**Compressed Gas Safety Plan**

**Tips and Considerations**

**Applicability.** The sample Compressed Gas Safety Plan applies to the safe storage, handling, anduse of compressed gas cylinders according to the requirements of the Occupational Safety and Health Administration (OSHA) general requirements for compressed gas (Code of Federal Regulations (CFR) Title 29, Section 1910.101), Department of Transportation (DOT) rules for inspecting compressed gas cylinders (49 CFR 171–179) which have been incorporated into OSHA rules by reference, and the following Compressed Gas Association (CGA) pamphlets:

* C-6-(latest version) Standards for Visual Inspection of Steel Compressed Gas Cylinders
* C-8-(latest version) Standard for Requalification of DOT-3HT, CTC-3HT, and TC-3HTM Seamless Steel Cylinders
* P-1-(latest version) Safe Handling of Compressed Gases in Containers
* S-1.1-(latest version) Pressure Relief Device Standards-Part 1-Cylinders for Compressed Gases
* S-1.2-(latest version) Pressure Relief Device Standards-Part 2-Cargo and Portable Tanks for Compressed Gases

A complete list of CGA pamphlets is available at the following URL under the heading “Publications”: <http://www.cganet.com/>

According to an OSHA compliance interpretation letter (Seiff, September 26, 2002), OSHA recommends that employers comply with later versions of CGA pamphlets which provide at least the same level of safety and health protection as would otherwise be provided by complying with previous CGA pamphlets that have been incorporated by reference into OSHA standards.

Other OSHA compressed gas-related regulations are:

29 CFR 1910.102—Acetylene

29 CFR 1910.103—Hydrogen

29 CFR 1910.104—Oxygen

29 CFR 1910.105—Nitrous oxide

29 CFR 1910.169—Compressed air receivers

29 CFR 1910.253—Oxygen fuel-gas welding and cutting

29 CFR 1910.254—Arc welding and cutting

29 CFR 1926.350—Gas welding and cutting (construction sites only)

49 CFR 172.704—Training requirements for shipping and receiving personnel

49 CFR Part 173, Subpart G (173.301 to 173.340) to —Gases; Preparation and Packaging

**Other safety plans.** Compressed gas can cause or contribute to hazardous conditions related toother activities or operations at a facility, and the procedures for controlling such hazards and responding to emergencies may be incorporated into other Plans, such as:

* Emergency Action Plan
* Hazardous Materials Contingency Plan
* Hazard Communication Plan
* Emergency Response Plan
* Hazardous Waste Operations and Emergency Response Plan

**Review and incorporate state regulatory requirements.** This plan is based on federalrequirements and/or best practices. Some states have laws and regulations that are stricter than federal requirements and may impact how you customize this plan. Click on the link below to view state requirements on this topic. After reviewing the specific information for your state(s), you can edit the plan accordingly.

**[Company name]**

**Compressed Gas Plan**

Plan last updated: **[date]**

**Authority and Scope**

Regulation: 29 CFR 1910.101 **[replace with the state regulation if applicable]**

Scope: This Plan applies to all employees who work with or near compressed hazardous gases, and all operations that use or handle such gases.

**Policy Statement**

It is the policy of **[name]** that all compressed gases will be handled, stored, received, and used in a safe manner consistent with the requirements of the Compressed Gas Safety Plan, and to ensure that employees handling compressed gases are adequately trained in the inherent hazards of the cylinders and their contents, as well as proper handling, storage, and use according to all federal and state regulations.

**Plan Administration**

Table **[number]** provides the roles and contact information for the administration of the Compressed Gas Safety Plan.

**Table [number]**

**Program Contact Information**

**[Modify the table as applicable to your organization.]**



|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Task** |  | **Contact Person** |  | **Contact Information** | |
| Plan Administrator |  | **[Name]** |  | Work: **[number]** |  |
|  |  |  |  | Mobile: **[number]** | |
| Hazard Assessment |  |  |  | Work: |  |
| Administrator |  |  |  | Mobile: | |
| Employee Trainer |  |  |  | Work: |  |
|  |  |  |  | Mobile: | |

**Plan Administrator.** The Plan Administrator is responsible for developing and maintaining thiswritten Compressed Gas Tank Safety Plan. The Plan Administrator is qualified to administer and oversee the Plan, ensure that the required evaluations are conducted, and ensure that all affected employees receive the appropriate training required in this Plan.

