1910.101

Previous Policy: Compressed Gas Cylinder Policy 700.31 (2019)

Defined Terms

A defined term has a special meaning within the context of this policy.

Policy History

Effective Date:

Revision Date: 02/04/23

Procedure

I. Gas Cylinder General Safety Procedures

Compressed gases present unique hazards. Depending on the particular gas there is a potential for simultaneous exposure to both mechanical and chemical hazards. Gases contained within cylinders can be toxic, flammable or combustible, explosive, corrosive, poisonous, or present a combination of hazards. Adherence to the following general procedures, therefore, is essential for the appropriate handling and storage of compressed gas cylinders:

- A. Compressed gas cylinders should only be handled by those familiar with the hazards and who are trained in proper handling techniques. Know and understand the gases and associated equipment before handling.
- B. Gas cylinder maintenance should only be performed by trained personnel.
- C. Gas cylinders must always be secured (chained, strapped, etc.) at, or slightly above, their midpoint, in an upright position, during their use, transport, and storage.
- D. The contents of a gas cylinder must be identified with a label that is clearly legible and visible at all times.
- E. The status of a gas cylinder (i.e., whether it is empty, full, in service/out of service) must also be identified with a label that is clearly legible and visible at all times.
- F. Gas cylinder manufacturer original labels must never be removed or defaced.
- G. Refer to the suppliers Safety Data Sheet to determine the proper personal protective equipment (PPE) and any other special requirements for the gas being used.
- H. Store gas cylinders in a cool, dry, well-ventilated, and fire-resistant area.
- I. Gas cylinders should be visually inspected on a daily basis for corrosion, leaks and/or cracks around cylinder valves, piping, and regulators.
- J. Only soapy water should be used to detect gas cylinder leaks; NEVER use an open flame to detect gas cylinder leaks.
- K. Before removing the regulator from a gas cylinder, ensure that the cylinder valve is closed and that the regulator has been relieved of gas pressure.
- L. When a gas cylinder is not in use, the cylinder valve must be kept closed at all times (whether the gas cylinder is charged or empty).

- M. Valve outlets should be pointed away from all personnel when the valve is being opened.
- N. Valve connections should never be forced; if the regulator has to be forced, then it is most likely the *wrong* regulator for the gas cylinder.

II Gas Cylinder Classifications

A. Flammable Gas Cylinders

1. These cylinders should never be used near open flames, heat sources, oxidizers, non-explosion proof electrical systems, or ungrounded electrical equipment.
2. Spark proof tools should always be available and in use when working with or on a flammable gas cylinder.
3. "No smoking" signs should be posted near the area along with a fire extinguisher.
4. Examples are: Acetylene, Butane, Natural Gas and Propane.

B. Asphyxiant Gases

1. Inert asphyxiant gases may cause suffocation by reducing the oxygen levels to less than 19.5% in an immediate area.
2. Only specifically trained and qualified persons wearing a self-contained breathing apparatus should respond to an asphyxiant gas leak.
3. Examples are: Argon, Carbon Dioxide, Helium, Neon, Nitrogen and Xenon.

C. Oxidizing Gases

1. These gases should be stored separate from flammable gas cylinders and combustible materials.
2. There should be a 20-foot separation or a five-foot tall barrier with a 30-minute fire rating separating the oxidizing cylinders.
3. All valves, piping, fittings and regulators shall be of a material and pressure rating compatible with Oxygen.
4. Examples are: Chlorine, Fluorine, and Nitrous Oxide.

D. Corrosive and Toxic Gases

1. Exposure to these gases should be kept as low as possible, and within the exposure levels established by OSHA and ACGIH.
2. Corrosive and toxic gases should be stored in an adequately ventilated area, preferably in a separate room without any other occupancy.
3. Examples are: Carbon Monoxide, Hydrogen Cyanide, Hydrogen Sulfide, Phosgene, Hydrogen Chloride, Hydrogen Fluoride, and Sulfur Dioxide.

