

SLC Requirements for Carbon Dioxide (CO₂) Systems



SCOPE

This document is to define the minimum safety requirements as they pertain to the use and storage of Carbon Dioxide (CO₂) gas systems storing and using more than 100 pounds of CO₂; or as otherwise outlined in the 2021 International Fire Code (IFC) Section 5307 with Utah amendments and NFPA 55. These requirements shall apply to new and existing systems, as well as storage only facilities in Salt Lake City.

DEFINITIONS

A “CO₂ system” where otherwise not specified shall be defined as including the CO₂ tank, piping and connections, ventilation and alarm systems when applicable.

IFC- 2021 International Fire Code with Utah State Amendments

NFPA 55- 2020 Edition of NFPA 55 Compressed Gases and Cryogenic Fluids Code

REQUIRED PERMITS

An operational permit is required for the storage, use, or handling of CO₂ over 100 pounds at normal temperature and pressure. As required by Section and Table 105.5.9 in the IFC.

A Construction permit is required to install, repair damage to, abandon, remove, place temporarily out of service, or close or substantially modify a CO₂ system over 100 pounds at normal temperature and pressure. As required by Section 105.6.2 and Table 105.5.9 in the IFC.

EQUIPMENT

The storage, use and handling of CO2 shall be in accordance with Chapter 53, specifically Section 5307, in the IFC and applicable requirements of the 2020 Edition of NFPA 55, Chapter 13.

CO2 systems and ALL their components shall be located in approved locations. The contractor shall provide the following information to the authorities having jurisdiction (AHJ) for approval:

- A detailed drawing on a floor plan showing the location of the CO2 tank, plumbing, connections, filling point and pressure relief venting point.
- If mechanical ventilation is used in accordance with IFC 5307.2 and 5004.3 a detailed drawing showing the location of the exhaust ventilation.
 - Provide mechanical ventilation system information and calculations.
 - Exhaust shall be taken from a point within 12 inches from the floor.
 - Exceptions for the IFC:
 - A gas detection system complying with Section 5307.2.1 shall be permitted in lieu of mechanical ventilation.
 - Areas containing insulated liquid carbon dioxide systems used in beverage dispensing applications shall comply with Section 5307.3.
- If an emergency alarm gas detection system is used in accordance with IFC 5307.3.2
 - A detailed floorplan showing the location of CO2 monitoring sensors, strobes and other components.
 - Provide CO2 monitoring equipment information manual and specification sheets.
 - The threshold for activation of an alarm shall not exceed 5,000 parts per million (ppm).
- All documentation, for permitting, must meet the requirements listed in 5307.4.1.
 - The following information shall be provided with the application for permit:
 - 1. Total aggregate quantity of liquid carbon dioxide in pounds or cubic feet at normal temperature and pressure.
 - 2. Location and total volume of the room where the carbon dioxide enrichment operation will be conducted. Identify whether the room is at grade or below grade.
 - 3. Location of containers relative to equipment, building openings and means of egress.
 - 4. Manufacturer's specifications and pressure rating, including cut sheets, of all piping and tubing to be used.
 - 5. A piping and instrumentation diagram that shows piping support and remote fill connections.
 - 6. Details of container venting, including but not limited to vent line size, material and termination location.
 - 7. Alarm and detection system and equipment, if applicable.
 - 8. Seismic support for containers.

