

Standard Safety Rules for Pipeline Flow Meters and Flow Meter / Regulators

WARNING: This equipment is pressurized when in service and can cause personal injury if it is improperly operated or maintained. In addition to the standard safety rules for the use of compressed gases, observe the following for this equipment:

DO NOT attempt to operate this equipment if any part is damaged or broken

DO NOT tamper with the preset regulator adjusting screw as over-pressurization can occur

DO NOT connect the Flow Meter inlet to any pressure source capable of exceeding 100 psig.

DO NOT clean the polycarbonate flow tube with any solvent or cleaning fluid as cracks may develop. Use only soap and water.

DO NOT attempt to alter or repair this equipment yourself. Return to a qualified repair station.

DO NOT use this equipment for any gas other than that specified on the flow tube.

WARNING: There are inherent and unavoidable hazards in the use of high pressure, oxygen regulating equipment. To minimize these hazards, before operating the equipment, please read and observe the following:

Combustion requires the presence of three elements: fuel, oxygen and ignition.

Oxygen itself does not burn, but supports and vigorously accelerates the combustion of other materials.

In the presence of high pressure oxygen (500 psig and up) almost all materials, including metals, will burn vigorously.

Fuel and oxygen are always present when an oxygen regulator is in use since the Regulator materials themselves may act as fuel if ignited.

Keep all foreign materials, especially other gases, dirt, rust, oil, grease and other hydrocarbons away from the oxygen regulator and cylinder valve to minimize the fuel and sources of ignition.

Ignition energy, the third element of combustion, can be supplied by the "heat of recompression," which is generated by the sudden compression of the oxygen when the cylinder valve is opened too quickly.

Always open oxygen valves slowly.

Safety Rules for Gases

Cylinders should be chained to a wall, post or in a cylinder cart in an upright position when in use.

Never tamper with or attempt to repair cylinder valves or regulators.

Never attempt to transfer gas from one cylinder to another, nor to refill a cylinder. Never attempt to mix any other gases in a cylinder.

Always leave a positive pressure of at least 25 psig in a compressed gas cylinder and close the valve before returning the cylinder to the supplier.

Be certain that the cylinder valve is tightly closed before handling the cylinder and that the cylinder cap is screwed securely in place on the cylinder.

Smoking or open flames are prohibited in cylinder storage areas.

Know and understand the properties, uses and safety precautions of the gas before placing the gas in service.

Never allow a welding arc or electrical arc to be struck against a gas cylinder. Do not allow the cylinder to become part of an electrical circuit or ground. Never attempt to heat a cylinder with a torch or other heating device.

All closed gas systems should be provided with a relief valve which is operable within the pressure rating of the system.

Never use gas from cylinders or a piping system without a suitable regulator attached to the valve.

OXYGEN

1. Never permit oil or grease to come in contact with oxygen cylinders, valves, regulators, hose or fittings. Do not handle oxygen cylinders, valves, or regulators with oily hands or oily gloves since oxygen under pressure combines with oil and grease with explosive violence.
2. Never use oxygen near flammable materials, especially grease, oil or any substance likely to cause or accelerate fires. Oxygen itself is not flammable, but does support and vigorously accelerate combustion.
3. Do not store oxygen and flammable gas cylinders together. They should be grouped and assigned a definite area for storage. The area should be dry, cool, well ventilated and preferably fire resistant. Keep cylinders protected from excessive temperature rise by storing them away from radiators or other sources of heat. Cylinders should always be stored in an upright position.
4. Always refer to oxygen by its full name, "Oxygen" and not by the word "air."
5. Never use oxygen regulators, hoses or other pieces of apparatus with any gases other than those for which they were intended.
6. Open oxygen cylinder valves slowly and then fully, when in use.
7. Should a leak occur in a compressed cylinder, move it outdoors, away from other cylinders, combustible materials or equipment. A leaking oxygen cylinder will increase the oxygen concentration in the air in the immediate area and create a possible fire hazard.
8. Before attaching a regulator to an oxygen cylinder, the inlet nipple and the porous filter in the nipple should be inspected for physical damage and contamination. If evidence of either is found, the parts should be cleaned or replaced.
9. At regular intervals, the filter in the inlet nipple and internal parts of the regulator should be replaced with new parts by qualified repair personnel.

