



City of Thornton Fire Department | 2300 Thornton Parkway | Thornton, CO 80229
303-538-7602 | FireDept@ThorntonCO.gov | ThorntonCO.gov

General Requirements Regarding Carbon Dioxide Dispensing Systems

- The storage and use of liquid carbon dioxide (CO₂) shall be in accordance with the requirements of 2021 International Fire Code, Section 5307 and 2019 NFPA 55, *Compressed Gases and Cryogenic Fluids Code*, Chapter 13.
- Insulated liquid CO₂ systems shall have pressure relief devices vented in accordance with NFPA 55
- 5307.2 Indoor storage and use area and storage buildings shall be provided with ventilation in accordance with Section 5004.3. Where mechanical ventilation is provided, the systems shall be operational during such time as the building or space is occupied.

Exceptions:

1. A gas detection system complying with Section 5307.2.1 shall be permitted in lieu of mechanical ventilation.
 2. Areas containing insulated liquid CO₂ system used in beverage dispensing application shall comply with Section 5307.3.
- 5307.3 Insulated liquid CO₂ systems with more than 100 pounds of CO₂ used in beverage dispensing applications shall comply with Section 5307.3.1.
 - 5307.3.1 Where insulated liquid CO₂ storage tanks cylinders, piping and equipment are located indoors, rooms or areas containing storage tanks, cylinders, piping and equipment, and other areas where a leak of CO₂ is expected to accumulate, shall be provided with mechanical ventilation in accordance with Section 5004.3 and designed to maintain the room containing CO₂ at a negative pressure in relation to the surrounding area.

Exception:

1. A gas detection system complying with Section 5307.3.2 shall be permitted in lieu of mechanical ventilation.
- 5307.3.2 Where ventilation is not provided in accordance with section 5307.3.1, a gas detection system shall be provided in rooms or indoor areas and in below-grade outdoor locations with insulated CO₂ systems. CO₂ sensors shall be provided within 12 inches of the floor in the area where the gas is expected to accumulate or other approved locations. The system shall be designed as follows:
 1. Activates an audible and visible supervisory alarm at a normally attended location upon detection of a CO₂ concentration of 5,000 ppm
 2. Activates an audible and visible alarm within the room or immediate area where the system is installed upon detection of a CO₂ concentration of 30,00 ppm.

- 5307.4 The design, installation and maintenance of CO2 enrichment systems with more than 100 pounds of CO2, and CO2 enrichment systems with any quantity of CO2 having a remote fill connection, shall comply with Sections 5307.4.1 through 5307.4.7.
- The **Documentation** information, noted in 5307.4.1 (1) through 5307.4.1 (8), shall be provided with the application for permit.
- 5307.4.2 Pressure relief, vent piping, fill indicators, vent terminations, piping systems, and the storage, use and handling of the CO2 shall be in accordance with IFC Chapter 53 and NFPA 55.
- 5307.4.3 A gas detection system complying with IFC Section 916, *Gas Detection System*, shall be provided in rooms or indoor areas in which the CO2 enrichment process is located, in rooms or indoor areas in which container systems are located, and in other areas where CO2 is expected to accumulate. CO2 sensors shall be provided within 12 inches of the floor in the area where the gas is expected to accumulate, or leaks are most likely to occur. The system shall be designed as follows:
 1. Activates a low-level alarm upon detection of a CO2 concentration of 5,000 ppm.
 2. Activates a high-level alarm upon detection of a CO2 concentration of 30,000 ppm.
- 5307.4.3.1 Activation of the low-level gas detection system alarm shall automatically:
 1. Stop the flow of CO2 to the piping system.
 2. Activate the mechanical exhaust ventilation system.
 3. Activate an audible and visible supervisory alarm signal at an approved location within the building.
- Activation of the high-level gas detection system alarm shall automatically:
 1. Stop the flow of CO2 to the piping system.
 2. Activate the mechanical exhaust ventilation system.
 3. Activate an audible and visible supervisory alarm signal at an approved location within the building.
- Activation of the low-level gas detection system alarm shall automatically:
 1. Stop the flow of CO2 to the piping system.
 2. Activate the mechanical exhaust ventilation system.
 3. Activate an audible and visible supervisory alarm signal at an approved location within the building.

- Activation of the low-level gas detection system alarm shall automatically:
 1. Stop the flow of CO₂ to the piping system.
 2. Activate the mechanical exhaust ventilation system.
 3. Activate an audible and visible supervisory alarm signal at an approved location within the building.
- 5307.4.4 Rooms or indoor areas in which CO₂ enrichment is provided shall be maintained at a negative pressure in relation to the surrounding areas in the building. A mechanical ventilation system shall be provided in accordance with the International Mechanical Code that complies with the following:
 1. Mechanical ventilation in the room or area shall be at a rate of not less than 1 cfm per square foot.
 2. When activated by the gas detection system, the mechanical ventilation system shall remain on until manually reset.
 3. The exhaust system intake shall be taken from points within 12 inches from the floor.
 4. The ventilation system shall discharge to the outside in an approved location.
- 5307.4.5 Hazard identification signs shall be posted at the entrance to the room and indoor areas where the CO₂ enrichment process is located, and at the entrance to the room or indoor area where the CO₂ containers are located. The sign shall be not less than 8 inches in width and 6 inches in height and indicate:

CAUTION-CARBON DIOXIDE GAS
 VENTILATE THE AREA BEFORE ENTERING
 A HIGH CARBON DIOXIDE (CO₂)
 GAS CONCENTRATION IN THIS AREA
 CAN CAUSE ASPHYXIATION

- 5307.4.6 CO₂ system containers and piping shall comply with the seismic design requirements of Chapter 16, *Structural Design*, of the International Building Code and shall not exceed the floor loading limitation of the building.
- 5307.4.7 CO₂ containers located indoors shall not be refilled unless filled from a remote connection located outdoors.

All service providers who inspect, test and repair fire protection systems within Thornton's jurisdiction are required to register and submit all test, inspection, and service reports via The Compliance Engine. All reports must be submitted in accordance with the testing schedule and requirements outlined in our adopted fire code.