City of Vista Fire Department

Prevention Bureau
200 Civic Center Dr, Vista CA 92084

Guideline:

Compressed Gases

Date:	May, 2012

Compressed Gas Guideline

PURPOSE

The intent of this guideline is to provide the information necessary to ensure that the design and installation of compressed gas containers, cylinders, tanks, and systems will comply with the applicable provisions of the 2010 California Fire Code (CFC) Chapter 30.

SCOPE

This guideline is applicable to storage, use, and handling of compressed gases in compressed gas containers, cylinders, tanks, and systems. Partially full compressed gas containers, cylinders, or tanks containing residual gases shall be considered as full for the purpose of the controls required.

REQUIREMENTS

1. Permits are required by the California Fire Code, Section 105.6.8 to store, transport on site, dispense, use, or handle compressed gases in excess of the quantities specified in CFC:

TABLE 105.6.8– PERMIT AMOUNTS FOR COMPRESSED GASES

TYPE OF GAS	AMOUNT (cubic feet)[2] x0.0282 for m^3
Corrosive	200
Flammable (except cryogenic fluids and liquefied petroleum gases)	200
Highly toxic	any amount
Inert and simple asphyxiant	6,000
Oxidizing (including oxygen)	504
Pyrophoric	any amount
Toxic	any amount

2. Applicant shall furnish the required information prior delivery of compressed gas to the business. Initial permit issuance shall be treated as a tenant improvement and detailed plans shall be submitted to the Vista Building Department for review processing. Any changes in quantity of compressed gas, type of gas or change to a process shall be reviewed and approved by the Vista Fire Department, prior to any on-site changes. Plans shall include the following *minimum* details; additional details may be required by the Fire Department after initial review of the proposed use:
   A. A site plan on 8 ½" X 11" paper(s), which contains:
      • Floor plan of the building showing where gas is to be installed, distributed, or stored.

- *Identification* of the type of gas, the *quantity* in cubic feet, and the type of storage containers
- Adequate separation of incompatible products
- The location of the storage containers
- The piping design plan identifying routing of pipe and labeling of piping
- Location of shut off valves and discharge points
- Location and type of alarm system(s)
- The storage room, including construction type, doors, and ventilation
- Method of securing cylinders from accidental dislodgment or unauthorized access

3. When the amount of compressed gas exceeds 200 cubic feet per cumulated type of gas, a hazardous materials business emergency plan and chemical inventory disclosure shall be required, per Vista Municipal Code and California Code of Regulations.

4. Compressed gases classified as hazardous materials shall

5. Permits for the *use* of the compressed gas, i.e. hot works permit required by CFC 105 shall be issued separately from compressed gas permits.

General Requirements: (CFC Chapter 30)

1. Compressed gas cylinders shall be marked in accordance with nationally recognized standards. Compressed gas cylinders shall be clearly labeled with the name of the chemical. Piping systems shall be marked with the content's name and the direction of flow. Markings are required at each valve; at wall, floor or ceiling penetrations; at each change of direction; and at a minimum of every 20' or fraction thereof throughout the piping run.

2. Compressed gas containers, cylinders, and tanks shall be secured to prevent falling from contact, vibration, or seismic activity, by one of the following methods:
   a. Securing one or more to a fixed object with one or more restraints
   b. Securing containers on a cart or other mobile device designed for specific use
   c. Nesting of cylinders at container filling or servicing facilities or in seller's warehouses which are not accessible to the public
   d. Securing containers to or within a rack, framework, cabinet, or similar assembly designed for such use

3. Compressed gas container, cylinder, and tank valves shall be protected from physical damage by means of protective caps, collars, or similar devices. Devices shall be maintained in place and shall be attached.

4. Compressed gas containers, cylinders, tanks, and systems shall be separated from materials and conditions that present exposure hazards and from incompatible materials. Containers shall not be exposed to corrosive chemicals or fumes, which could damage containers and/or valves.

5. Combustible waste, vegetation, and similar materials shall be kept a minimum of 10' from containers, cylinders, tanks, and systems.