HYDROGEN

1. The wide flammability range and the small amount of energy required to ignite air/hydrogen mixtures necessitates special handling of hydrogen to minimize possible damaging reactions. Care must be taken to eliminate sources of ignition such as sparks from electrical equipment, static electricity, sparks, open flames or any hot object. An unconfined hydrogen/air mixture will burn rather than explode. Confined hydrogen/air mixtures, when ignited explode with great force.
2. The hazards associated with hydrogen handling are fire, explosion and asphyxiation. Fire and explosion hazards can be controlled by employing proper operating procedures to prevent the formation of combustible fuel/oxidant mixtures and by removing or otherwise inerting potential sources of ignition (electrical spark, static electricity, open flames, etc.) in the area where the hydrogen will be used. Adequate ventilation will help reduce the possible formation of flammable mixtures in the event of a hydrogen leak or spill and will also eliminate the potential hazard of asphyxiation.
3. Hydrogen burns with an almost invisible flame and personnel may become injured because it is difficult to detect visually.
4. Keep sparks, flames and heat away from hydrogen cylinders.

ARGON, HELIUM, NITROGEN

1. These gases are inert, colorless, odorless, tasteless, non-corrosive and non-flammable. They are non-toxic, but can act as asphyxiation by displacing the necessary amount of oxygen in the air to support life.
2. The hazards associated with these gases are the high pressure involved with storage and use, and the possibility of asphyxiation in confined areas. Adequate ventilation will help reduce the potential hazard of asphyxiation.

CARBON DIOXIDE

1. Carbon dioxide is a relatively inert, non-flammable gas which, when furnished in high pressure cylinders, exists as a liquid with a gaseous head pressure of 838 psig at 70° F. Cylinder pressure will vary directly with temperature as long as liquid carbon dioxide remains in the cylinder. Regulators should be used on cylinders designed for gas withdrawal only. Instructions for liquid withdrawal from cylinders should be obtained from the supplier.
2. The hazards associated with carbon dioxide gas are asphyxiation, toxic effect in high concentrations, the possibility of rupture of high pressured containers, and possible equipment malfunction due to regulator freeze-up, if cylinders are overdrawn.
3. Adequate ventilation will help prevent the hazards of asphyxiation and toxicity. Manifolding of cylinders or the use of an approved heater will help prevent equipment problems.
4. As carbon dioxide is vaporized in the cylinder and expanded through the regulator valve seat, the gas stream cools rapidly and can reliquify and sublime to a solid state. Because of this phenomenon, withdrawal rates for an individual cylinder are very low. The recommended rate for a 50-pound capacity carbon dioxide cylinder is only 25 scfh. If larger flows are required, cylinders should be manifolded together or a carbon dioxide heater should be used to prevent regulator freeze-up and the formation of "dry ice" downstream of the regulator.

COMPRESSED AIR

1. Compressed air is generally a mixture of nitrogen, oxygen and trace amounts of other gases.
2. The hazard with compressed air in cylinders relates to high pressure as discussed in the "Argon, Helium and Nitrogen" section.
3. Compressed air at high pressure can accelerate burning of materials which are combustible at atmospheric pressure.
4. CAUTION: Compressed air should not be used for human respiration unless the cylinders are specifically labeled as suitable for that purpose.
5. Additional information on the safe handling of compressed gases is available from the Compressed Gas Association, 4221 Walney Road, 5th Floor, Chantilly VA 20151-2923. www.cganet.com.
6. NOTE: Material Safety Data Sheets for each gas are available from your gas supplier.