Appendix F – Compressed Gases

Compressed gases must be constructed according to the Interstate Commerce Commission (ICC).

**ICC definition of a compressed gas:** Any material or mixture having in the container either an absolute pressure exceeding 40 pounds per square inch at 70 F, or an absolute pressure exceeding 104 pounds per square inch at 130 F, or both; or any liquid flammable material having a Reid vapor pressure exceeding 40 pounds per square inch absolute at 100 F.

**General**

- It is illegal to remove or to change the prescribed numbers or marks stamped into cylinders.
- Each cylinder must bear the proper ICC label required for the compressed gas contained.
- It is illegal to ship a leaking cylinder by common or contract carrier whether charged or partially charged. It is illegal to ship compressed gas in cylinders that have been exposed to fire.
- Do not deface or remove any markings, labels, decals, tags, and stencil marks used for identification of content attached by the supplier.
- Cylinders containing compressed gases should not be subjected to a temperature above 125 F. A flame should never be permitted to come in contact with any part of a compressed gas cylinder.
- Keep cylinder valve closed at all times, except when the cylinder is in active use.
- Never attempt to repair or to alter cylinders, valves, or safety relief devices.
- Never tamper with the safety relief devices in valves or cylinders.
- Do not place cylinders where they might become part of an electric circuit. When the cylinders are used in conjunction with electric welding, precautions must be taken against accidentally grounding compressed gas cylinders and allowing them to be burned by electric welding arc.
- Do not repaint cylinders unless authorized by the owner.

**Moving**

- Where removable caps are provided for valve protection, such caps should be kept on cylinders at all times except when cylinders are in use.
- Do not lift cylinders by the cap.
- Never drop cylinders nor permit them to strike against each other or against other surfaces violently.
- Avoid dragging or sliding cylinders. It is safer to move cylinders even short distances by using a suitable truck or by use of a hand truck.
Storing

- Cylinders should be stored in accordance with all local, state, and municipal regulations and in accordance with appropriate standards of the Compressed Gas Association and the National Fire Protection Association.
- Compressed gas containers, cylinders, and tanks in use or in storage shall be secured to prevent them from falling or being knocked over by corolling them and securing them to a cart, framework, or fixed object by use of a restraint.
- Cylinder storage areas should be prominently posted with the names of the gases to be stored.
- Where gases of different types are stored at the same location, cylinders should be grouped by types of gas, and the groups arranged to take into account the gases contained, e.g., flammable gases should not be stored near oxidizing gases.
- Charged and empty cylinders should be stored separately with the storage layout so planned that cylinders comprising old stock can be removed first with a minimum handling of other cylinders.
- Storage rooms should be dry, cool, and well ventilated. Where practical, storage rooms should be fire-resistant.
- Storage in subsurface locations should be avoided. Cylinders should not be stored at temperatures above 125 F, nor near radiators or other sources of heat.
- Do not store cylinders near highly flammable substances such as oil, gasoline or waste.
- Cylinders should not be exposed to continuous dampness and should not be stored near salt or other corrosive chemicals or fumes. Rusting will damage the cylinders and may cause the valve protective caps to stick.
- Protect cylinders from any object that will produce a cut or other abrasion in the surface of the metal. Do not store cylinders near elevators or gangways, or in locations where heavy moving objects may strike or fall on them. Where caps are provided for valve protection, such caps should be kept on cylinders in storage.
- Cylinders may be stored in the open but should be protected from the ground beneath to prevent rusting. Cylinders may be stored in the sun except in localities where extreme temperatures prevail, or in the case of certain gases where the supplier's recommendation for shading shall be observed. If ice or snow accumulate on a cylinder, thaw at room temperature, or with water at a temperature not exceeding 125 F.
- Cylinders should be protected against tampering by unauthorized individuals.

