

UT Health Science Center HM5200 - Compressed Gas Policy	
Version: 2	Effective Date: 11/20/2023

Objective

The University of Tennessee Health Science Center (UTHSC) has developed a Compressed Gas Policy in accordance with the Occupational Safety and Health Administrations (OSHA) compressed gas standards as found in 29 CFR 1910.101. Also referenced within this policy are regulations as they pertain to the Department of Transportation (DOT) Hazardous Materials Regulations 49 CFR 171-179, DOT Hazardous Materials Regulations 14 CFR 103 and the Compressed Gas Association (CGA) guidelines. It is the policy of UTHSC to permit only trained and authorized department members to handle, store, use and inspect compressed gases and equipment. The written Compressed Gas Guidelines describes methods and practices for care and use of compressed gases for managers, supervisors and department members at UTHSC.

Scope

This program covers all University department members working within University owned, leased or subsidiary facilities. Contractors engaged by the UTHSC are required to review, understand and follow all University safety policies and procedures while on-site.

Roles

Facility Supervisors/Principal Investigators/Lab Managers

- Shall make sure that each employee is properly trained in the proper use and handling of all compressed gas cylinders in their area.
- Shall periodically inspect cylinders to verify that they are properly secured, labeled and properly closed or open.

Definitions

- CGA- Compressed Gas Association
- DOT- Department of Transportation
- NFPA- National Fire Protection Association
- OSHA- Occupational Safety and Health Association

Background

According to OSHA, a compressed gas is defined as the following:

- A gas or mixture of gases having, in a container, an absolute pressure exceeding 40 pounds per square inch (psi) at 70°F (21.1°C); or
- A gas or mixture of gases having, in a container, an absolute pressure exceeding 104 psi at 130°F (54.4°C) regardless of the pressure at 70°F (21.1° C); or
- A liquid having a vapor pressure exceeding 40 psi at 100°F (37.8°C) as determined by the American Society for Testing and Materials (ASTM) 323-72.

Compressed gases can be toxic, flammable, oxidizing, corrosive or inert. In the event of a leak, inert gases can quickly displace air in a large area creating an oxygen-deficient atmosphere, toxic gases can create poison atmospheres and flammable or reactive gases can result in fire and exploding cylinders.

Personal Protective Equipment

General requirements for the use of personal protective equipment include wearing protective gloves when using gases that are harmful to the skin. Aprons or other protective clothing may be needed depending on the risk of skin contact. University department members are instructed to consult the material safety data sheet before handling a compressed gas for appropriate manufacturer personal protective equipment recommendations.

Eye protection must always be worn when handling and working with compressed gases. In some cases, additional protection may be needed in the form of a face shield when working with compressed gases. Respirators are not currently required by the University with any work with compressed gases due to the specific work that is being completed.

Procedure

General Safe Practices for Handling/Storage

A. General Safety Requirements

1. All containers shall have their contents identified on the label.
 - a) Color shall not be used to identify container content.
 - b) Containers not bearing a legibly written, stamped, or stenciled identification shall not be used and shall be returned to the supplier.
2. The fittings on vessels should not be modified under any circumstances.
3. All compressed gas cylinders, either in use or in storage (empty or full), shall be secured in an upright position by means of a strap, chain or rack.

NOTE: Chains and straps secured to the wall should be attached to studs rather than sheet rock to ensure secure points of attachment and shall be around the upper third of the cylinder.

4. Suitable hand trucks, equipped with safety chains, shall be utilized when transporting gas cylinders. Cylinders shall not be rolled in the horizontal position or dragged. Never use the cylinder valve as a handle to move a cylinder.

5. Ropes, chains or slings shall not be used to suspend containers unless equipped with appropriate lifting attachments such as lugs. Where attachments have not been provided, suitable cradles or platforms to hold the containers shall be used for lifting.
6. Protective valve caps must be in place when cylinders are not in use. Do not switch caps, since not all suppliers use the same cap threads.
7. Container valves shall be closed at all times (full or empty) except when the container is in use. Valve outlets shall be pointed away from all personnel when the valve is being opened.
8. All cylinders, lines, and equipment used with flammable compressed gases shall be grounded. Cylinders used in conjunction with electric welding shall not be grounded or used for grounding.
9. When in use, all cylinders must be equipped with an appropriate regulating device. All regulators must be marked to identify the gas (or group of compatible gases) with which the regulator is to be used. Regulator threads must match cylinder valve outlet threads. Adapters shall never be used to attach a regulator to a cylinder that it is not designed.
10. When a cylinder is in use, a hand wheel, valve handle, spindle key or special tool to open the cylinder valve shall be attached to the cylinder so that it will be available immediately in the event of an emergency.
11. Cylinders containing compressed gases shall be used only in well-ventilated areas.
12. Cylinders containing toxic or flammable gases must be stored in an approved storage area. Approval will be made by Campus Safety and UTHSC Facilities.
 - a) Storage areas shall be prominently posted with the hazard class or the name of the gases stored.
13. Containers shall not be stored near elevators, walkway, unprotected platform edges, or in locations where heavy moving objects may strike or fall on them. Stored containers (inside or outside) shall not obstruct exit routes or other areas normally used or intended for the safe exit of personnel.
14. Cylinders containing oxidizing gases, such as oxygen and nitrous oxide, shall be stored separately from flammable gases or liquids. Separation will be 25 feet or by a fire-rated wall.
15. Flammable gases shall be stored in well-ventilated areas away from oxidizers, open flames, sparks, and other sources of heat or ignition.
16. Empty cylinders shall be so identified and stored separately from full or partially full cylinders.
17. Compressed gas cylinders shall be used only for their intended purposes.
18. Compressed gases should be handled only by experienced and properly instructed personnel.

