



1. Purpose:

Compressed gas cylinders present a variety of potential hazards due to their pressure and/or contents. The use of compressed gases requires special controls and work practices including, but not limited to, transportation and storage, proper equipment design, and leak testing procedures. Compressed gas cylinders/containers are under pressure and the gases inside are often highly flammable or toxic. Extra care is needed to prevent leaks, fires, explosions, and uncontrolled release of pressure. *The user is responsible for the safe use of the container and its contents and for returning the container to the gas manufacturer or distributor in the same safe condition as it was received.*

2. Scope:

This procedure applies to the Westlake Lake Charles complex and is to be in compliance with Westlake Global Guidelines, OSHA 29 CFR 1910.101, CGA P-1 for Compressed Gas Containers and CGA S-1.1 and S-1.2 for Relief Devices.

3. Hazard Classes: (P-1)

- 3.1 Gases may represent a hazard because they are: Flammable, Asphyxiate (Inert), Oxidizer, Corrosive, Toxic, Highly Toxic, Extremely Cold (Cryogenic) and/or Under High Pressure.
- 3.2 Some gases may combine several of the hazards. An example is a hydrogen gas combines high pressure with the flammable hazard. Liquid argon combines the asphyxiate with the low temperature hazard.

4. Key Requirements:

- 4.1 All persons handling or using cylinders must be trained and the training must be documented. All facilities handling compressed gas cylinders shall have a fire emergency procedure that specifically includes procedures for dealing with fires or incidents involving compressed gases. This will be accomplished by a CBT for an initial training and then a refresher every five years.(GO)
- 4.2 Containers not bearing a legibly written, stamped or stenciled identification of the contents shall not be used, they shall be segregated for return to the gas manufacturer or distributor.(P-1)
- 4.3 Gas containers in the following locations shall be visually inspected annually by a member of the owning unit/shop that has completed the CBT training. Locations where gases are stored, used in manifolds or single bottles on regulators for standby use shall be identified and entered into the Meridium system. Compressed Gas Containers that are in regular use (at least once a week) are not required to be in the inspection process. The inspection documentation shall be retained in Meridium. Inspection criteria are: legible written, stamped or stenciled identification of contents, dents, gouges, corrosion (other than light surface) that causes loss of metal thickness and any indication that the bottle may be damaged. Supplier should be contacted to inspect/remove the containers in question.



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- 4.4 All compressed gas cylinders shall have safety relief devices installed in accordance with applicable regulations. Maintenance of the container, its valve or relief device shall be performed only by trained personnel under the direction of the container owner or an authorized representative. (GO)(P-1)
- 4.5 Pressurized cylinders must be secured by means of straps, latches, bands, racks, heavy gauge wire, etc. to prevent falling and located away from all ignition sources and with appropriate signage and adequate ventilation. All cylinders, whether full or empty, must be secured in the upright position, in such a way as to prevent tipping or falling. Cylinders **not** in use must have their valves covered. 'No Smoking' signs, explosive warnings and GHS compliant labels must be visible.(GO)
- 4.6 Compressed gas cylinders must always be transported, stored and used in an upright position, unless the cylinders are designed to be used, transported, and stored in a horizontal position. When transporting individual cylinders, minimize rolling the cylinder on edge by hand. Cylinders must be transported with the valve cap in place. The cap protects the valve, which if damage could result in an unwanted release of the gas and/or make the gas container a projectile.
- 4.7 Valve Protection Cap, outlet caps and/or plugs, where provided by the gas manufacturer, the user shall keep such caps on containers at all times except when containers are secured and connected to dispensing equipment.(P-1)
- 4.8 Gas Tight valve outlet caps and plugs serve the purpose of containing any residual product and are required on poison gas containers, but may also be used for other products. All containers being returned to the gas manufacturer shall have a valve protection cap (if provided) and the gas tight valve outlet plug (if required) must be checked and tightened securely prior to shipment.(P-1)
- 4.9 ***Cylinders must be clearly marked to indicate their contents, and appropriate hazard signage must be clearly visible.*** Color of the container is **not** to be used for the identification of the contents. ***The cylinders should not be painted or otherwise marked by the customer, as misidentification of tanks may present a hazardous condition.*** The prescribed stamped markings on the container shall be made and kept in legible condition. The user shall not remove or alter any of these markings.(GO)(P-1)

5. General

- 5.1 Compressed gas cylinders SHALL NOT be used as rollers, supports, or for any purpose other than to contain and use the content as received.(P-1)



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- 5.2 Containers SHALL NOT be placed where they might become part of an electrical circuit. When compressed gas containers are used in conjunction with electric welding, they shall not be grounded or used for grounding. These precautions will prevent the container from being damaged by the electric welding arc. (P-1)
- 5.3 Compressed gas containers SHALL NOT be exposed to or stored at temperature extremes (>125° F). High temperatures may result in excessive cylinder pressure. NEVER apply a flame or heat directly to any part of a compressed gas container or allow it to come in contact with an electrically energized system. If ice accumulates on a container, thaw at room temperature or with water at a temperature not exceeding 125° F (51.7° C) (P-1/3.3.3).

