



# University of New Haven

## POLICIES AND PROCEDURES

**Policy Title:**

**Compressed Gas**

**Policy & Procedure**

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**Responsible Office:** Department of Public Safety

**Responsible Official:** Associate VP of Public Safety & Administrative Services

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## **1.0 Policy Statement**

The University of New Haven has developed a Compressed Gas Policy and Procedure 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.

### **1.1 Purpose**

It is the University of New Haven's policy to permit only trained and authorized department members to handle, store, use and inspect compressed gases and equipment. This policy is applicable to daily users and those who only occasionally have cause to use the equipment. This written Compressed Gas Plan describes methods and practices for the care and use of compressed gases that can be read and understood by all managers, supervisors and department members at the University of New Haven. This written plan is intended to be used to:

- Create an awareness of the hazards among our workplace;
- Standardize procedures for use and care of the equipment;
- Provide a consistent format for training department members on the proper procedures to be used;
- Minimize the possibility of injury or harm to our department members; and,
- Demonstrate the University of New Haven's compliance with OSHA's compressed gas requirements.

### **1.2 Scope**

This program covers all University department members working within University owned, leased or subsidiary facilities.

### **1.3 Review**

The Associate Vice President of Public Safety will review and update this policy whenever necessary or at least annually.

- A walk-through of the facility, and/or
- Interviews with department members to determine whether they are familiar with the requirements of this program and if safety measures are being practiced.

All the elements of this policy are considered University of New Haven policy and may be enforced as such. Failure on the part of the department members to follow the policies and safety requirements of this Policy may result in disciplinary action.

## 2.0 Definitions

According to OSHA Hazard Communication Standard 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.

## 3.0 Roles and Responsibilities

The following individuals have these responsibilities with regard to this compressed gas policy.

### 3.1 Associate Vice President of Public Safety & Administrative Services

- Support and assist the department managers/department chairs on the full implementation of this safety program.
- Update the program as necessary to protect employee and student safety as outlined in section 1.3.
- Assure that appropriate training has been conducted with University staff.

### 3.2 Associate Vice President of Facilities

- Assure that all facility personnel that perform work associated with compressed gas and/or compressed air equipment follow the procedures outlined in this policy.

### 3.3 Director of Facilities

- Evaluate compressed gas and/or compressed air equipment at the University to ensure proper working order.
- Identify department members under facility direction that perform work associated with compressed gas and/or compressed air equipment.
- Assure that those department members under facility direction that perform work associated with compressed gas and/or compressed air equipment have the appropriate training and understand all aspects of safety associated with this equipment.

### **3.4 Department and Laboratory Managers/Department Chairs**

- Assure that equipment associated with the movement, storage and use of compressed gas cylinders is available and properly inspected before being used.
- Ensure department members conducting work associated with compressed gas and/or compressed air equipment have the appropriate training and understand all aspects of safety associated with this equipment.

### **3.5 Contractors**

- Are required to review, understand and follow all University safety policies and procedures while on-site.
- Provide appropriate personal protective equipment or other hazard control measures appropriate with work being conducted.
- Ensure all hazards are appropriately communicated to his/her department members as well as subcontractors working under their direction.

### **3.6 University Department Members**

All University of New Haven department members working with compressed gases are required to maintain safe work practices as outlined by OSHA and this policy.

- Department members include professors, adjuncts, teaching assistants, researchers, students and volunteers.

Additional department member responsibilities as it pertains to this policy include:

- Complete the University's compressed gas training prior to working with compressed gases in their respective departments.
- Wear the appropriate personal protective equipment for the task being performed.
- Inspect hazard control measures and personal protective equipment prior to each use.
- Maintain awareness of hazards associated with the handling and use of compressed gas.

