

Compressed Gas Safety

OAR
Division 2/H

Compressed Gas Safety

General Industry Requirements

The storage, handling, use, and inspection of compressed gas must follow the Compressed Gas Association (CGA) guidelines referenced in OAR 437-002-2101, [Compressed Gases](#) (General Requirements), Division 2/H. Employers must also follow local fire codes.

Employers are responsible for safe use of compressed gas cylinders and liquid containers and their contents. Compressed-gas hazards include oxygen displacement, explosion, and toxic effects as well as the physical hazards of a ruptured cylinder. Employers must evaluate compressed-gas hazards and have an emergency-response plan that defines procedures and responsibilities to address emergencies.



Safe Handling and Use

Compressed gases must be handled and used only by trained employees. Employers must inform employees about chemical hazards through a hazard communication program, labels, and other forms of warnings. Always consult the gas manufacturer's safety data sheets (SDSs) for specific information.

- Ensure that cylinders are clearly identified. Labels must not be defaced or removed. Do not accept or use containers whose content labels are not legible. Instead, separate the containers and return them to the supplier. Do not use the container's color to identify the cylinder's content and do not repaint the container. All gas lines leading from a compressed gas supply must be clearly labeled or identified in compliance with OAR 437-002-0378, [Pipe Labeling](#), Division 2/Z.
- Leave valve protection caps in place (if provided) until cylinders are secured and connected for use. Some types of gas cylinders have valve outlet caps and plugs that form a gas-tight seal. Keep the device on the valve outlet except when containers are secured and connected.
- Keep cylinder valves closed except when the cylinder is being used. Closing the valve isolates the cylinder's contents from the surrounding atmosphere and prevents corrosion and contamination of the valve. When opening a cylinder valve, stand so that the valve outlet is pointed away from yourself and all other employees. Open valves slowly.
- Replace protective caps and outlet caps or plugs before returning empty cylinders to the supplier.
- Never tamper with or alter cylinders, valves, or safety-relief devices. Do not tighten connections or leaking fittings or attempt other repairs while the system is under pressure.
- Do not subject cylinders to artificially low temperatures or temperatures above 125 F. Do not place them next to heat sources or allow a flame to contact any part of the cylinder.
- Do not place cylinders where they become part of an electric circuit or use them as a ground during electric welding.
- Transferring compressed gases from one container to another should be performed only by the gas supplier or by personnel familiar with the hazards. They must be trained and qualified to use the proper transfill equipment and must have detailed written operating procedures that include equipment inspections and maintenance procedures. Non-refillable cylinders cannot be refilled.
- Avoid dragging or sliding cylinders. Do not lift cylinders by the caps. Firmly secure the cylinder and move with a suitable hand truck, lift truck, or crane with a cradle or platform. Do not use lifting magnets. Slings, ropes, or chains are acceptable if the cylinder is equipped by the manufacturer with lifting attachments. Never drop cylinders or strike them against one another or other surfaces.

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Cylinder Storage

Group and store compressed gases based on their hazard class. Provide adequate space or segregate by partitions and post a conspicuous sign that identifies the gas or hazard class. For example:

PROPYLENE
FLAMMABLE GAS – ASPHYXIAN
NO SMOKING – NO OPEN FLAME

Storage areas should be dry, well-drained, ventilated, and fire-resistant. Avoid sub-surface storage. Cylinders can be stored in the open, but they should be protected from the ground or continuous dampness to prevent rusting. Prevent exposure to salt, corrosive chemicals or fumes. Cylinders can usually be stored in the sun; however, cylinders must not exceed temperatures above 125 F. Always refer to the manufacturers' storage requirements and SDSs.

Storage areas should protect cylinders from damage. Do not store on unprotected platform edges or obstruct walkways or exits. Use brackets, chains, or straps around the upper third of the cylinder to secure cylinders in storage or in use. Store charged and empty cylinders apart, if possible. Empty cylinders have residual pressure and should always be handled as if full.

