

Compressed-Gas Cylinder Safety

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PURPOSE

This Bulletin provides information on a safety concern that may impact operations at Department of Energy (DOE) facilities. Specifically, the concern is the safe handling and storage of compressed-gas cylinders.

BACKGROUND

DOE records show that there have been 29 gas cylinder safety incidents over the last 5 years. In two cases, breached cylinders were propelled into the air, and in another incident, a pressure gauge blew off. There were seven cases where cylinders were dropped, toppled over, or unsecured. Twelve more occurrences involved leaks and release of gas.

WHAT ARE THE HAZARDS

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 (http://www.csb.gov/completed_investigations/docs/CSBPraxairSafetyBulletin.pdf).

In addition, there are hazards from the pressure of the gas and the physical weight of the cylinder. A gas cylinder falling over can break containers and crush feet. The cylinder can itself become a missile if the cylinder valve is broken off.

GENERAL CYLINDER SAFETY

- Accept only properly identified cylinders and do not rely on color codes.
- Wear safety equipment appropriate for the hazard potential of the gas before beginning work.
- If a cylinder or valve is noticeably corroded, the vendor should be contacted for instructions.
- A leaking cylinder should be removed and isolated in a well-ventilated safe area. It may be necessary to call in trained emergency response personnel.
- If the leak is at the junction of the cylinder valve and cylinder, DO NOT try to repair! Instead, contact the supplier.
- Cylinders manufactured before 1930 could explode – Report LL-2002-LLNL-17: (http://www.llnl.gov/es_and_h/lessons) *Unsafe Cylinders* (under Pressure / Noise / Hazardous Atmospheres).

CYLINDER USE AND STORAGE

- Leave cap on and valve closed when cylinder is not in use.
- Regulators should only be used for the gas for which they were designed and should not be interchanged. Do not force regulator connection fittings.

- Never drag, slide, or roll the cylinder; never transport with the regulator in place; and secure the cylinder to a suitable hand truck or cart during transport.
- Properly secure cylinders in a well ventilated and protected area away from heat, flames, and the sun.
- Segregated cylinders by hazard classes while in storage.
- DO NOT:
 - Purchase more or larger cylinders than necessary;
 - Store flammable gases next to an exit or near oxygen cylinders;
 - Use copper fittings or tubing on acetylene tanks;
 - Use Teflon[®] tape on cylinder or tube fitting connections, which have metal-to-metal face seals or gasket seals;
 - Permit oil or grease to contact cylinders or their valves, especially cylinders containing oxidizing gases.
- Discontinue use of the cylinder when it has at least 25 psi remaining; close valve to prevent air and moisture from entering. Return unused and empty cylinders to the vendor for reuse or refill.
- Mark or tag empty cylinders "EMPTY" or "MT." Separate empty and full cylinders during storage.

WHAT IF A CYLINDER IS NOT RETURNED TO THE VENDOR?

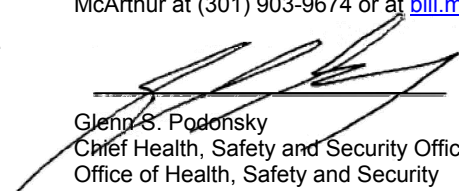
The contents of any cylinder (where the pressure in the cylinder exceeds atmospheric pressure) destined for disposal is solid waste and must be characterized to determine if hazardous waste regulations apply.

ADDITIONAL SOURCES OF INFORMATION

- Your Safety and Health Office.
- Online safety library on compressed-gas cylinders: (<http://www.pp.okstate.edu/ehs/links/gas.htm>).
- Online consolidated compressed-gas requirements: (<http://www.hss.energy.gov/nuclearsafety/techstds/standard/hdbk1139/hdbk11392003vol3.pdf>)

SUMMARY

Gas cylinder incidents can lead to serious consequences, but they can be avoided. If you have any questions, please contact Dr. Bill McArthur at (301) 903-9674 or at bill.mcarthur@hq.doe.gov.



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PREVENT EVENTS

Learning from Industry Experience

PREVENT EVENTS is intended for use by personnel during morning meetings, pre-job briefings, and work unit meetings to communicate key industry experience.

Management:

1. Is our procurement and inventory tracking system set up to help minimize the size and quantity of pressurized-gas cylinders at our site?
2. Do we have written procedures on the safe handling and proper storage of pressurized cylinders?
3. Have our workers who handle compressed-gas cylinders been properly trained?
4. Are emergency response personnel trained to handle worst-case scenarios from hazardous compressed gas releases?
5. Have all cylinders been properly identified or labeled?
6. Do all cylinders on site have the hydrostatic test label as required by the Department of Transportation specifications?
7. Do our procedures address the situation in which non-empty cylinders must be disposed of rather than returned to the vendor?

Supervisors and Workers:

1. Do we need personal protective equipment for the job?
2. Are eyewash fountains and emergency showers nearby and working?
3. Are dry chemical fire extinguishers available, if needed?
4. Do we have a checklist for safe cylinder handling and storage?
5. Are there special requirements for handling particular pressurized cylinders?
6. Are special ventilated cabinets needed for highly toxic gases?
7. What are the proper ways of securing compressed-gas cylinders?
8. What are the procedures for safely moving these cylinders?
9. What should we do with a leaking cylinder?
10. Shouldn't we get rid of cylinders of gas that are not being used?