6. Compressed gas containers, cylinders, and tanks shall not be placed near elevators or unprotected platform ledges where they may fall. Cylinders shall not be placed in areas where they are likely to be damaged from falling objects.

7. Compressed gas containers, cylinders, and tanks shall not be exposed to temperatures exceeding 125° F, or sub ambient temperatures, unless by approved method and trained personnel. Devices designed to maintain containers at constant temperature shall be approved and be designed to be failsafe. When cylinders are stored where extreme temperatures prevail, overhead covers shall be provided.

8. To prevent bottom corrosion, containers, cylinders, and tanks are to be protected from direct contact with soil or unimproved surfaces. The area where cylinders are located shall be graded to prevent accumulation of water.

9. Leaking, damaged or corroded containers, cylinders and tanks are to be removed from service and handled in an approved manner. Containers that have been exposed to fire shall also be removed from service and handled by approved qualified persons.

10. Systems, containers, cylinders, tanks, piping, tubing, valves, fittings, and related components shall be designed and constructed in accordance with nationally recognized standards, and shall be of an approved type.

11. Piping, tubing, valves, fittings, and related components shall be fabricated from materials compatible with the material to be contained, and of adequate strength and durability to withstand the pressure, structural and seismic stress, and exposure to which they are subject.

12. Emergency shut-off valves shall be identified and location shall be clearly visible and indicated by means of a sign.

13. Areas for the storage, use, and handling of compressed containers, cylinders, tanks, and systems shall be safeguarded from unauthorized entry and secured with such protective facilities as public safety requires.

14. Emergency shutoff for flammable, oxidizing and pyrophoric gases shall be provided at each point of use and at each source.

Storage: (CFC Section 3004)

1. Compressed gas containers, cylinders, and tanks shall be maintained in an upright, "valve end up" position, unless designed for use in a horizontal position. An upright condition shall include axis inclined as much as 45 degrees. Exception: containers with a water volume of less than 1.3 gallons are allowed to be stored in the horizontal position.

2. Additional material specific requirements shall comply with CFC 2010 provisions of Chapters 31, 35, 37, and 37 through 44 for the following classifications of compressed gases:
   a. Toxic and Highly Toxic compressed gases
   b. Flammable gases
   c. Oxidizing gases
   d. Pyrophoric gases
   e. Unstable (reactive) gases
   f. Radioactive gases
   g. Corrosive gases

Use and Handling: (CFC Section 3005)

1. Compressed gas systems shall be suitable for the use intended and shall be designed by persons competent in such design. *Compressed gas* equipment, machinery, and processes shall be listed or approved.
2. Compressed gas system controls shall be designed to prevent materials from entering or leaving process or reaction systems at other than the intended time, rate or path. Automatic controls shall be designed to be fail safe.
3. Piping, including tubing, valves, fittings, pressure regulators, valves, and other apparatus shall comply with this Section and Chapter 27. Piping, tubing, pressure regulators, valves and other apparatus shall be kept gas tight to prevent leakage.
4. Valves utilized on *compressed gas* systems shall be suitable for the use intended and shall be accessible. Valve handles or operators for required shutoff valves shall not be removed or otherwise altered to prevent access.
5. Venting shall be directed to an approved location. Venting shall comply with the *California Mechanical Code*
6. Compressed gas containers, cylinders, tanks, except those designed for horizontal position, and all compressed gas containers, cylinders and tanks containing non-liquified gases, shall be used in an upright position with the valve end up. An upright position shall include conditions where the container, cylinder or tank axis is inclined as much as 45 degrees (0.80 rad) from the vertical. Use of non-flammable liquefied gases in the inverted position when the liquid phase is used shall not be prohibited provided that the container, cylinder or tank is properly secured and the dispensing apparatus is designed for liquefied gas use.

   Exception: Compressed gas containers, cylinders and tanks with a water volume less than 1.3 gallons (5L) are allowed to be used in a horizontal position.
7. Transfer of gas between containers, cylinders and tanks shall be performed by qualified personnel using equipment and operating procedures in accordance with Compressed Gas Association P-1.