**Hazard Assessment Administrator.** The Hazard Assessment Administrator is responsible forplanning and conducting hazard assessments for all work areas where compressed gas cylinders and equipment are used. The assessment administrator will submit hazard assessments to the Plan Administrator or designated representative.

**Employee Trainer.** The Employee Trainer is responsible for administering the trainingrequirements for compressed gas safety as outlined in this Plan for all employees who work with or around compressed gas cylinders and equipment.

***Plan Review and Update***

This Plan will be reviewed and updated:

* Annually
* Whenever there is a change in federal or state regulations related to compressed gas
* Whenever there is a change in facility operations related to the use, handling, or storage of compressed gas containers or equipment

**Definitions**

*Storage*—removal of an object from regular use for an appreciable period of time. Placing anobject aside for a short while with the intent of using it again would not constitute storage of the object.

**Hazard Assessment**

The hazards of compressed gases fall into one or more of the following general categories:

* Fire
* Explosion
* Release of toxic gases

A hazard assessment is required for all processes or equipment involving the use of hazardous gases, and include:

**[Modify the following list as applicable to your facility.]**

* All pressure vessel systems that contain oxygen or irritant, toxic, infectious, flammable, and/ or radioactive materials at any pressure.
* All pressurized equipment (including ASME-coded vessels that have been structurally modified) that operates at gas pressures over 150 lbs per square in. gauge (psig) or at liquid pressures over 1,500 psig, or that contains over 75,000 foot-pounds (ft-lb) of stored energy.
* Confined or oxygen-deficient space.

Labels on the cylinders and safety data sheet (SDS) will be consulted as part of the overall hazard assessment.

Following are several common causes of injury from compressed gas hazards:

* Exposure to the release of toxic substances
* Being struck by an object due to a pressure release or explosion
* Fire
* Asphyxiation
* Strains from moving cylinders
* Being stung by wasps or bees nesting in cylinder caps

**Inspection**

**[Name(s)]** is/are qualified to determine that compressed gas cylinders are in a safe condition tothe extent that can be determined by visual inspection. Inspections of cylinders will be conducted **[frequency]**.

A visual inspection alone, however, may be insufficient to determine the mechanical integrity of a compressed gas cylinder. Therefore, additional inspections will be conducted as prescribed by the following rules and manuals:

**[Modify the list of Compressed Gas Association (CGA) pamphlets or DOT rules that apply to your inspection operations. DOT rules only apply when the compressed gas is being moved for purposes of interstate commerce (see especially Title 49, section 173.34).]**

* Title 49, Parts 171 to 179 of the federal DOT Hazardous Materials Regulations
* C-6-(latest version) Standards for Visual Inspection of Steel Compressed Gas Cylinders
* C-8-(latest version) Standard for Requalification of DOT-3HT, CTC-3HT, and TC-3HTM Seamless Steel Cylinders
* P-1-(latest version) Safe Handling of Compressed Gases in Containers
* S-1.1-(latest version) Pressure Relief Device Standards-Part 1-Cylinders for Compressed Gases
* S-1.2-(latest version) Pressure Relief Device Standards-Part 2-Cargo and Portable Tanks for Compressed Gases
* **[other]**

Copies of the above documents are available from/at **[name, phone, or location]**.

**Identification**

Each gas cylinder will be marked with its identity; the marking will be matched with the appropriate SDS in order to identify specific hazards and protections.

Compressed gas cylinders must be marked with the name of the compressed gas, and have a label indicating the hazards of the compressed gas.

Cylinders that are transported between the vendor and the facility will have Department of Transportation (DOT) labels. Labels or markings must never be removed from a cylinder or bulk storage system.

Empty cylinders will be identified with the letters “MT”.

***Bulk Tanks and Pipes***

The National Fire Protection Association (NFPA) has labeling requirements for bulk tanks. The colored diamond-shaped labels indicate the different types of hazards:

* Blue = health hazard
* Yellow = instability hazard (formerly reactivity)
* Red = fire hazard

Make sure the tank and all the associated piping are properly labeled. You should be able to look at the pipe anywhere along the system and know what gas it contains. All user points should also be labeled so that the user knows what gas is being hooked up.