EQUIPMENT INSTALLATION GUIDELINES

1. Installation of an emergency alarm gas detection system shall be, *at a minimum*, installed according to manufacturer's specifications, and IFC and/or NFPA 55 requirements if not otherwise specified hereinafter.
2. Use of Automatic Background/Baseline Calibration (ABC) sensors shall be prohibited.
3. If not specified by the manufacturer, one sensor shall be required for up to 2,000 square feet of floor area. Where the protected space exceeds 2,000 square feet of floor area, additional sensors shall be installed so that one sensor is installed for every 2,000 square feet of floor space required to be protected.
4. Sensors shall be installed no more than twelve (12") from the floor.
5. Sensors shall be installed no more than ten feet (10') from a CO2 tank or bib rack.
6. A sensor shall be required in a draft beer cooler connected to the CO2 system.
 - 6.1. A sensor *MAY* also be required at the discretion of the AHJ at any point where the CO2 system is vulnerable to mechanical damage which could cause a leak.
7. Sensors shall be installed in a manner preventing damage to the sensor.
8. If the sensor is installed in an enclosed space, a remote audible signaling device (80 dBa) shall be installed outside the enclosed space to indicate an alarm condition inside the enclosed space.
9. A visual indicating (amber strobe minimum 100 candela) device shall be installed where audible indicating devices are required. Visual signaling devices shall be installed in the best location providing the earliest warning to occupants entering the space where a CO2 system is installed.

SIGNAGE INSTALLATION GUIDELINES

Approved warning signs shall be installed as follows:

1. A readily visible and durable sign shall be posted within four inches (4") below all amber strobes. The warning sign shall be at least 8 inches wide and 6 inches high and state the following on a contrasting background:

- Signs inside a room or area shall state:

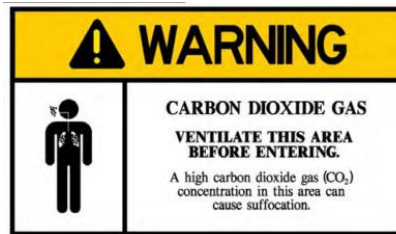
**FLASHING LIGHT MEANS CARBON DIOXIDE LEAK DETECTED
EVACUATE ROOM/AREA**

- Signs outside a room or at a remote location state:

**DO NOT ENTER WHEN LIGHT IS FLASHING
CARBON DIOXIDE LEAK DETECTED/CALL 911**

2. A warning sign shall be posted at the entrance to the building, room, enclosure or confined area where the container is located. The warning sign shall be at least 8 inches wide and 6 inches high and state the following:

CAUTION – CARBON DIOXIDE GAS
VENTILATE THIS AREA BEFORE ENTERING
A high carbon dioxide (CO₂) gas concentration in this area can cause suffocation



3. Grow cultivation rooms/areas and other areas using or storing more than 100 pounds of CO₂ shall have the following signs posted on the exterior doors:



4. All areas that have CO₂ Systems shall have posted all Utah State, system manufacturer, alarm manufacturer, IFC, and/or NFPA required signs. All signs shall be posted as required by these governing bodies.

TESTING AND MAINTENANCE

CO2 systems and their safety systems shall be inspected and serviced annually by a professional to ensure correct operation.

- Testing and maintenance of emergency alarm gas detection system shall be, *at a minimum*, tested and maintained according to manufacturer's specifications if not otherwise specified hereinafter.
- The CO2 system shall be checked for damage, wearing or missing components.
- The ventilation system (if applicable) shall be tested for correct operation.
- The emergency alarm system (if applicable) shall be tested for correct operation. Test shall include sensor detection of CO2 gas as recommended by the manufacture.
- Gas detection monitoring sensors shall be calibrated annually.
- Gas detection monitoring sensors shall be replaced every ten (10) years.
- **The system shall be tagged indicating ALL systems were inspected and are in good working order.**
- **Records of work done shall be maintained on-site along with the device *User Manual* for review by the Code official and a copy the maintenance record shall be provided to the AHJ.**

A CO2 system found not to be in good working order shall be shut down and taken out-of-service immediately until appropriate corrections are made by professional personnel.

References

2021 International Fire Code, and Utah State Amendments
2020 Edition of NFPA 55, Chapter 13
SLC Fire Department
SLC Building Services
Spokane, WA Fire Department

This document is designed to set forth the minimum requirements for CO2 systems as required by the IFC, NFPA 55, Salt Lake City, and CO2 system and alarm manufacturers. It in nowise authorizes for systems to be installed with less than what is required from these Utah State approved CO2 system governing bodies.