

Compressed Gases

Hazards associated with compressed gases include oxygen displacement, fires, explosions, and toxic gas exposures as well as the physical hazards associated with high pressure systems. Special storage, use, and handling precautions are necessary in order to control these hazards.



COMPRESSED GAS CYLINDERS:

Compressed gas cylinders are a common sight in UMCES laboratories. Because of the dangers the cylinders present, they're regulated by both OSHA and DOT. An awareness and understanding of the regulatory requirements for compressed gas cylinders is important for anyone who uses them. Three aspects of cylinders pose problems:

1. Gas cylinders are heavy and can cause an injury or physical damage if they fall over or are allowed to roll.
2. Contents of cylinders pose the physical hazards of being explosive, flammable, corrosive, and may pose a combination of hazards to those nearby.
3. They are pressurized and can become projectiles if a valve breaks off – and a regulator that becomes detached can also fly off at a dangerously high speed.

Here are five basic safety practices to use when working with or around gas cylinders: [Safe Handling of Compressed Gases](#)

1. Store cylinders properly.
 - a. Keep cylinders out of the sun and out of areas in which temperatures may exceed 125°F.
 - b. Keep away from sources of flame or sparks
 - c. Separate them by types of hazards their contents pose. For example do not store any oxidizers within 20 feet of flammable gases, unless the cylinders are separated by a firewall.
 - d. Store cylinders vertically, not on their sides. For example: Acetylene is unstable and therefore is usually dissolved into acetone and mixed with a porous material (diatomaceous earth or crushed firebrick) which helps to keep it stable. If stored on its side the liquid acetone could leak through the valve and create a fire hazard.



- e. Never use copper fittings or tubing with acetylene cylinders.
- 2. Keep cylinders secured.
 - a. Use straps, guards, or chains to secure cylinders. A cylinder can fall over and crush a foot, damage machinery, or cause a variety of other problems.
 - b. Never remove the cap until it has been secured.
 - c. Always use a cart when moving a cylinder. Do not drag or roll a cylinder.
 - d. Make sure the protective cap is in place before you move the cylinder, and never move a cylinder that still has a regulator attached.



3. Inspect cylinders before moving or using. [49CFR 171-177](#)

- a. Check the cylinder for any obvious damage.
 - b. Make sure it has a legible description of the contents, if it does not then do not use it.
 - c. Make sure the correct regulator has been attached.
 - d. Inspect the regulator and cylinder valves to verify that they haven't been compromised with solvent, dirt, or lubricants such as grease or oil.
 - e. Refer to the Safety Data Sheet (SDS) for the gas being used for information regarding use and toxicity.
 - f. Fire extinguishing equipment should be readily available when welding or cutting operations using compressed gas cylinders.
4. Open cylinders carefully. Opening them too quickly can cause high-pressure gas to damage the regulator and valve seats.



- a. Wear proper personal protective equipment (PPE) per the SDS.
- b. Start by relieving the regulator's spring force by easing off the pressure adjustment screw before you open the valve, and make sure the outlet is pointing away from you.
- c. Leaving the valve key or other tool in place will make it easier to close the valve quickly in the event of an emergency.
- d. If the valve appears to be damaged do not open it. Also, do not use lubrication to try to loosen stuck valves or components. Notify the supplier.
- e. The valve of cylinders with flammable gases should not be opened more than three-quarters of a turn to minimize the risk of an explosion and to ensure that you can close the valve quickly if needed.
- f. When working with gases that are toxic or cause irritation do not open the valve unless you are under a fume hood or protected by a similar ventilation device.
- g. Never use copper fittings or tubing with acetylene cylinders.

- h. Never use cast iron pipe for chlorine.
 - i. Do not use unnecessarily long hoses. Keep hoses free from kinks.
5. Follow procedures for empty cylinders.
- a. Always leave some residual pressure in the cylinder, rather than emptying it all the way.
 - b. Close the valve completely so that moisture or other contaminants cannot get into the cylinder.
 - c. Replace the protective cap.
 - d. Label the cylinder as empty, and store it away from filled cylinders.



A cylinder is defined by DOT as a pressure vessel designed for pressures higher than 40 pounds per square inch absolute (psia) and having a circular cross section. It does not include portable tanks, multi-unit tank car tanks, cargo tanks or tank cars.

Employers must determine that compressed gas cylinders under their control are in a safe condition, to the extent that this can be determined by visual inspection [29 CFR 1910.101(a)]. Visual and "other" inspections are required, but "other" inspections are not defined. These inspections must be conducted as prescribed in the Hazardous Materials Regulations of the Department of Transportation (DOT) contained in 49 Federal CFR Parts 171 and 14 CFR Part 103. Where these regulations are not applicable, these inspections must be conducted in accordance with Compressed Gas Association (CGA) Pamphlets D-6 and C-8.

According to 49 CFR 173.34 "A cylinder that leaks, is bulged, has defective valves or safety devices, bears evidence of physical abuse, fire or heat damage, or detrimental rusting or corrosion, must not be used unless it is properly repaired and requalified as prescribed in these regulations."

DOT requires basic information markings on all cylinders. Each required marking on a cylinder must be maintained so that it is legible.

There are many hazards associated with compressed gas handling, storage and use. Understanding the basic information marked on cylinders may aid in the visual inspection process which is key in accident prevention.

For more information and/or suggestions contact the Environmental Safety Compliance Officer (ESCO) at 410-221-8441 or Email <mailto:umces-safety@umces.edu>