## **4.0 University List of Compressed Gases and Equipment**

The compressed gases used at the University include the following:

- |             |                  |                   |
|-------------|------------------|-------------------|
| • Helium    | • Oxygen         | • Compressed Air  |
| • Nitrogen  | • Argon          | • Freon           |
| • Propane   | • Carbon Dioxide | • Liquid Nitrogen |
| • Acetylene | • Hydrogen       | • Nitric oxide    |

## **5.0 Personal Protective Equipment**

The hazards associated with compressed gases and equipment at the University of New Haven have been assessed and the University has taken measures to eliminate or reduce their presence with engineering and administrative controls. Where these controls were not enough for employee protection, all necessary personal protective equipment has been supplied according to the University's Personal Protective Equipment (PPE) Policy and Procedure.

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. Should these processes change and/or additional gases be brought on-site, department members are instructed to notify the Associate Vice President of Public Safety & Administrative Services so that a hazard analysis can be completed.

Staff are instructed to contact their department manager should there be any questions concerning the appropriate personal protective equipment needed for a specific task.

## **6.0 Inspection Procedures**

The University of New Haven's compressed gas vendor is 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-6-1968 (Standards for Visual Inspection of Steel Compressed Gas Cylinders).

- Compressed Gas Association Pamphlet C-8-1962 (Standard for Re-qualification of DOT-3HT Seamless Steel Cylinders).

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.

All compressed gas cylinders should be fixed with a tag declaring its status:

- Full: the cylinder has been delivered and the gas has not been utilized in any way yet
- In-Service or In-Use: the cylinder has been used, regardless of amount (aside from flushing the line/checking for leaks)
- Empty/MT or Used: this indicates that the cylinder has been utilized and must be returned to the vendor

## **7.0 Handling Procedures**

Compressed gases are considered to be handled when a department member performs any of the following activities:

- Fill, change gas service, maintain and move containers; and
- Connect containers and withdraw content.

The University follows the safe handling procedures found in the CGA pamphlet series, including the P-1-2015 pamphlet. The University's handling procedures include the following:

- Identify a gas and its dangers before using it. Look for this information on labels, SDSs and cylinder markings. If you do not know what is in a cylinder, do not use it.
- Examine cylinders as soon as you receive them. If you detect signs of damage or leakage, move them to a safe, isolated area and return them to the supplier as soon as possible.
- Use only regulators, pressure relief devices, valves, hoses and other auxiliary equipment that is designed for the specific container and compressed gas/cryogenic liquid to be used.
- Do not interchange equipment between different types of gases.
- Make sure valves, hoses, connectors and regulators are in good condition. Do not use cylinders without them.
- Use pressure relief devices and safety devices to help maintain cylinder or system pressure at the desired levels. (Exceeding the desired pressure could damage the cylinder or system.)
- Check to see if regulators, hoses and gauges can be used with different gases. Assume they cannot.

- Never open valves until regulators are drained of gas and pressure-adjusting devices are released. When opening cylinders, point outlets away from people and sources of ignition, such as sparks or flames. Open valves slowly. On valves without hand wheels, use only supplier-recommended wrenches. On valves with hand wheels, never use wrenches.
- Do not tamper with connections and do not force connections together.
- Do not hammer valves open or closed.
- Do not drop, bang, slide, clank or roll cylinders.
- Cylinders may only be rolled along the bottom rim.
- Do not let cylinders fall or have things fall on them.
- Do not lift a cylinder by its cap unless using hand trucks so designed.
- Use carts or other material handling equipment to move cylinders. Use ropes and chains to move a cylinder only if the cylinder has special lugs to accommodate this.
- Keep cylinders secured and upright. (But never secure cylinders to conduit carrying electrical wiring.)
- When transporting compressed gas cylinders, be sure the vehicle is adequately equipped to haul compressed gases safely.
- Do not move cylinders between different buildings on campus unless approved by Public Safety and Facilities departments.
- Know accident procedures.

