

Compressed Gas Management Plan

NCTC

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1.1 PURPOSE

Compressed Gas Cylinders pose a number of potential hazards if not properly handled, stored or used. Serious injuries or death may occur from unsafe practices by handlers. These procedures are designed with accident prevention and safety in mind. Failure to follow these safety guidelines can result in serious injury from crushing, inhalation of potentially dangerous gases, fire and/or explosion.

1.2 HANDLING COMPRESSED GAS CYLINDERS

NCTC accepts only cylinders approved for use by the Department of Transportation for transportation of compressed gases. Upon receipt, visually inspect the cylinders for obvious defects such as dents, large amounts of rust and missing or loose safety caps.

NCTC will accept no compressed gas cylinder unless identified with the appropriate markings:

- 1) Contents identified by stenciling or labeling,
- 2) A DOT label,
- 3) Cylinder test dates must be legible.

Cylinders will be loaded and unloaded at the vendor's truck by using a cylinder cart that has been designed to handle gas cylinders. Rolling cylinders in the vertical position on the bottom edge is to be avoided as much as possible. Gas cylinders must never be dragged or rolled in the horizontal position.

1.3 STORING COMPRESSED GAS CYLINDERS

To maintain a safe environment for employees and students of **NCTC**, the following procedures are in place:

- 1.) Gas Cylinders will be stored in a safe, well-ventilated place prepared and reserved for this purpose. Cylinders should be stored in such a fashion as to prevent accidental tipping over. Cylinders will be stored in racks with safety chains or special devices designed for the purpose of preventing cylinders from tipping. Gas cylinders will be stored the racks provided and safety chains will be utilized at all times. Cylinders should be stored with the valves closed and the protective caps in place.

- 2.) Flammable / combustible substances such as oil and volatile liquids should not be stored in the same area. A minimum distance of at least 20 feet will be maintained.
- 3.) Keep oxygen cylinders well away (at least 20 feet) from fuel gas cylinders and other flammable substances. Exception: Cylinders that are in use (with regulators attached) kept on specially constructed oxygen and acetylene welding carts.
- 4.) Acetylene and liquefied flammable gas cylinders must be stored and used in the upright position.
- 5.) Cylinders stored in the open should be protected from direct contact with the ground to prevent corrosion of the cylinder and to prevent the cylinder from freezing to the ground. Cylinders frozen to the ground should be removed by the application of hot water only.
- 6.) Cylinders should not be stored near sources of heat. Never store any gas cylinders where the temperature may rise above 130° F.
- 7.) Cylinder storage should be planned so those cylinders will be used in the order in which they are received from the supplier.
- 8.) Cylinders with like contents should be grouped together and empty and full cylinders will be segregated when stored.
- 9.) Cylinders should be protected against tampering by unauthorized personnel.

1.4 TRANSPORTATION OF GAS CYLINDERS

The potential for accidents or injury increases during transportation of gas cylinders. Tipping or falling of cylinders may cause crushing type injuries. Additional risks due to damaged cylinders as a result of tipping or falling include:

- a.) A rapid escape of contents causing breathing hazards;
- b.) Rapid escape of pressurized contents causing the cylinder to become a projectile;
- c.) Explosion or fire due to escaping contents

For the safety of employees and students the following procedures are in place:

- 1.) Forklift operators will use only the gas cylinder platform attachment when transporting cylinders.
- 2.) Safety chains **MUST ALWAYS** be used to secure cylinders while it is being transported.

- 3.) **NEVER** transport a cylinder by laying it horizontally across the truck forks.
- 4.) Forklift operators will deliver gas cylinders only to areas that have proper storage facilities and to persons who are approved handlers. Storeroom personnel will return gas cylinders to the stores area only.
- 5.) Using areas must transport cylinders to point of use by a three-wheeled cart, specifically designed to handle gas cylinders. Two wheeled carts are not to be used for transporting gas cylinders.

1.5 USE OF COMPRESSED GAS CYLINDERS

Persons not trained in the use of attachments or equipment for use with Compressed Gas Cylinders should not use Compressed Gas Cylinders without proper instruction and supervision. These cylinders are under very high pressure and given the right set of circumstances can be very hazardous. Persons designated to use Compressed Gas Cylinders will inspect all equipment and attachments prior to its use. Only proper tools will be used when connecting attachments or equipment. Failure to follow these guidelines is a violation of these procedures and may result in serious injury or death.