NOTE: USE OF STEAM OR CONDENSATE TO WARM CHLORINE TON CYLINDERS COULD CAUSE AN OVER PRESSURE PLUG FAILURE. THIS FAILURE WOULD RELEASE THE CONTENTS OF THE CYLINDER INTO THE AIR CREATING A HEALTH HAZARD AND A RELEASE TO THE ENVIRONMENT.

- 5.4 Release of highly pressurized gas can cause puncture wounds and/or severe frost burns if brought into contact with the skin. Personal protective equipment providing hand, foot, and eye protection should be worn when working directly with compressed gas cylinders. Additionally, appropriate respiratory protection should also be used whenever there is the potential for release of a toxic gas. See SDS sheets for protective requirements.(GO)
- 5.5 Check for leaks using a soap and water solution. Leaks generally occur where connections and valves are located. NEVER USE A FLAME TO CHECK FOR LEAKS. If a leak is detected, ventilate the area thoroughly and contact the gas supplier immediately. If the leak cannot be stopped, remove the cylinder carefully to a safe outdoor location. Keep possible ignition sources away from the leaking cylinder.(GO)
- 5.6 Compressed air cylinders used for breathing air shall have unique fittings to prevent the accidental connection of a breathing airline to the wrong cylinder. Cylinders containing compressed air for breathing shall be CGA “Grade D” or better and the supervisor for Safety Repair shall maintain the Certificate of Analysis (C of A) as proof of quality. (GO)
6. Special Handling (P-1)
- 6.1 When a container or valves are noticeably corroded, the gas manufacturer shall be notified and his instructions followed. Any other damage noted that might impair the safety of the container shall be called to the attention of the gas manufacturer before the return of the container.
- 6.2 Compressed gas streams shall not be directed toward any person. This may cause serious injury to the eyes or body.



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6.3 Cylinders and Containers that are leaking by seals should be removed to an open area if it can be done safely and allowed to depressurize. Those containing toxics, asphyxiates, oxidizers and flammables will have the area evacuated and the ERT called in to evaluate and possibly remove the hazard. Use manufacturer as resource for handling.

7. Non-refillable Cylinders (P-1)

7.1 Non-refillable cylinders shall not be refilled with any material after use of the original contents. After usage such cylinders shall be disposed of in accordance with the cylinder manufacturer's recommendations and environmental regulations for the plant.

8. Safe Handling of Containers

8.1 Users of compressed gas containers shall ensure that they are not rolled in the horizontal position or dragged. A suitable hand truck, forklift truck, or similar material handling device should be used with the container properly secured to the device. Caution should be used when handling containers to guard against dropping or permitting containers to violently strike against each other or other surfaces.(P-1)(GO)

8.2 Personnel who handle containers shall be trained and instructed NEVER to lift containers by using the container cap or magnets.(P-1)

8.3 Ropes, chains, or slings shall not be used to suspend containers unless provisions at time of manufacture have been made on the container for appropriate lifting attachments, such as lugs. Where appropriate lifting attachments have not been provided on the container, suitable cradles or platforms to hold the containers shall be used for lifting.(P-1)

9. Transfilling (P-1)

9.1 Compressed gases shall not be transferred from one container to another container except by the gas manufacturer using qualified trained personnel with the appropriate equipment and operating procedures. Exception is Safety Repair and E-Squad filling SCBA bottles from specially designed manifolds of Class D Breathing Air.

10. Storage Areas (P-1)

10.1 Container storage areas shall be prominently posted with the **appropriate Hazard Communication signage** and "NO SMOKING or open flames within 50 ft" signs for flammables.(P-1)(GO)

10.2 Storage areas shall be designed to accommodate the various gases required by the user. Adequate spacing, or segregation by partitioning shall be provided so that containers can be grouped together by the hazard class of the gas. Fuel gas cylinders shall be separated from



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oxidizers by at least 20 feet or have a five foot high fire barrier that is rated for 30 minutes. Containers are not to be stored near readily ignitable substances, such as gasoline. Containers should not be exposed to corrosive chemicals or fumes. Corrosion may damage the containers and may cause the container valve protection caps to stick. Additional consideration should be given to separate storage of full and empty containers. ***Storage area temperatures shall not exceed 125° F (51.7° C).*** Storage in subsurface locations should be avoided. (P-1/3.7.2.1)

10.3 Containers shall be protected from any object that will produce a harmful cut or other abrasion in the surface of the metal. Containers shall not be stored near elevators, walkways, unprotected platform edges, or in locations where - heavy moving objects may strike or fall on them.

11. Outdoor Storage (P-1)

11.1 Cylinders may be stored in the open, but to prevent bottom corrosion prolonged exposure to a damp environment should be avoided. Also, cylinders should not be exposed to salt, corrosive chemicals, or fumes. Corrosion may damage the cylinder and cause valve protection caps to stick. It is preferable to store cylinders on paved surfaces, such as asphalt or concrete which has been graded to prevent accumulation of water. Cylinders may be stored in the sun except in locations where extreme temperatures prevail (>125° F). If the gas manufacturer recommends storage in the shade for a particular gas, such recommendations shall be observed.

