



COMPRESSED GAS CYLINDER SAFETY

Purpose

Employees handling compressed gases must be trained in the inherent hazards of the cylinders and their contents, as well as proper handling, storage, and use according to OSHA requirements. Never use compressed gas unless you have been trained and authorized by a member of management. Compressed gas cylinders can present a variety of hazards due to their pressure and /or contents. If not stored, handled, inspected and transported correctly compressed gas cylinders can be deadly. Mistreated, misused and malfunctioning cylinders are potentially explosive, can create a toxic environment causing asphyxiation, or explosive concentrations of flammable gas, and have a contact hazard such as the risk of frostbite from liquid propane used on PIT.

Policy

It is the policy of Tate Engineering Systems Inc. that all compressed gases be handled, stored, received and used in a safe manner. The following are requirements for the safe use of compressed gas cylinders.

Engineering Controls at the branch and verified at client site:

- Ventilation systems
- Smoke detectors
- Sprinkler systems
- Flow Restrictors
- Gas cylinder storage areas

Administrative Controls at the branch and verified at client site:

- Employee training
- Segregation of gas containers
- Inspections and audits
- Signs
- Use of PPE
- Identification of authorized employees
- Procedures for receipt, use and storage



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Work Practices and Procedures

Training

All persons handling or using cylinders must have basic training. Review of the information contained in this document, review of any additional information in the written safety plan for all work areas, and hands-on assistance by an experienced gas user will meet this minimum requirement. The gas user must be thoroughly familiar with the properties of each gas they are using. Review the SDS.

Receiving/shipping cylinders into facility

- Do not receive or ship cylinders unless you have received training and are authorized to do so.
- Be sure the cylinder tag clearly identifies the contents.
- Cylinders found to be leaking upon delivery may not be accepted from the gas supplier.
- Cylinders must be transported directly from the receiving dock to the end use location. No staging of hazardous gases is permitted.

Leak Testing

- Gases must be leak tested at the following intervals; receiving, start up and disconnect.

Pre use

- Wear all required PPE
- Ensure all cylinders are labeled legibly: never work with unidentified cylinders. If contents are unknown immediately notify supervisor and mark as damaged and place out of service.
- Visually inspect cylinder for damage, verify it is in a safe condition before using. If a cylinder is damaged or leaks report it to your supervisor and place it out of service immediately.
- Hoses and connections should be inspected regularly for damage and leaks. Hoses should be protected from damage when not in use by carefully coiling them up and storing them off the floor.

Storage

- Store cylinders in the upright position only. Acetylene must never be tipped on its side at any time.
- Storage areas should be dry, fire resistant, and well ventilated. Never leave cylinders near a source of heat, such as a furnace or water heater.
- Do not store cylinders in walkways, evacuation paths, stairs or elevators.
- Store empty cylinders apart from charged cylinders and label them so that they are easily distinguished.
- OSHA Section 1926.350(a)(10) Cylinders must be segregated into hazard classes while in storage. Oxygen and other oxidizers must be separated from flammable gases or combustible materials by a minimum distance of 20 feet or by a noncombustible barrier at least 5 feet high with a fire-resistance rating of at least one-half hour.
- Use appropriate materials, such as chain, plastic coated wire cable, commercial straps, brackets and use around the upper third of the cylinder to prevent the cylinder from falling over.



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- Do not allow cylinders to get bumped, banged or dropped.
- Cylinder valves must be closed and the valve protection caps must be screw on to the last thread.
- When a cylinder cap cannot be removed by hand, cylinder shall be tagged "Do Not Use" and returned to the designated storage area for return to vendor.
- Storage area should be dry, cool, and well ventilated. Cylinders should not be stored at temperatures above 51 degrees C. (125 degrees F.) or near radiators or other sources of heat. Cylinders must be stored a minimum of 20 feet from incompatible materials and a minimum of 10 feet from combustible material, including vegetation.
- When gases of different types are to be stored at the same location, cylinders should be grouped by type of gas and the groups arranged taking into account the type of gas contained (e.g., flammable gases may not be stored next to oxidizing gases). Empty cylinders should be stored separately from full cylinders.