To ensure safe use of compressed gas cylinders at **NCTC**, the following additional policies are in place:

- 1.) Hoses or plastic tubing are not permitted in any bottled gas system unless the Safety Department has approved the specific application.
- 2) Make sure the threads on a regulator or union corresponds to those on the cylinder valve outlet. **DO NOT FORCE OR MODIFY CONNECTIONS THAT DO NOT FIT.**
- 3) All cylinder valves must have a valve handle; special wrench or other tool attached to the valve while the cylinders are in use.
- 4) Do not use cylinder or compressed gas without a pressure-reducing regulator attached to the cylinder valve, except where cylinders are attached to an approved manifold header ahead of the regulators.
- 5) Before making connections to a cylinder valve outlet, check to see that the mating parts are clean and free of dust or grease. Wipe the parts with a clean dry cloth if necessary. Do not open the cylinder valve to blow dust out.
- 6) All regulators must have an inlet and outlet pressure gauge.
- 7) Use regulators and pressure gauges only with gases for which they are designed and intended. **Do not attempt to repair or alter cylinders, valves or attachments.**

- 8.) Unless the cylinder valve has first been closed tightly, do not attempt to stop a leak between the cylinder and the regulator by tightening the union nut.

Acetylene Cylinders.

- 1.) Acetylene should not be used in fuel gas systems or pipelines made from copper or of copper based alloys containing more than 67% copper, or when the gas may come in contact with silver bearing materials such as those used in silver-brazed pipeline joints. This precaution applies only to piping systems, not brass hose connections, torches and tips.
- 2.) Use only in an upright position.
- 3.) Store only in an upright position.
- 4.) Do not couple acetylene cylinders to a manifold unless an approved flash arrested is installed between the cylinder and coupler block.
- 5.) Never open the cylinder valve more than one turn. Leave the valve key or wrench on the valve whenever the valve is open, so that the valve can be closed quickly in case of fire or accident.
- 6.) Never use acetylene at a pressure above 15 psig.
- 7.) Never allow the temperature or any part of the acetylene system to rise above 130° F.

Hydrogen Cylinders.

- 1) Hydrogen gas heats as it is throttled rather than cools as do other gases. Because of this, hydrogen cylinders should never be throttled with the valves of the cylinder.

Oxygen Cylinders.

- 1) Cylinders of oxygen must not be stored indoors close to cylinders containing flammable gasses. Unless stored apart, a minimum of 20 ft., oxygen cylinders and flammable gas cylinders should be separated by a fire resistant partition.
- 2) Never use oil or grease as a lubricant on valves or attachments of oxygen cylinders. Keep oxygen cylinders and fittings away from oil and grease and do not handle such cylinders on apparatus with oily hands, gloves or clothing. Oil or grease in contact with high-pressure oxygen will cause an explosion and/or fire.

1.6 USING COMPRESSED GAS REGULATORS

The regulator is a metering device that attaches to the compressed gas cylinder for the purpose of managing gas flow from the high pressure tank to the attachment, so that the gas may be used for its intended purpose. Because it regulates high-pressure gases, only persons that are properly trained or under supervision should work with compressed gas systems and attachments such as the regulator. To prevent serious injury or to employees the following policies have been established regarding use of compressed gas regulators:

- A) When attaching a regulator or reducing valve to a cylinder for the first time, this procedure should be followed:
- 1.) Connect the regulator to the outlet valve on the cylinder.
 - 2.) With the cylinder valve closed release the pressure, adjusting the screw on the regulator, slowly to its limit, and then turn it counterclockwise until it is loose.
 - 3.) Open the cylinder valve slightly to let the hand on the high pressure gauge move up slowly.
 - 4.) Regulators should be designed to withstand full cylinder pressure upstream and downstream of the regulator or the downstream side of the regulator must be provided with a suitable relief valve.
 - 5.) Regulators, associated gauges, and relief valves should be maintained in excellent working condition.
 - 6.) The pressure adjusting screws should always work freely. If it is necessary to force the adjusting screw, the regulator should be replaced or repaired. Do not lubricate.
 - 7.) Never attempt to repair or alter a pressure regulator
 - 8.) Make sure that the mating pairs are clean. Wipe with a clean dry cloth if necessary. DO NOT clean with solvents
 - 9.) High-pressure cylinders (100 psig or higher) must have a pressure regulator screwed directly into the cylinder outlet valve (except for manifold installations).
 - 10.) A pressure regulator must be used any time a cylinder is connected to circuit of lower pressure rating than the cylinder pressure.
 - 11.) When regulators are connected but are not in use, the pressure-adjusting device should be released and the cylinder valve should be closed.

1.7 **FIRE**

If a gas cylinder leak ignites, a spray of water should be applied to cool the cylinder. Cylinders exposed to fire should be cooled with a spray of water and removed from the area. It is not necessary to extinguish the burning cylinder until the cylinder gas pressure is practically depleted. The burning (or leaking) cylinder should be carried to a remote location in an upright position and allowed to empty.