CGA's P-1-2008 Safe Handling of Compressed Gases in Containers, Appendix B-1, provides a list of common compressed gases by hazard classification: flammable, asphyxiant, oxidizer, toxic, corrosive, and extreme cold. It also lists characteristics, such as carcinogenic and pyrophoric. Many gases have multiple hazards. The following table is an example of common welding gases and the hazard-classification system.

Gas	Flammable	Asphyxiant	Oxidizer	Ext. cold	Other
Acetylene	P	S			1
Oxygen			P		
Propane	P	S		S	
Argon		P			
CO2		P			

P = primary hazard S = secondary hazard

Oxygen's primary hazard is as an oxidizer that vigorously accelerates combustion. A minimum of 20 feet must be maintained between oxidizers and flammable gases and other combustible materials, such as oil or grease. A firewall (partition) five feet high with a half-hour fire rating can be substituted. Common oxidizing gases include chlorine, nitrous oxide, and fluorine.

The primary hazard for acetylene and propane is flammability; both are secondarily asphyxiants. Acetylene may decompose violently under pressure in excess of 15 pounds per square inch gauge. These two gases can be stored together. Store flammables in a well-ventilated area away from oxidizers, open flames, sparks, and other sources of heat or ignition. Storage areas must have appropriate fire protection (fire extinguishers or fire suppression equipment). See Division 2/H, [Hazardous Materials](#) for storage and use requirements.

Argon and carbon dioxide are asphyxiants. Asphyxiants (including inert gases) can displace oxygen and may cause suffocation.

Atmosphere-supplying respiratory protection is required in an oxygen-deficient atmosphere, which has less than 19.5 percent oxygen by volume.

Corrosive and toxic gases present serious hazards: keep exposures as low as possible and avoid inhaling or contact with skin or eyes. Employee exposures should not exceed Oregon OSHA exposure limits. Safety showers and eyewash stations must be available for those using corrosive gases such as ammonia and chlorine.

Appropriate protective equipment that is readily accessible for an emergency response depends on proper assessment of the hazards. Emergency entry or planned entry into unknown concentrations or conditions immediately dangerous to life and health (IDLH) for toxic, corrosive, or asphyxiation hazards require the use of NIOSH-approved, full-facepiece, pressure-demand, self-contained, breathing apparatus (SCBA) or a pressure-demand, supplied-air respirator with auxiliary self-contained air supply used in compliance with 1910.134, [Respiratory Protection](#), Division 2/I.

Cryogenic liquids are extremely cold and cause thermal burns upon contact with the body. Provide suitable personal protective equipment. Commonly used liquid cryogens include argon, helium, methane, oxygen, and hydrogen. Hazards vary according to the specific cryogen and include explosion or flammability and asphyxiation. Store containers upright and follow distributors' recommendations.

Cylinder Inspections

Employers must visually inspect compressed-gas cylinders. CGA's Pamphlet C-6, 2013, 11th edition, Standards for Visual Inspection of Compressed Gas Cylinders gives detailed instructions and Appendix A provides a sample inspection report form. In general, inspect for exterior corrosion, denting, bulging, gouges or digs and measure these flaws with a variety of devices and compare to defined limits. Experience is important in the inspection of cylinders. Users who lack experience should return questionable cylinders to the gas supplier. Leaking regulators, cylinder valves, or other equipment should be taken out of service.

Resources

Standards containing requirements for compressed gases include [Welding and Cutting](#), Division 2/Q and Division 3/J and [Compressed Gases](#), Division 2/H. Others contain provisions for the use of compressed gas. For example, chemical-related standards, such as 1910.1025 – [Lead](#), Division 2/Z, do not permit the use of compressed air for cleaning contaminated surfaces. The full text of Oregon OSHA rules is on our website, www.orsosha.org, Rules/Laws.

Related resource links

- [Oregon OSHA Division 2, General Requirements](#)
- [Cryogenic liquid hazards](#)
- [Compressed Gas Association](#)