11.2 Containers when stored (either inside or outside) shall not obstruct exit routes or other areas normally used or intended for the safe exit of people.

12. Cylinder Positions in Storage (P-1)

12.1 All compressed gas cylinders in service or in storage shall be secured to prevent falling. Properly secured gas cylinders with a water volume less than 305 cu. in may be stored in a horizontal position.

12.2 Liquefied gas cylinders, except those designed for use in a horizontal position on tow motors, etc., shall be stored and used valve end up. This will insure that the container's pressure relief device will remain in contact with the gas phase as designed. ("Valve end up" includes conditions where the container axis may be inclined as much as 45 degrees from the vertical.) Non-flammable liquified gases may be used in the inverted position when the liquid phase is used, if the cylinder is properly secured and the dispensing apparatus is designed for liquified gas use.

13. Container Valve (P-1)

13.1 The container valve shall be kept closed at all times (charged or empty) except when the container is in use. Valve outlets shall be pointed away from all personnel when the valve is being opened. Compressed gas streams shall not be directed toward any person. This may cause serious injury to the eyes or body.



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- 13.2 Manually Operated Valve shall be opened slowly. On valves without hand wheels, the wrenches provided by, or recommended by, the gas manufacturer shall be used. The wrench shall remain on the valve while the container is in use. On valves with hand wheels, wrenches, hammers, or other tools shall not be used in attempting to open or close valve.
- 13.3 Compressed gas containers should not be attached to a process where the container may be contaminated by the backflow of other process materials. In cases where such a possibility could exist, design consideration must include the use of check valves and or traps for this purpose. These check valves and/or traps must be checked and maintained on a regular schedule to ensure proper operation.
14. Manifold (P-1)
- 14.1 Where compressed gas containers are connected to a manifold, the manifold and its related equipment, such as regulators, shall be of proper design for the product(s) they are to contain at the appropriate temperatures, pressures, and flows.
15. Removing Pressure Regulator (P-1)
- 15.1 Before a regulator is removed from a container, the container valve shall be closed and the regulator relieved of gas pressure.
16. Gas Tight Connections (P-1)
- 16.1 Piping, regulators, and other apparatus shall be kept gas tight to prevent leakage. This can be confirmed by the use of a compatible leak test solution, or an appropriate leak-detection instrument. CAUTION: DO NOT tighten connections or leaking fittings or attempt other repairs while the system is under pressure.
17. Residual Container Pressure (P-1)
- 17.1 When using a nonliquefied compressed gas from a container, the pressure should not be reduced below the operating pressure of the system or not less than 20 psig (138 kPa) to prevent the backflow of atmospheric air or other contaminants into the container. The container valve should be closed hand tight to retain this residual pressure.
18. Changing Equipment Service (P-1)
- 18.1 Regulators, gauges, hoses, and other apparatus provided for use with a particular gas, or group of gases, shall not be used on gas containers having different chemical properties unless information obtained from the gas manufacturer indicates that this can be done safely. As an example, only pressure regulating devices approved for use with oxygen shall be used in oxygen service.
19. Transportation(P-1)



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- 19.1 The Transportation of Compressed Gas Cylinders in automobiles or closed bodied vehicles can present serious safety hazards and should be discouraged.
 - 19.2 Leaks can develop because of improper blocking or securing of cylinders, inadequate valve protection, or extended confinement in an enclosed compartment when subjected to excessive heating by the sun in a trunk or passenger compartment.
 - 19.3 Leaking flammable gases can present a serious fire and/or explosion hazard if transported improperly.
 - 19.4 Oxidizers, while not flammable in themselves, present additional hazards. In the presence of an ignition source and fuel, they can support and vigorously accelerate combustion in an enclosed vehicle.
 - 19.5 Inert gases are chemically inactive, but in an enclosed vehicle can cause asphyxiation by displacing the oxygen in air which is necessary to sustain life.
 - 19.6 Shipping compartments should be adequately ventilated.
20. Emergency Response(P-1)
- 20.1 Anyone experiencing an uncontrolled release will evacuate the area, call 2700 and report the emergency to security control. Security will notify Shift Safety. Shift Safety will respond to the area and take appropriate actions to mitigate the uncontrolled release.
 - 20.1.1 Shift Safety will use qualified Emergency Responders. The Emergency Responders will be qualified fire fighters for flammables and /or qualified Hazmat Technicians for all other gases.
 - 20.1.2 Personnel shall be promptly evacuated from the immediate area in danger and kept up wind or cross wind at a sufficient distance to avoid any inhalation or contact with potentially hazardous products until safe re-entry can be assured.
 - 20.1.3 Placards, container labels, and markings when observed at a safe distance provide available information in identifying the products involved. Once the product(s) has been clearly identified, the appropriate Safety Data Sheet or other recognized emergency response guides should be consulted for specific hazards, precautionary safety, and related emergency response information.