

# Department of Environmental Health & Safety Procedures

## Compressed Gas Cylinder Program

**March 2010** 



## **Table of Contents**

- I. Introduction
- **II.** Policy
- III. Scope
- IV. Responsibilities
- V. Definitions
- **VI.** Methods of Compliance
  - A. Use and Handling
  - **B. Storage**
  - **C.** Transportation
  - D. Disposal
  - E. Training
- VII. Procedure Review and Continuous Improvement



## I. <u>INTRODUCTION</u>

The Occupational Safety and Health Administration (OSHA) standard 29 CFR 1910 Subpart H – Hazardous Materials provides the mandatory guidelines for working with near, or around compress gas cylinders.

The purpose of this program is to heighten employee awareness of the need to properly use, handle, and store compressed gases. Users of compressed gas must become familiar with the properties and inherent hazards of the products in use. Valuable information about each specific gas is contained in its product labeling and material safety data sheet (MSDS).

## II. POLICY

This procedure provides the minimum requirements to ensure that the Compressed Gas Cylinder Program is successfully and consistently implemented.

#### III. SCOPE

This procedure is designed to protect all Drexel University and Drexel University College of Medicine (DUCOM) personnel protection from the hazards of use, handling, and storage of compressed gas cylinders.

**Note:** This procedure excludes self contained breathing apparatus (SCBA), span gas, and other similar small cylinders.

## IV. <u>RESPONSIBILITIES</u>

#### A. Department of Environmental Health and Safety

- Develop and coordinate the implementation of the overall Compressed Gas Cylinder Program;
- Provide initial and refresher training and written instructions for the care, use and storage of compressed gas cylinders;
- Conduct periodic inspections and evaluations to determine the continued effectiveness of the program.



#### **B.** Department Management

- Implementation of the Compressed Gas Cylinder Program;
- Coordinate employee training schedules with the Department of Environmental Health and Safety; and
- Enforce the care, use and storage procedures of compressed gas cylinders as outlined in this program.

#### C. Employees

- Comply with the procedures outline within the University's Compressed Gas Cylinder Program;
- Use, handle, and store compressed gas cylinders in accordance with the instructions and training received.

## V. **DEFINITIONS**

<u>Compressed Gas</u> - Any gas or mixture of gases in a container having a pressure exceeding 40 psia at 70°F (21.1°C), or regardless of the pressure at 70°F (21.1°C), having a pressure exceeding 104 psia at 130°F (54.4°C), or any liquid having an absolute vapor pressure exceeding 40 psia at 100°F (37.8°C).

<u>Cylinder</u> - Generally a compressed gas container having a maximum water capacity of 1,000 lbs. (453.6 kg.). This is approximately the equivalent of 120 gallons (454.2 L).

<u>Handling</u> - Moving, connecting or disconnecting a compressed or liquefied gas container under normal conditions of use.

<u>Pressure Regulator</u> - A pressure and/or temperature activated device used to prevent the pressure from rising above a predetermined maximum, thereby preventing rupture of a normally charged cylinder when subjected to a standard fire test.

<u>Valve Protection Cap</u> - A rigid removable cover provided for container valve protection during handling, transportation and storage.



## VI. METHODS OF COMPLIANCE

#### **A.** Use and Handling

- MSDS's shall be reviewed prior to working with any chemical.
- Personal protective equipment shall be worn when using compressed gases.
- Cylinders shall be secured when in use.
- Never use cylinder if their contents cannot be identified positively.
- Colors shall not be used to identify container contents.
- Never bring cylinders into tanks, unventilated rooms, or other confined spaces.
- Use toxic, flammable, or reactive gases in fume hoods only.
- Never direct high-pressure gases at a person.
- Oxygen, nitrogen, or other gases shall never be used as a substitute for compressed air in pneumatic tools, in oil preheating burners, to start internal combustion engines, or to dust off clothing or equipment.
- Valve caps shall be secured anytime the regulator is removed from the cylinder.
- Never use a cylinder without a regulator.
- Carefully inspect valve and regulator threads and mating surfaces for traces of oil or grease.
- Ensure the regulator has the correct pressure rating for the cylinder being used.
- Do not use the regulator if oil, grease, or damaged parts are detected on the regulator, cylinder valve, or if the inlet filter is missing or dirty.
- Open the cylinder valve slowly. A cylinder not provided with a hand wheel valve must be opened with a spindle key, special wrench, or other tool provided or approved by the gas supplier.
- Before making connections to a cylinder valve outlet, "crack" the valve for an instant to clear the opening of particles of dust and/or dirt. Always point the valve and opening away from your body and not towards anyone else. Never "crack" a fuel gas cylinder valve near welding work, sparks, open flames, or other possible sources of ignition. If an acetylene cylinder sprays a mist when it is "cracked", let it sit for 15 minutes. Then try to "crack" the cylinder valve again.
- For oxygen and fuel gas cylinders release the pressure adjusting screw on the regulator to its limit, turn it counter clockwise until it is loose. Engage the adjusting screw and open the downstream line to the air to drain the regulator of gas.
- Open the cylinder valve slightly to let the needle on the high pressure gauge move up **slowly**. On an oxygen cylinder, gradually open the cylinder valve to its full limit. On an acetylene cylinder, never open the valve spindle more than 1 1/2 turns.