**Safe Work Practices**

***General Use and Handling Practices***

Compressed gas cylinders will be handled in accordance with **[ANSI Z49.1, CGA P-1-(latest** **version) *Safe Handling of Compressed Gases in Containers*, or other consensus standards]**.

Employees who work with or around hazardous gas or compressed gas cylinders will comply

with the following general safe work practices:

* Do not mix gases in a cylinder.
* Do not refill a cylinder.
* Do not smoke around compressed gas cylinders.
* Only accept and use DOT-approved cylinders.
* Never drop a cylinder.
* Connections to piping, regulators, and other appliances will be tight to prevent leakage. If a leak is suspected, a gas detection fluid, soapy water, or other commercially available solution will be used for leak detection.
* Release of gas pressure within a pressurized system will be done before removal of appliances, hoses, or regulators.
* Protect cylinders from cuts or abrasions that might be caused by banging into equipment or machinery.
* Never use a cylinder for any purpose other than its intended function of containing a compressed gas. Do not use the cylinder as a roller or some sort of support, such as a sawhorse.
* Each cylinder bearing a DOT specification marking must be inspected, retested, and marked in conformance with 49 CFR 173.34, “Qualifications, Maintenance and Use of Cylinders.”
* Keep cylinders upright and secure to prevent them from being knocked over.
* Never tamper with cylinder safety devices. You are putting yourself and others in danger.
* Keep the cylinders away from operations that create sparks, heat, and fire, as well as electrical circuits.

—Don’t use oil or grease on the cylinders or handle them with oily hands or gloves. —When welding nearby, protect the cylinders with heat-resistant blankets or tarps. —Don’t let oxygen spray on an oily or greasy surface or on your clothes.

—Don’t use cylinders in unventilated areas. —Keep cylinders secured upright.

—Open valves by hand, not with a wrench or other tool.

—Don’t tamper with safety devices.

—Open, then close, valves quickly. Open valves slowly, standing to the side, rather than standing in front of the outlet.

**Cylinder valves.** When working with cylinder valves:

* Valves with wheels will be opened slowly by hand and pointed away from persons or sources of ignition. On valves without wheels, only non-sparking wrenches provided by or recommended by the supplier will be used. If the valve requires a tool, do not use the cylinder; too much stress on the valve will cause it to break off.
* If a cylinder leaks, close the valve, take it outside, away from any ignition sources, empty it, and mark it “MT”. Be sure a person trained and equipped for firefighting is with you. Don’t try to fix a cylinder leak, valve, or any other problem. Tag leaking cylinders as such and state that they will be kept away from heat.
* Never tamper with a cylinder’s safety valves.
* Keep the valve stem caps on when cylinders are not in use.
* Open the valve slowly with your hand to the side, not above, the valve. Opening the valve

quickly might put undue pressure on the regulator or other systems. Serious injury could occur if the valve was to fail when your hand is above it. Turn the valve with your hand to the side, because the valve handle could become a projectile if the valve was to fail.

**Moving a cylinder.** When moving a cylinder:

* Always make sure the valve is closed and the cap is on. This means that the cylinder must be detached from any equipment, and the regulator must be removed.
* Do not walk a cylinder (i.e., rock it back and forth or roll it along the bottom edge) while holding onto the valve cap. The cap could come loose, causing you to drop the cylinder, and the exposed valve could be knocked off. Now your cylinder has been converted into a rocket.
* Never roll a cylinder on its side. Not only could this damage the cylinder, but it also exposes the valve and cap to the hazard of striking a solid object while the cylinder is rolling.
* Use a hand truck that has a proper securing system such as a chain.

**Regulators and Gauges**

Following are guidelines for using regulators and gauges:

* Every regulator and gauge must be rated for the pressure that will be applied from the gas system. Do not use a low-pressure regulator/gauge on a high-pressure gas system.
* Before installing the regulator, make sure it is compatible with the gas; exchanging a gauge from one gas to another could cause a dangerous reaction. The thread sealant must be approved for the application. The wrong sealant may react with the gas.
* Wear eye protection whenever operating a regulator or gauge. Although very rare, the regulator or gauge could fail.

***Oxygen***

Oxygen containers will be separated from flammable gas containers or combustible materials a minimum of 20 ft or by a noncombustible barrier at least 5 ft high having a fire resistance rating of at least one-half hour.

Bulk oxygen storage systems will be located above ground and outdoors, or will be installed in a building of noncombustible construction, adequately vented, and used for that purpose only.