Exception: Fueling of vehicles with compressed natural gas (CNG)

8. Inflatable equipment, devices, or balloons shall be only pressurized or filled with compressed air or inert gas
9. In addition to the requirements of this section, indoor and outdoor use of compressed gases shall comply with the material specific provisions of Chapters 31, 35, and 37 through 44.
10. The handling of containers, tanks, and cylinders shall comply with Sections 3005.10.1 and 3005.10.2.

11. Containers, cylinders and tanks shall be moved using an approved method. Where containers are moved by hand cart, hand truck, or other mobile devices designed for the secure movement of containers, cylinders and tanks within buildings shall comply with section 2703.10. Carts and trucks utilized for transport of compressed gas containers, cylinders and tanks exterior to buildings shall be designed so that the containers and tanks against dropping or otherwise striking against each other or other surfaces.

12. Ropes, chains, or slings shall be not be used to suspend compressed gas containers, cylinders or tanks, unless provisions at the time of manufacturer have been made on the container, cylinder or tank for appropriate lifting attachments such as lugs.

Medical Gas Systems (CFC Section 3006)

1. Compressed gases at hospitals and similar facilities intended for inhalation or sedation, including, but not limited to, analgesia systems for dentistry, podiatry, veterinary, and similar uses shall comply with Sections 3006.2 through 3006.4 in addition to other requirements of this chapter.

2. Medical gases shall be stored in areas dedicated to the storage of such gases, and without any other storage or uses. Where containers of medical gases in quantities greater than the permit amount are located inside buildings, they shall be in a 1-hr exterior room, a 1-hour interior room or gas cabinet in accordance with Section 3006.2.1, 3006.2.2 or 3006.2.3, respectively. Rooms or areas where medical gases are stored or used in quantities exceeding the maximum allowable quantity per control area as set forth in Section 2703.1 shall be in accordance with the International building Code for high-hazard group H occupancies.

3. A 1-hour exterior room shall be a room or enclosure separated from the remainder of the building by fire barriers with a fire-resistive rating of not less than 1-hour. Openings between the room or enclosure and interior spaces shall be self-closing smoke-and draft-control assemblies having a fire protection rating of not less than 1-hour. Rooms shall have at least one exterior wall that is provided with at least two vents. Each vent shall be within 36 inches in area. One vent shall be within 6 inches of the floor and one shall be within 6 inches of the ceiling. Rooms shall be provided with at least one automatic sprinkler to provide container cooling in case of a fire.

4. When an exterior wall cannot be provided for the room, automatic sprinklers shall be

installed within the room. The room shall be exhausted through a duct to the exterior. Supply and exhaust ducts shall be enclosed in a 1-hour-rated shaft enclosure from the room to the exterior. Approved mechanical ventilation shall comply with the California Mechanical Code and be provided at a minimum rate of 1 cu./ft per min square foot of the area of the room.

5. Gas cabinets shall be constructed in accordance with Section 2703.8.6 and the following:
    1. The average velocity of ventilation at the face of the access ports or windows shall not be less than 200 ft per minute (1.02m/s) with a minimum of 150 feet per minute (0.76 m/s) at any point of the access port or window.
    2. They shall be connected to an exhaust system
    3. They shall be internally sprinklered

6. Medical gas systems including, but not limited to, distribution piping, supply manifolds, connections, pressure regulators, and relief devices and valves, shall comply with NFPA 99 and the general provisions of this Chapter.

7. Indoor storage and use areas and storage buildings shall be provided with mechanical exhaust ventilation or natural ventilation in accordance with the requirements of Section 2704.3 or 2705.1.9. When mechanical ventilation is provided, the systems shall be operating during such time as the building or space is occupied.

8. Additional material specific requirements shall comply with CFC 2010 for the following classifications of compressed gases:
    a. Toxic and Highly Toxic compressed gases
    b. Flammable gases
    c. Oxidizing gases
    d. Pyrophoric gases