## 8.0 Storage Procedures

The University follows the safe storage procedures found in the CGA pamphlet series, including the P-1-2015 pamphlet. The University's storage procedures for compressed gases include the following:

- Store cylinders upright and position containers properly.
- Post areas where gases are present.
- When a cylinder is in storage, keep the steel protective cap screwed on. This step reduces the chance that a blow to the valve will allow gas to escape.
- Group cylinders by types of gas.
- Separate combustibles.
- Store oxygen cylinders at least 20 feet from flammables or combustibles **or** separate them by a 5-foot, fire-resistant barrier.
- Keep oil and grease away from oxygen cylinders, valves and hoses.
- If your hands, gloves or clothing are oily, do not handle oxygen cylinders.
- Store full and empty cylinders apart.



- Store gases so that old stock is removed and used first.
- To keep cylinders from falling over, secure them with chains or cables.
- Store compressed gas containers in dry, well-ventilated areas away from exits and stairways. If storing compressed gas cylinders outside, store containers off the ground and out of extremely hot or cold environments.
- Do not store compressed gas containers in high pedestrian and vehicle traffic areas. (Containers are more likely to be damaged there.)
- Avoid corrosives or areas where container damage can occur.
- Make sure fire extinguishers near the storage area are appropriate for gases stored there.

## 9.0 Usage Procedures

The University follows the safe usage procedures found in the CGA pamphlet series, including the P-1-2015 pamphlet. The University's procedures for using compressed gases include the following:

- Remove any leaking containers to a well-ventilated area and post a warning of the hazard.
- Shut a leaking valve and tighten the valve gland or nut. Then try opening the valve; if it still leaks, close it and tag the container unserviceable.
- Make sure labels are legible before using containers; otherwise, return the containers to the supplier.
- Do not misuse containers (i.e., using them for support); only use them as they were intended.
- Keep containers away from fire, sparks, and electricity.
- Do not smoke or allow others to smoke in the vicinity of flammable compressed gas containers.
- Do not subject containers to extreme heat or cold.
- Contact the manufacturer/supplier with questions about safe handling.
- Always keep removable caps and valve outlet caps/plugs on containers except when connecting to dispensing equipment.
- Do not use oxygen and compressed air interchangeably. They are not the same.
- Comply with American National Standard Institute (ANSI) Z49.1 when using or storing oxyfuel-gas containers for welding and cutting and other similar activities.
- When empty, close and return cylinders. Empty cylinders must be marked MT or Empty. Empty acetylene cylinders must be labeled.
- Be sure valves are closed when not using the container and before returning containers. Properly label returning containers.
- Do not refill non-refillable containers once they are empty.

## **10.0 Compressed Gas Emergency Procedures**

In an emergency, University personnel are instructed to call the University of New Haven Police Department at X7070 or 203.932.7070 and await further instructions.

## **11.0 Training Program**

Each department manager/chair is responsible for assuring department personnel who handle, store or use compressed gas are appropriately trained. The Associate Vice President for Public Safety & Administrative Services shall assure that department managers/department chairs are following this portion of the policy. Under no circumstances will an employee handle, store or use compressed gas until he/she has successfully completed the University's compressed gas training program. This includes all new workers who will handle, store and use compressed gases, regardless of claimed previous experience. Individuals in the following departments will receive training:

- Facilities
- Science and Engineering Laboratories
- Shipping and Receiving as applicable

With the assistance of the University's Human Resource department, department managers/department chairs are responsible for identifying all new department members that require compressed gas training. Refilling gas cylinders and/or dewers are prohibited by all UNH faculty and staff, unless trained by designated vendor and EH&S approval. The Associate Vice President for Public Safety & Administrative Services shall assure that department managers/department chairs are following this portion of the policy. In addition, department managers/department chairs are responsible for coordinating with their staff to schedule the instruction for those department members previously identified in this policy as needing training. General training elements include the following:

- Compressed gases and equipment at the campus.
- Hazards of compressed gases and equipment at the campus.
- Personal protective equipment.
- Inspection procedures.
- Handling procedures. □
- Storage procedures.
- Usage procedures.
- Gas-specific safety procedures.
- Compressed gas emergency procedures.

## **12.0 Recordkeeping**

Each department manager/department chair shall maintain training records. Training records must be forwarded to the Associate Vice President for Public Safety and Administrative Services office.