***Acetylene***

In-plant transfer, storage, and utilization of acetylene cylinders will be in accordance with Compressed Gas Association Pamphlet G-1, Acetylene, **[latest year]**.

Acetylene tanks will be transported, stored, and utilized only in an upright position.

Only regulators designed for acetylene gases will be used on acetylene tanks.

Storage near oxidizers is prohibited.

***Liquified Petroleum Gas (LPG)***

Storage of LPG within buildings is prohibited.

When stored outside of buildings, containers awaiting use will be located away from the nearest building or group of buildings, in accordance with Table **[number]**.

**Table [number]**

**LPG Storage Distances from Buildings**



|  |  |  |  |
| --- | --- | --- | --- |
| **Quantity of LP-Gas Stored** |  | **Distance (feet)** | |
| 500 lbs. or less |  | 0 |  |
| 501 to 6,000 lbs |  | 10 |  |
| 6,001 to 10,000 lbs |  | 20 |  |
| Over 10,000 lbs |  | 25 |  |

LPG containers will be stored in a suitably ventilated enclosure or otherwise protected against tampering.

Storage locations will be provided with at least one approved portable fire extinguisher having a rating of not less than 20-B:C.

***Hydrogen***

Hydrogen containers will comply with the DOT specifications or ASME Boiler and Pressure Vessel Code, Section VIII.

Each container will be marked with the name “Hydrogen.”

Only spark-proof tools will be used in and around hydrogen environment.

Hydrogen storage areas will be permanently labeled as follows: “DANGER HYDROGEN-NO SMOKING” (ASN P810-3). Bottled hydrogen cylinders will be kept within the storage room.

Hydrogen systems will be located so that they are readily accessible to delivery equipment and to authorized personnel.

Manifold systems will not be used with compressed hydrogen.

A limited number of hydrogen cylinders may be stored on site. This should be limited to 15 cylinders (or no more than 3,000 cu ft of hydrogen). Any exception to this must be approved by **[name]**.

***Leaking Cylinders***

Never try to repair a compressed gas cylinder.

Tag the cylinder with information that warns others the cylinder is leaking and must not be used, move it outdoors if safe to do so, and keep it away from heat or flame. You may also need to secure the area to prevent people from getting too close to the leaking gas and to prevent people from smoking near the cylinder.

Contact the manufacturer or local cylinder dealer for advice on how to handle the leaking cylinder. Consult the SDS if necessary.

***Cylinder Storage***

Following is a list of safe practices for storing compressed gas cylinders that will be followed in all work areas:

* Adequate, portable fire extinguishers of carbon dioxide or dry chemical types will be available for fire emergencies at storage areas.
* Contents of any compressed gas cylinder must be identified and labeled properly. Visual inspection is important to ensure that they are in good and safe conditions.
* Oxygen cylinders must be stored in a dry, well-ventilated area and 20 ft away from combustible materials, and away from any heat source or electrical wiring.
* Where storage 20 ft away from combustibles, heat sources, or electrical wiring is impractical, gas cylinders will be separated from such sources by a 5-ft-tall, 1/2-hour rated fire wall.
* Keep cylinders away from stairs and elevators.
* Cylinders will be stored on a level, fireproof floor in a place where they won’t be banged or knocked over.
* Cylinders will be secured upright by chain, cable, or similar restraint.
* Leaking cylinders must be reported and moved to a safe place.
* When cylinders are in storage, valves will be closed and valve protection caps will be screwed down to the last thread.
* The storage area will be organized so that users will withdraw the cylinders that have been in there longest. The newest ones received will be placed behind those already in storage.
* Keep combustibles (i.e., wood, paper, cardboard) away from the storage area. Remove any heat sources such as machinery or welding practices. Do not allow a cylinder to become part of an electrical current.
* Do not store cylinders in elevators, staircases, hallways, etc., where people are often traveling. This will increase the risk of knocking over a cylinder.
* Store cylinders in an upright position.
* Secure cylinders with straps, chains, cords, or other ways to prevent them from tipping or falling over.
* Make sure cylinders are stored with the valve cap on.
* Sparks, open flames, and smoking are not allowed near cylinder storage areas.
* Periodic surveillance of cylinders in storage areas must be done. Deficiencies discovered

must be corrected immediately.