E. Cryogenic Gases

1. To prevent thermal burns when working with cryogenic gases, appropriate (PPE) should be worn including eye protection devices (face shield and safety glasses or goggles), loose fitting insulated gloves, an apron and cuff-less pants.
2. These cylinders should be provided with a pressure relief valve.
3. Examples are: Liquid Helium, Liquid Oxygen, Liquid Hydrogen, and Liquid Neon.

III. Gas Cylinder Storage Guidelines

- A. All compressed gas cylinders should be secured to prevent them from falling, tipping, or rolling over.
- B. Straps or chains connected to a wall bracket is acceptable as well as a cylinder stand as a means to immobilize the cylinders.
- C. When not in use, all cylinders should be capped and all valves securely closed.
- D. Cylinder storage areas should be clearly labeled with the names of the gases stored in that location.
- E. Storage areas should be dry, cool, and well ventilated.
- F. Cylinder storage area temperatures should not be extreme and should never exceed 125 degrees Fahrenheit.
- G. Charged and empty cylinders should be stored separately.
- H. Separate oxygen cylinders from fuel-gas cylinders.
- I. Upon the arrival of new shipments, cylinders should be rotated so that the older gases are used first.
- J. Cylinders should be grouped by their hazard classification.
- K. Special precaution should be taken to store cylinders away from highly ignitable substances, corrosive materials, and fumes.
- L. Cylinders should not be stored near elevators, walkways, building exits, unprotected platform edges, or in locations where heavy moving objects could hit or fall on them.
- M. All compressed gas cylinders in service or in storage at the user's location shall be secured to prevent falling/tipping/rolling, and they shall be stored and used with the valve-end extended upward.
- N. If gases of different types are being stored at the same location, the cylinders should be grouped by types of gas, and these groups should be arranged to consider the gases contained.
Example: Flammable gases should be stored a minimum of 20 feet from oxidizing gases.

IV. Transportation of Gas Cylinders

- A. Users of compressed gas cylinders shall ensure that they are not dragged in an upright position or dragged or rolled in a horizontal position.
- B. A suitable hand truck, forklift, or similar material handling device designed for cylinder transport should be used.
- C. One must ensure that the container is properly secured to the device.

- D. Personnel should take cautious measures to ensure that the handled cylinders do not strike against each other or other surfaces.
- E. Dropping or striking may damage the cylinder valve, which could turn the cylinder into a dangerous torpedo with the potential to injure personnel, or damage property.
- F. Never lift a cylinder by the cap.
- G. Personnel transporting gas cylinders must be familiar with the hazards associated with the gases they handle and they must know what to do in the event of a release.

V. Lecture Bottles

Lecture bottles are very small compressed gas cylinders, typically 2-3 inches in diameter and 12-18 inches in height. While most gas suppliers offer lecture bottles for purchase, many will not accept the empty or partially full cylinders back for disposal. Lecture bottle disposal can be very costly, depending on the original contents.

ETSU researchers should only purchase lecture bottles that can be returned to the distributor. Most distributors, including the most commonly used sources at ETSU, do offer a returnable cylinder, although in some cases, these cylinders are slightly larger than typical lecture bottles. Also, keep in mind that distributors' policies toward lecture bottles are subject to change. In order to avoid costly disposal fees and potential hazards involved in emptying and cutting the cylinder, it is worthwhile to purchase a returnable cylinder, even if it is a bit more than what you need.

If you have unneeded lecture bottles, first call the manufacturer or distributor and ask that they pick up the cylinder for return. If they will not accept the cylinder, the [Office of Environmental Health and Safety \(EHS\)](#) (439-6028) can help coordinate the disposal with one of our vendors.

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Related Form(s)/Links

[U.S. Dept. of Labor OSHA Compressed Gas Overview/Standards](#)

Scope and Applicability

Primary:

Secondary: