

Toolbox Safety Topic

Compressed Gas Cylinder Safety

Compressed gas cylinders are used in many applications on campus. Oxygen and acetylene are probably the most common, since they are used for welding and cutting operations, and many laboratories use various specialty gases as well. Some of the gases being used, such as argon or nitrogen, can create a hazardous atmosphere by displacing the oxygen in the area. Gases, such as acetylene and hydrogen, are extremely flammable or explosive, and some gases may be toxic. In addition to these health hazards, cylinders are commonly pressurized up to 2,200 pounds per square inch! If the cylinder is not handled properly and the valve is damaged, this pressure can be released accidentally and uncontrollably—creating a dangerous physical hazard as well.

Clemson University reported an incident with a compressed acetylene cylinder (note that acetylene cylinders are only pressurized up to about 250 psig). The cylinder went through the roof of the building and traveled 1 ½ blocks, finally imbedding itself in the 40 yard line of their football field! Gases can escape at pressures of up to 30,000 mph and have been known to go through as many as 3 concrete block walls! Obviously, having the cylinder take off like a missile is not the preferred scenario. What other action would you prefer the cylinder to take? (spinning in place)

There are specific storage and handling requirements for compressed gas cylinders. But first, upon delivery of compressed gas cylinders, always perform a visual inspection before you accept delivery of the cylinder from the vendor. If the cylinder appears to be damaged, leaking, defective, or rusting, refuse delivery! Also, notify the supplier of any leaks or problems you experienced with a particular cylinder while in use so it can be inspected and removed from service after being picked up.

(As you go through this storage checklist, identify any deficiencies in your area and make a note to have them corrected.)

- ❑ If possible, do not store extra cylinders. Have the vendor deliver the quantity you need, when you need it. This will eliminate the need for storage areas.
- ❑ Cylinders should be stored in a dry, well-ventilated, fire-resistant area away from heat sources. Avoid exposing cylinders to direct sunlight.
- ❑ Post “Danger—No Smoking, Matches, or Open Flames” signs in the area.
- ❑ The storage location must be well protected to prevent accidental contact by vehicles and other equipment.
- ❑ Oil, solvents, chemicals, and other highly combustible materials should be located at least 20 feet from cylinder storage area.
- ❑ Valve protection caps should be in place and hand-tightened when the cylinders are not in use (i.e. in storage or overnight). This will protect the valve from accidentally being damaged and creating a potentially dangerous release of gas and pressure.
- ❑ Empty cylinders should be separated from full cylinders to avoid confusion. Always close the valve on empty cylinders and mark the cylinder as “empty” or “MT” to help clarify which cylinders are ready to be refilled.
- ❑ Oxygen and fuel gases, such as acetylene and MAPP gas, must be stored at least 20 feet apart, or be separated by a fire wall at least 5 feet in height with a fire rating of at least 30 minutes. This will avoid accidental mixing of vapors from the cylinders where leaky valves or other defects may exist.
- ❑ A 20-pound ABC-rated fire extinguisher should be placed between 25 and 75 feet from the fuel gas storage area for safe access.
- ❑ Cylinders, as well as any other chemical product, must be labeled as to their contents. Do not rely on cylinder color-coding for identification. Always check the markings on the cylinder.
- ❑ Always secure cylinders in an upright position. A cart, straps or chains connected to a wall bracket or other fixed surface are acceptable methods.

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Here are some safe handling tips when working with compressed gas cylinders.

1. When switching out empty cylinders, never roll or drag the cylinder or hook a cylinder by its protection cap to lift with cranes or hoists! The caps were not designed for this purpose and may fail. Cylinders may be secured onto a cradle, net, or cart and lifted with a hoist or forklift carefully.
2. Acetylene cylinders should never be stored or handled in a horizontal position. Acetylene cylinders are filled with a porous material and saturated with liquid acetone. When acetylene is pumped into the cylinder, it is dissolved into the acetone and held in a stable condition. If the acetylene cylinder is placed in a horizontal position, the acetone may leak out of the porous material leaving an explosive pocket of acetylene.
3. Compressed oxygen itself is not flammable, however, the presence of pure oxygen accelerates the combustion process and can be quite dangerous. Oil and grease in the presence of oxygen becomes highly explosive. Never use petroleum-based products to clean or lubricate oxygen cylinders, gauges, hoses, etc.
4. Always consult the product's MSDS (Material Safety Data Sheet) for specific information regarding the particular compressed gas you will be using, or which is present in your work area. The MSDS will give you information regarding the dangers of the gas, recommended safe use, and any personal protective equipment that should be worn when exposure is possible.
5. Before attempting to attach gauges to the compressed gas cylinder valves, "crack" the valve (a brief opening of the valve handle) to clear any openings of dust and debris. Gauges should be gas-specific and should not attach to the incorrect valve, for example, oxygen gauges have a right-handed thread and acetylene gauges have a left-handed thread so that they cannot be attached to the incorrect cylinder valve. Do not use adapters to override this feature!
6. If valve turn handles are missing and it is necessary to use a wrench to open the valves, the wrench must remain in place (on the valve) while the unit is in use.
7. Compressed gas cylinders in use must be secured with a chain in a cart or secured to the wall. Avoid using nylon straps for securing. They will melt in a fire and leave the cylinders unsecured in a very dangerous situation.

Suppose there is an accident involving a compressed gas cylinder, what would you do? If it takes off like a missile, make sure you are not in its path! If the cylinder is spinning in place, which is the preferred option, you should back out of the area, never taking your eye off of the cylinder, and take shelter until the gas is expelled. If the cylinder is interrupted while spinning, it may decide to take a straight path! Leave it alone and protect yourself. Your safety comes first!

Compressed gas cylinders must be handled and used with care. If you have any questions regarding the information provided here, or have concerns specific to your situation, please contact us at your convenience.

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Date: _____

Meeting Conducted By: _____ Title: _____

Attendees

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