* Use hands to open and close valves; in case there is a difficulty in opening a valve, contact the supplier or vendor.
* Do not refill an empty cylinder.
* Never smoke in the vicinity of compressed gas cylinders.
* Cylinders must not be dropped or allowed to fall.

**Signs.** Container storage areas will be prominently posted with the hazard class or name of thegases stored. Most storage areas will have “No Smoking” signs along with general “Danger,” “Caution,” or “Warning” signs.

See Attachment **[number]** for a description and location of compressed gas cylinder storage areas.

***Transporting Cylinders***

When transporting cylinders by hoist or forklift, use appropriate baskets or cradles that secure the cylinder and prevent it from banging around or falling.

Never use a sling or an electromagnet to lift or hoist a cylinder. Cylinders could easily fall out of a sling, and electromagnets could fail or otherwise release a cylinder.

Never lift a cylinder by the cap; valve caps are not made to carry the weight of a cylinder.

**Personal Protective Equipment (PPE)**

**[Name]** has assessed the hazards associated with the compressed gases and equipment andappropriate measures have been taken to eliminate or reduce their presence with engineering and administrative controls.

Where these controls are not enough for employee protection, **[name]** will provide all necessary PPE according to the PPE program. Shatterproof safety goggles will be used whenever any connection is made or broken to a compressed gas cylinder or valve. Fabric or leather work gloves will be worn whenever a compressed gas cylinder is moved or transported.

**Emergency Procedures**

This facility has adopted an Emergency Action Plan (EAP) for procedures and assignments during an emergency. See Attachment **[number]** for a copy of the EAP. Also contact **[name]** at **[phone or location]** for a copy.

**Training**

All employees who use, handle, store, or transport hazardous gases will be trained in the inherent hazards of the cylinders and their contents, as well as proper handling, storage, and use of compressed gas containers before they begin work with or around such gases.

The training program will include the following elements:

* How to recognize a compressed gas and its container.
* How to safely handle, store, and use compressed gas cylinders.
* The labeling requirements of compressed gases.
* The specific hazards of different types of compressed gases.

***Refresher Training***

Refresher compressed gas training will be provided to employees who work with or near compressed gas whenever there is a change in facility operations that affect the use, handling, storage, or transport of compressed gas. It will also be provided to any employee who demonstrates a deficiency in using, handling, storing, or transporting compressed gas.

***Training Records***

Training records will be maintained that show when the training was held, what was covered, who gave the training and the trainer’s qualifications, and who attended. Such records will be kept at **[location]** by **[name]**.

**Recordkeeping**

**[Name]** will maintain a written log of each compressed gas or pressurized equipmentmodification, repair, test, calibration, or maintenance service, including the date and nature of work performed, serial number of the item, and the name of the person performing the work. Such records will be kept at **[location]** by **[name]**.

**References**

**[Modify the following list of references as applicable.]**

F ollowing is a list of references incorporated as a whole or in part into this Plan. These references can provide additional explanation or guidance for the implementation of this Plan.

* American National Standards Institute, ANSI 248.1-1954, Marking Portable Compressed Gas Containers to Identify the Material Contained
* ANSI B31.1-1967, Industrial Gas and Air Piping
* ANSI UL 407-1995, Standards for Safety Manifolds for Compressed Gases
* American Society of Mechanical Engineers, ASME Boiler and Pressure Vessel Code, Section

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* OSHA, 29 CFR 1910.101, Compressed Gases (general requirements)
* OSHA, 29 CFR 1910.102, Acetylene
* OSHA, 29 CFR 1910.103, Hydrogen
* OSHA, 29 CFR 1910.104, Oxygen
* OSHA, 29 CFR 1910.253, Oxygen-Fuel Gas Welding and Cutting
* OSHA, 29 CFR 1910, Subpart M, Compressed Gases and Compressed Air Equipment
* OSHA, 29 CFR 1910, Subpart S, Electrical
* OSHA, 29 CFR 1926.153, Liquified Petroleum Gases
* DOT, 49 CFR 173.34 Qualifications, Maintenance and Use of Cylinders

**Supporting Materials**

**[*This product includes supporting materials, such as forms or attachments, which you may* *need to supplement your EHS plan. Samples of the attachments are available at safety.blr.com*]**

Attachment **[number]**—Compressed Gas Cylinder Storage Areas Attachment **[number]**—Emergency Action Plan