- Use a check valve or trap when making connections to prevent contamination or backflow.
- Before a regulator is removed from a cylinder valve, close the cylinder valve and release the gas from the regulator.
- Never lubricate, modify, force, or tamper with cylinder valves.
- Close the main cylinder valves tightly when not in use.
- Promptly remove the regulators from empty cylinders and replace the protective caps at once. Label the cylinder empty.
- Never use adaptors or homemade modifications.
- Be aware that rapid release of a compressed gas will cause an unsecured gas hose to dangerously and also may build up a static charge that could ignite a combustible gas.
- Always close the main cylinder valves tightly when not in use. Valve outlets should be pointed away from all personnel when the valve is being opened.
- The manually operated container valves shall be opened slowly. On valves without hand wheels, use the wrenches provided or recommended by the gas supplier. The wrench shall remain on the valve while the container is in use. On valves with hand wheels, do not use tools such as wrenches and hammers in attempting to open or close valves.
- Do not expose cylinders to temperatures higher than about 50 degrees Celsius. High temperatures may result in excessive cylinder pressure. Some rupture devices on cylinders will release at about 65 degrees Celsius. Small cylinders, such as lecture bottles, are not fitted with rupture devices and may explode if exposed to high temperatures.
- Compressed gas cylinders which leak shall be taken out of use immediately.
- In the event of a leak or suspected leak of a flammable gas, evacuate the building or area.

#### B. Storage

- Cylinders shall be stored in the upright position and secured with a cylinder stand or a non-combustible belt or chain.
- Always store cylinders with the caps on and valves closed.
- Cylinders shall not be stored with the regulator attached.
- Regulators shall be stored in a dust-free container.
- Cylinders shall be stored in a dry ventilated area.
- Gases shall be stored in separate hazard classes: Flammable, Asphyxiant,
  Oxidizing, Corrosive, Toxic, Cryogenic, High Pressure, and Pyrophoric. Some
  gases combine hazard classes, such as Hydrogen has both high pressure and
  flammable hazards.



- Do not store compressed oxidizers and flammables together.
- Oxygen cylinders and cylinders containing oxidizing gases shall not be stored within 20 feet of flammable gas cylinders or highly combustible materials unless they are separated by a 5 foot high 30-minute fire wall.
- Cylinders shall be stored away from all sources of ignition and from flammable and combustible substances and materials that are ignitable.
- The temperature of the storage area shall not exceed 125 degrees Fahrenheit.
- Container storage areas shall be prominently posted with the hazard class or name of the gases stored. No smoking signs shall be posted where appropriate.
- Cylinders shall not be stored near elevators, gangways, stair wells, or any other passageways.
- Cylinders stored outdoors shall be protected from the following:
  - i. Ground beneath to prevent bottom corrosion.
  - ii. Accumulation of ice and snow.
  - iii. Full sun exposure.

#### C. Transporting

- All cylinders shall be handled as high energy sources and therefore as potential explosives.
- Cylinders must be secured upright at all times with chains and/or cables.
- Protective caps shall remain securely in place to protect the valve stems.
- Cylinders shall remain strapped to properly designed wheeled carts to ensure stability.
- Use appropriate hand trucks and carts.
- Do not roll cylinders on their side or along the bottom rim.
- Do not lift and/or hoist cylinders by the valve cap or stem.
- Compressed gas cylinders shall not be used as rollers, supports, or for any purpose other than to contain and use the contents as received.
- Cylinders shall be grouped by hazard class.
- Keep full and empty cylinders apart.
- Prevent cylinders from falling, banging or from having objects fall on them.

## D. Disposal

- All compressed gases are considered hazardous and contain a certain volume of gas even if the gauge reads empty or zero.
- Empty cylinders shall be marked "empty" or "MT".



Unused and/or empty gas cylinders must be disposed of in a timely fashion.
 Contact the Department of Environmental Health and Safety for disposal and pickups.

#### E. Training

Employees using compressed gases are required to know the hazardous properties of the gases they handle. Employees shall be trained on all of the rules and regulations pertaining to compressed gas cylinders, including the proper use and handling, storage, and disposal.

Additional training shall be conducted in response to the following circumstances:

- Whenever changes in the workplace or this procedure render previous training obsolete;
- When inadequacies in the employee's use and handling indicate that the employee has not retained the requisite understanding or skill; and
- When any other situations arise in which retraining appears necessary to ensure effective use and handling, storage, and disposal of compressed gas cylinders.

## VII. PROGRAM REVIEW AND CONTIUOUS IMPROVEMENT

The Department of Environmental Health and Safety shall review the Compressed Gas Cylinder Program annually at a minimum to ensure that the procedure is current, practical, and compliant with all applicable regulatory requirements.