Training

All personnel working with compressed gas cylinders shall be trained in safety and proper procedures. Detailed training requirements will be found in the Compressed Gas Guidelines document.

Training shall include the following as a minimum, as applicable:

1. General safety procedures for use with compressed gas cylinders or medical gases including:
 - a. Proper storage and handling of compressed gas cylinders
 - b. Safety hazards associated with the gases
 - c. Hazards associated with high-pressure cylinders
 - d. Hazards associated with the specific equipment
 - e. Hazards associated with contaminated tools, parts, etc.
2. Procedures to prevent cross connections of medical gas pipelines.

NOTE: Many older outlets are not inherently safe from cross connection due to common threads or fittings used for different gases.

3. Mechanical skills required for work on equipment.
4. Procedures to follow prior to any shutdown of a service or during an emergency.
5. Location, operation, and areas controlled for all valves. Training should be conducted and documented annually.

Training records shall be kept for at least three years.

Inspections

Campus Safety / Research Safety shall conduct hazard surveillance of all laboratories, and other areas on campus that use compressed gas cylinders (i.e. shop areas) annually.

- During the annual site visit the storage and use of compressed gas cylinders shall be evaluated. Deficiencies shall be noted on the standard inspection form and communicated to the responsible individual. The person responsible for the area that contains cylinder deficiencies shall make corrections and respond to the CAMPUS SAFETY.

For UTHSC, the various compressed gas vendors are qualified to determine that compressed gas cylinders at the campus are in a safe condition to the extent that can be determined by visual inspection.

Inspections of cylinders are conducted according to the following schedule:

- Upon delivery (visual)
- Per manufactures' recommendations thereafter.

University inspections of compressed gas cylinders are conducted as prescribed by the following, as applicable:

- 49 CFR 171 - 179 and 49 CFR 103 (Hazardous Materials Regulations under the Department of Transportation).
- Compressed Gas Association (CGA) Pamphlet C-6-2013 (Standards for Visual Inspection of Steel Compressed Gas Cylinders).
- Compressed Gas Association Pamphlet C-8-2005 (Standard for Re-qualification of DOT 3HT Seamless Steel Cylinders).

NOTE: The OSHA standard adopts by reference the Compressed Gas Association's (CGA) Pamphlets C-6-1986, C-8-1962, and P-1-1965. The Compressed Gas Association has updated the three pamphlets cited by OSHA as C-6-2013, C-8-2005, and P-1-2015.

If a cylinder is found unfit in its present condition, the University as per this policy requires that the vendor determine whether it can be repaired or must be scrapped. If a cylinder is repaired, it can only go back into service if the defect is corrected as specified according to the requirements listed above.

Responsible Official & Additional Contacts

Subject Matter	Office Name	Telephone Number (xxx) xxx-xxxx	Email/Web Address
Policy Clarification and Interpretation	Campus Safety and Emergency Management	901-448-6114	labsafety@uthsc.edu
Policy Training	Campus Safety and Emergency Management	901-448-6114	labsafety@uthsc.edu
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Related Policies/Guidance Documents

1. [Compressed Gas Association \(CGA\) Pamphlet, CGA P-1 \(2015\), "Safe Handling of Compressed Gases in Containers"](#)
2. 49 CFR 171 - 179 and 49 CFR 103 (Hazardous Materials Regulations under the Department of Transportation)
3. NFPA Codes 1, 43-A, 43-C, 45, 50-A, 51, 58, 70, and 77
4. [OSHA 29 CFR 1910, Subpart H](#)
5. [SA0100 - Safety and Environmental Health Program](#)

6. [SA0400 - Hazardous Material Safety](#)
7. [SA0700 - Safety and Environmental Health Responsibilities](#)
8. [Compressed Gas Guidelines](#)