

MBAA Safety Toolbox Talk



Carbon Dioxide (CO₂) Safety

Overview

Carbon dioxide (CO₂) is naturally in our atmosphere in concentrations which are not hazardous to human health. However, in breweries, concentrations can become elevated and dangerous. Employees and guests alike should be protected from high levels of CO₂ which can cause adverse health effects.

CO₂ in brewing operations can be found in small and large tanks, utilized in the packaging area as well as a serving area if you have that. It is also a by-product of fermentation. Due to the nature of CO₂—as in, a gas heavier than air—it can collect in the bottom of tanks/vessels, low-lying areas/pits, and near the brewery floor. To help prevent CO₂ exposure in hazardous areas, it is a best practice to use ventilation to remove it from the area.

Characteristics of CO₂ Gas

CO₂ is:

- Colorless
- Odorless
- Non-flammable
- CO₂ is heavier than air—concentrations will be higher near the floor/ground.

NOTE: Being a carrier gas, CO₂ may pick up a yeast-like odor during the fermentation process. However, purified carbon dioxide has no odor and is colorless.

General CO₂ Hazards

CO₂ is:

- An asphyxiant (can cause suffocation)
- A respiratory stimulant
- A stimulant and a depressant of the central nervous system (depending on concentration level)

Signs/Symptoms of Exposure

Symptoms of CO₂ exposure vary with the level of concentration as follows:

- **2–3%:** Increased breathing
- **3%:** Headache and breathlessness
- **5–10%:** Headaches, confusion, dizziness, general feeling of discomfort and increased heart rate and blood pressure.
- **12%:** Unconsciousness and death within 20 minutes
- **20–30%:** Death within one minute

NOTE: The OSHA Permissible Exposure Limit (PEL) for CO₂ is 0.5% (5000 ppm). This is the concentration that an employee may be exposed to over an 8 hour time-weighted average (TWA), without incurring the risk of adverse health effects.

Areas with Potential High Levels of CO₂

- Fermentation Areas
- Bright Tank Areas
- Confined Spaces
- Walk-in Coolers
- Packaging Fillers—Bottle, Cans, and Kegs
- Quality Lab

CO₂ Measuring and Alarms

- Area monitors and alarms should be installed in areas with a potential for high CO₂ concentrations.
- A portable gas detector should be used when entering a confined space.
- Always follow alarm procedures; the alarms are installed to protect you.
- If an alarm is activated, evacuate the area until the alarm stops.
- Install CO₂ sensors according to manufacturer's recommendations and close to the floor (within 18" of the floor).
- Inspect/test alarms as per the manufacturer's recommendation.

Training

To ensure employees are aware of the hazards associated with CO₂, train them on at least the following:

- CO₂ characteristics
- CO₂ hazards and signs/symptoms of exposure
- CO₂ monitoring procedures
- CO₂ alarm procedures

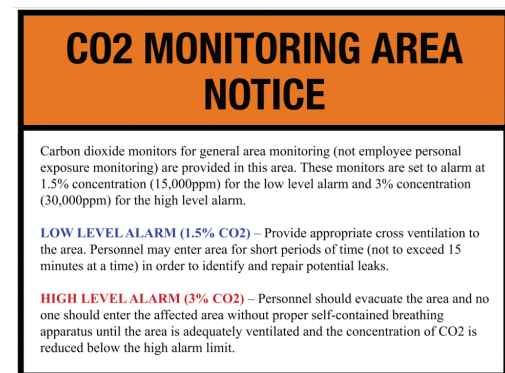
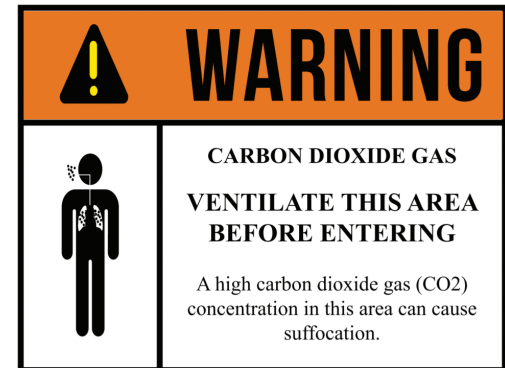
Emergency Preparedness

If exposed to a high concentration of CO₂, do the following:

- Stay calm
- Evacuate the area to clean/fresh air (e.g., outside the building)
- Notify supervisor immediately
- Try to stop any leaks, from a safe area
- If needed, depending on exposure level: Have a trained person perform artificial respiration (CPR) if breathing has stopped and seek medical attention
- If a major building leak:
 - Evacuate the building immediately.
 - Activate building evacuation alarm and call 911.
 - Provide emergency responders with details of the situation upon their arrival

Example Alarm Notification Signs

Source: <http://co2meters.com/Documentation/Other/NBIC-CO2-Warning-Sign.pdf>



LEARN MORE!

To learn more about CO₂, refer to the following:

- Presentation from 2015 MBAA Annual Conference, "CO₂ safety monitoring in breweries:"
<https://www.mbaa.com/meetings/archive/2015/proceedings/Pages/31.aspx>
- CO₂ Hazards:
<https://www.brewersassociation.org/safety/co2-hazards/>
- Venting and Management of CO₂:
<https://www.brewersassociation.org/safety/venting-and-management-of-co2-and-fermenters/>

FOR MORE INFORMATION ON BREWERY SAFETY, PLEASE VISIT THE MBAA BREWERY SAFETY WEBSITE AT:
<http://www.mbaa.com/brewresources/brewsafety>