



CIRSA HAZARD ALERT

SAFER TOGETHER

Hazard Alert – Carbon Dioxide Beverage Systems



Recently, several serious incidents involving hazardous concentrations of carbon dioxide (CO₂ gas) have occurred around the country. Improperly installed or poorly maintained beverage delivery systems have resulted in injuries and even death to customers or employees and pose a serious hazard for first responders. It is estimated that there may be as many as 10,000 CO₂ beverage systems in use in restaurants, golf courses, concession stands, and other locations in Colorado. These incidents demonstrate the need to raise awareness regarding the importance of safety when working with CO₂.

CO₂ is a colorless, odorless, non-flammable gas. It can be deadly even when normal oxygen levels are present. CO₂ is not only an asphyxiant but also acts as a toxicant. At high concentrations it has been shown to cause unconsciousness almost immediately and respiratory arrest within a minute. CO₂ is about 1.5 times heavier than air and hazardous levels can occur quickly and without warning. CO₂ beverage systems can displace oxygen in the area surrounding the machine. Even slow leaks can cause hazardous concentrations of CO₂ in poorly ventilated or improperly ventilated spaces.

To prevent injuries or fatalities, it is important to be aware of common symptoms of CO₂ exposure.

- Frostbite
- Headache
- Drowsiness
- Rapid Breathing
- Confusion
- Increased Heart Rate
- Unconsciousness

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Carbon Dioxide Beverage Stations (cont.)

What are safe levels of CO2?

- 400 ppm – Outdoor fresh air contains about 400 ppm of CO2
- 1000 ppm – CO2 levels indoors should ideally be below 1000 ppm
- 1500 ppm – CO2 levels above 1500 ppm indoors should be addressed with ventilation
- 2000 ppm – More serious symptoms like sweating, increased heart rate and difficulty breathing can occur at CO2 levels of 2000 ppms

Precautions and prevention of CO2 exposure:

- Employee training – All employees should be trained on preventative measures, safety precautions, exposure limits, and symptoms of exposure to CO2. Training should be documented and kept on file for a minimum of 5 years.
- Warning Signage – All affected facilities must have proper signage around CO2 sources or areas where workers may be exposed to some level of CO2. Signage should be clearly visible in areas where CO2 is stored. Listed below are some examples of wording that is appropriate for signage.
 - WARNING Carbon Dioxide gas can cause injury or death. When alarm operates vacate immediately.
 - WARNING CO2STORAGE AREA – Care must be taken to avoid suffocation and Asphyxiation.
- Ventilation – A ventilation system that will vent CO2 from the work area must be installed.
- CO2 Alarms – Safety alarms should be installed to protect employees and customers. Alarms must be continuously monitored. Emergency responders must be notified if CO2 levels become hazardous. (These alarms cannot go directly to the Fire Department) Do not depend on measuring the oxygen content of the air because CO2 can be dangerous even when the oxygen content is adequate.

Who might be regulated by newly adopted IFC or NFPA standards?

- Beverage systems that have greater than 100 pounds of CO2 on a system
- Beverage systems that have any amount of CO2 gas below grade, including blends
- Enclosed outdoor installations

Potential sources of hazardous concentrations when CO2 systems are indoors or in an enclosed outdoor area can include:

- CO2 storage containers that are not properly vented to a well-ventilated area outside of the building. Vents through walls or ceilings are not adequate if gas isn't moving outside.
- Leaking fittings, connections, piping/tubing/hoses, or storage container plumbing.
- Leaking carbonators, syrup pumps, bag in box racks (i.e., any equipment using CO2).
- Leaking beer keg connections and equipment.

It is important to know what standards apply. Information can be collected from the local fire marshal or building inspection department.

Resources:

[Denver Fire Department Policy on CO2 Beverage Systems](#)

[Compressed Gas Use and Storage](#)

[NFPA 55 Compressed Gases and Cryogenic Fluids Code Free Access Version](#)

[Compressed Gas Association Hazard Alert](#)