Loading and transporting cylinders:

- To move cylinders use a cart, dolly or pallet jack and always secure cylinder with chain or strap.
- Never move cylinders by laying them down and rolling or dragging.
- Lift and load carefully using proper lift procedures.
- Never use the protective cap for lifting or handling the cylinder.
- Never transport with regulator installed
- Never ship or accept damaged cylinders from shipments.
- Never transport flammable gases in the trunk or passenger compartment of the vehicle
- Transport gas received from supplier to the end user storage location.

Maintenance Considerations

- Compressed gases are a hazardous energy source requiring lockout procedure. Be sure to adequately purge lines following lockout procedures and before beginning maintenance.

General Work Practices

- Use cylinders away from sparks, heat, fire and electrical circuits.
- Do not use oil or grease on the cylinders or handle them with oily hands or gloves.
- Do not let oxygen spray on an oily or greasy surface or on your clothes.
- Do not use cylinders in unventilated areas.
- Keep cylinders secure and upright during use.
- Open and close valves quickly by hand. Do not use a wrench or other tool. Do not stand in the line of fire when opening the valves.
- Do not tamper with safety devices.
- No smoking around compressed gas cylinders.
- Install a check valve on the downstream side of the regulator valve whenever there is danger of material flowing back into the cylinder.
- When using individual oxygen cylinders, the pressure regulator should be located directly on the cylinder. Use no oil, grease, or pipe compound when making oxygen connections.
- Make sure you're using the proper regulators and fittings for each type of gas.



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- Never use a cylinder without a regulator.
- Never attempt to force a connection or modify fittings, tamper with or attempt to repair defective valves or safety relief devices on cylinders.
- Make sure all lines are secured tightly.
- When opening valve, stand to the side and open slowly.
- Perform leak check whenever cylinder is reconnected and notify supervisor if leaks are present.
- Never attempt repairs yourself.
- Close cylinder valve when not in use: never leave open cylinder unattended.
- Never direct gas toward co-workers or use in place of compressed air to blow away dust or dirt.
- Never fully empty cylinder or attempt to refill a cylinder.
- Never discard empty cylinders in normal trash.

Emergency Procedures

- Close the main cylinder valve of identified leaking cylinders.
- Do not place leaking or damaged cylinders in enclosed areas.
- Do not extinguish a flame involving a highly combustible gas until the source of gas has been shut off, otherwise, it can reignite, causing an explosion.

Gases for Welding and Cutting

OSHA lists requirements for oxygen-fuel gas welding and cutting in 29 CFR 1910 .253. This information should be reviewed by persons who will be using acetylene, oxygen. Personal Protective Equipment for eye protection is required for welding and cutting operations. Be sure that all fuel gases are shut off *at the cylinder valve* after each use.

Flammable Gases

- Keep flammable gasses need for work at client site to a minimum and use outdoors when ever possible.
- Flammable gases must be stored in well-ventilated areas away from flammable liquids, combustible materials, oxidizers, open flames, sparks and other sources of heat or ignition. A distance of 20 feet or a noncombustible barrier at least 18 inches above the tallest container, but not less than 5 feet and laterally not less than 18 inches beyond the sides of the containers and having a fire rating of at least ½ hour is the minimum separation requirement.
- Portable fire extinguishers (carbon dioxide or dry chemical type) must be available for fire emergencies where flammable gas is stored and used.
- Spark-proof tools should be used when working with flammable gas cylinders.
- Flammable gases are not to be left unattended when at client site.
- In the event of an emergency involving a flammable gas, such as a gas leak, fire or explosion, personnel must immediately evacuate the area.



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- All lines and equipment associated with flammable gas systems must be grounded and bonded.
- Acetylene should not be utilized in lines or hoses at a pressure exceeding 15 psi.