Withdrawning cylinder content

- Compressed gases should be handled only by experienced and properly instructed persons.
- The user responsible for the handling of the cylinder and connecting it for use should check the identity of the gas by reading the label or other markings on the cylinder before using. If cylinder content is not identified by marking, return cylinder to the supplier without using.
• Removable type valve protective caps should remain in place until ready to withdraw content, or to connect to a manifold.

• Before using cylinder, be sure it is properly supported to prevent it from being knocked over.

• Suitable pressure regulating devices must be used in all cases where gas is admitted to systems having pressure rating limitations lower than the cylinder pressure.

• Never force connections that do not fit. Threads on regulator connections or other auxiliary equipment must be the same as those on cylinder valve outlet. Detailed, dimensioned drawings of standard cylinder valve outlet and inlet connections are published in the "American and Canadian Standard Compressed Gas Cylinder Valve Outlet & Inlet Connections."

• Where compressed gas cylinders are connected to a manifold, such a manifold and its related equipment, such as regulators, must be of proper design.

• Regulators, gages, hoses, and other appliances provided for use with a particular gas or group of gases must not be used on cylinders containing gases having different chemical properties unless information obtained from the supplier indicates that this can be done safely.

• Never use compressed gas to dust off clothing, as this may cause serious injury to the eyes or body, or create a fire hazard.

• Never use compressed gases where the cylinder is apt to be contaminated by the feedback of process materials unless protected by suitable traps or check valves.

• Connections to piping, regulators, and other appliances must always be kept tight to prevent leakage. Where a hose is used, it is to be kept in good condition.

• Before a regulator is removed from a cylinder, close the cylinder valve and release all pressure from the regulator.

Flammable gases

• Do not store cylinders near highly flammable solvents, combustible waste material and similar substances, or near unprotected electrical connections, gas flames or other sources of ignition.

• Never use a flame to detect flammable gas leaks. Use soapy water.

• Do not store reserve stocks of cylinders containing flammable gases with cylinders containing oxygen. They should be segregated. Inside of buildings, stored oxygen and fuel gas cylinders are to be separated by a minimum of 20 feet, or a fire-resistive partition is to be placed between the oxygen and fuel gas cylinders. This is in accordance with NFPA Standard No. 51. "Gas Systems for Welding and Cutting."

Poison gases

• Personnel handling and using poison gases are to have available for immediate use gas masks or self-contained breathing apparatus of a design approved by U. S. Bureau of Mines for the
particular service desired. Such equipment is to be located convenient to the place of work, but kept out of the area most likely to be contaminated.

- Poison gases are to be used only in forced ventilation areas or, preferably, in hoods with forced ventilation or out-of-doors. Poison gases emitted from equipment in high concentration are to be discharged into appropriate scrubbing equipment which will remove it from effluent streams.
- Before using, read all label information and data sheets associated with the use of the particular poison gas.
- Use poison gases in cylinder sizes that will insure complete usage of the cylinder content in a reasonable amount of time.
- The Interstate Commerce Commission requires that containers charged with the following materials when offered for transportation bear the poison gas label and be subject to all other regulations prescribed by the ICC for such materials:
  - Bromoacetone
  - Cyanogen
  - Cyanogen Chloride (Containing less than 0.9% water)
  - Diphosgene
  - Ethyldichloroarsine
  - Hydrocyanic Acid
  - Lewisite
  - Methylidichloroarsine
  - Mustard Gas
  - Nitric Oxide
  - Nitrogen Peroxide (Nitrogen Tetroxide)
  - Phenylcarbzyamine Chloride
  - Phosgene

- Because of the hazardous nature of poison gases, persons handling such gases are advised to contact the supplier for more complete information.

**Pressurized liquid oxygen, nitrogen, and argon**

- ICC specification cylinders containing pressurized liquid oxygen, nitrogen or argon must be transported, stored, and used in an upright position. These materials are maintained at extremely low temperatures, and cylinders must be kept upright to permit venting of vapor periodically to maintain safe internal pressures.
- Persons handling these pressurized liquids are advised to contact the supplier for more complete handling information.