Asphyxiate Gases

- Do not store asphyxiate gases in areas without ventilation. This includes environmental chambers (e.g. cold boxes) that do not have a fresh air supply or exhaust system.
- Any gas that has the potential to displace oxygen in sufficient quantities can cause asphyxiation. Tate Engineering personnel must respond to all alarms to evacuate when notified of an inert gas leak, they cannot enter an area where an asphyxiant gas could be present. If a person has symptoms of asphyxiation, move the victim to fresh air and obtain proper medical attention.

Oxidizer Gas

- All equipment used for oxidizing gases must be cleaned with oxygen-compatible materials free from oils, greases, and other contaminants (hydrocarbons and neoprene are not oxygen-compatible; PTFE Teflon is compatible. The equipment will state that it is oxygen compatible). Do not handle cylinders with oily hands or gloves.
- Oxidizers shall be stored separately from flammable gas containers or combustible materials. A distance of 20 feet or a noncombustible barrier at least 5 feet high having a fire rating of at least ½ hour is the minimum separation requirement.

Regulators

Cylinders must be equipped with the correct regulators. Regulators and cylinder valves should be inspected for grease, oil, dirt and solvents. Regulators must be protected with covers where there is likelihood of damage.

- Never force a cap or regulator. The cap should be only be hand tight. Before using a cylinder, slowly "crack" the valve to clear dust or dirt, being sure the opening is not pointed toward anyone. Additional precautions must be taken when toxic or flammable gases are involved. Do not stand in front of the regulator gauge glass when opening the valve.
- Never use a cylinder without a regulator. Always use the correct pressure regulator.
- After attaching the regulator, and before the cylinder is opened, check the adjusting screw of the regulator to see that it is released. Never permit the gas to enter the regulator suddenly.
- Never try to stop a leak between a cylinder and regulator by tightening the union nut unless the valve has been closed first.
- Never strike an electric arc on a cylinder.



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Disposal of Cylinders

- Close and tighten valves and replace safety caps on cylinders.
- Contact supplier/vendor to obtain guidelines for the shipment of cylinders to be returned.
- Identify the gas that was in the container. Valves will be removed from empty nontoxic gas cylinders before disposal as metal scrap.
- Work with Safety Manager and Safety Klean for removal of cylinders that cannot be returned to the supplier/vendor or for disposal of orphaned and cylinders.

Compressed Air

Use compressed air as a cleaning method only when absolutely necessary. It involves a large number of hazards not present with other methods.

Compressed Air Usage

- Only machinery that cannot be cleaned in any other way should be cleaned by compressed air.
- Compressed air used for cleaning machinery or shop areas and/or operated from a hand-held nozzle or similar device must have a nozzle pressure of less than 30 p.s.i.
- Employees are prohibited from using compressed air for cleaning unless the pressure is reduced to less than 30 p.s.i.
- Wear goggles for eye protection when you must use compressed air for cleaning. Ensure people working around you are shielded from the air blast and flying debris.
- Compressed air cylinders must be visually inspected prior to use to ensure that they are not damaged.
- Every air receiver shall be equipped with an indicating pressure gauge, so located as to be readily visible, and with one or more spring-loaded safety valves. The total relieving capacity of such safety valves shall be such as to prevent pressure in the receiver from exceeding the maximum allowable working pressure of the receiver by more than 10 percent.
- All safety valves shall be tested frequently and at regular intervals to determine whether they are in good operating condition. Safety valves, indicating/controlling devices, and other safety appliances need to be constructed, located, and installed so they cannot be rendered inoperative by any means.
- The drain valve on air receivers shall be opened and the receiver completely drained frequently and at such intervals as to prevent the accumulation of excessive amounts of liquid in the receiver.

SAFETY MUST ALWAYS BE YOUR NUMBER ONE CONSIDERATION WHEN HANDLING COMPRESSED GAS CYLINDERS.