



COMPRESSED GAS ASSOCIATION, INC.

SAFETY BULLETIN

SB-29—2013

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PREVENTION OF INJURY AND LOSS FROM CARBON DIOXIDE DELIVERY TO SMALL CUSTOMER SITES

The installation of small, bulk liquid carbon dioxide containers has a potential for accidental injury or death. This bulletin outlines precautions to be taken when filling containers at customer sites.

Before remotely filling these containers at restaurants or other establishments, the operator should verify that the system is at normal pressure. This will reduce the possibility of inadvertently discharging carbon dioxide into rooms or other confined areas when the system is not fully installed or is improperly connected to the fill box.

Enclosed, improperly ventilated areas can include but are not limited to basements and outside locations such as one with four solid walls and no ceilings (see Figures 1, 2, 3, and 4).

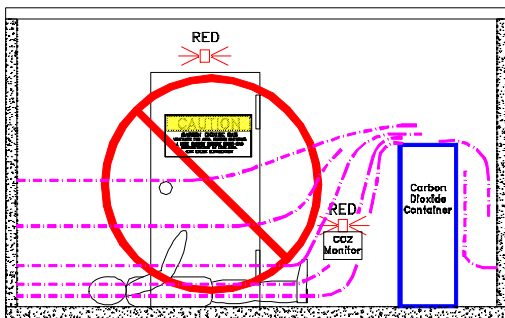


Figure 1—Example of an unsafe, unventilated enclosed space

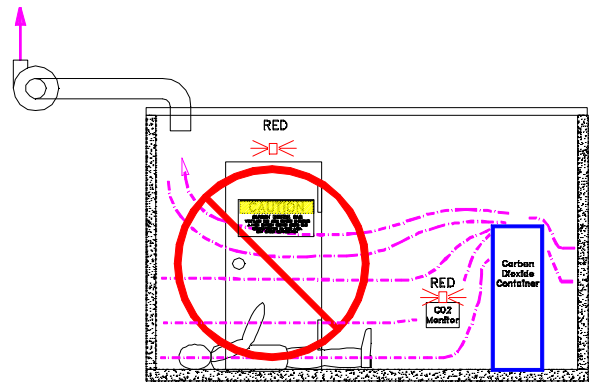


Figure 2—Example of a properly monitored but improperly ventilated enclosed space

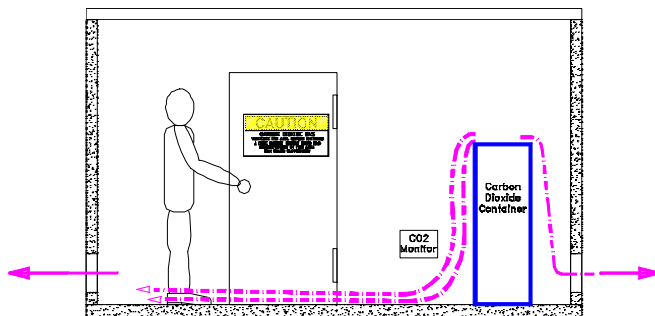


Figure 3—Example of a naturally ventilated and monitored enclosed space

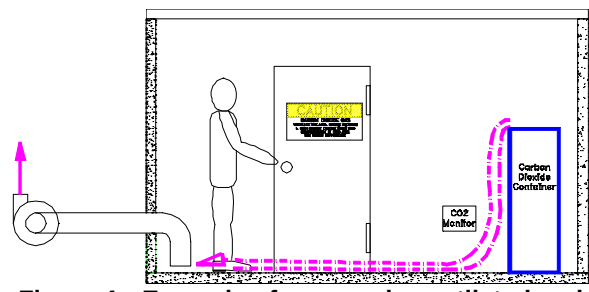


Figure 4—Example of a properly ventilated and monitored enclosed space

Basement, enclosed spaces, or below grade installations of containers present an additional hazard because carbon dioxide gas is 1.5 times heavier than air and will collect and remain in low elevations without an exhaust system venting from the floor level. Basements should be used as container installation sites only as a last resort. A fan and a ducting system is recommended to vent carbon dioxide vapors continuously from the lowest floor level while fresh “make-up” air is introduced. The hazards associated with containers in basement or enclosed spaces can also apply to the downstream system equipment as well. A thorough assessment of a facility must include ventilation and/or monitoring review of all areas that contain carbon dioxide handling equipment and not just the location of carbon dioxide storage container.

A carbon dioxide monitoring system with appropriate visual and/or audible alarm should be installed to detect dangerous concentrations of carbon dioxide. Releases of carbon dioxide can cause sufficient accumulation, which can lead to asphyxiation because vapors accumulate in low elevations, such as basements, and in non-ventilated rooms not necessarily limited to the location of the container. Coolers, such as those containing beer kegs, that have inert gases connected to them pose a significantly higher risk due to the fact that they are not ventilated. Slow leaks of small percentages of the system capacity can cause hazardous gas concentrations.

The following are additional safety guidelines:

- Appropriate warning signs should be placed at the entrance to confined areas where high concentrations of carbon dioxide gas can accumulate. A typical warning follows:

CAUTION—CARBON DIOXIDE GAS
Ventilate the area before entering.
A high carbon dioxide (CO₂) gas concentration
in this area can cause asphyxiation.

- Any time a container is disconnected or taken out of service, the container fill valve (located in the fill box) should be removed and the fill box should be tagged “out of service, do not fill”;
- If an indoor or confined location is used, the outlet from the pressure relief device must be piped to the outside or to a point where the discharge of carbon dioxide vapor will not result in a high concentration of carbon dioxide in the area;
- Any liquid or gas vent valves should be piped so they discharge outside; and
- All liquid and vapor fill connections should be piped so the connections are made outside.

Operators and users should always be trained to understand the proper installation and operation of carbon dioxide systems and containers as well as the properties and hazards of carbon dioxide. See CGA G-6.5, *Standard for Small, Stationary, Insulated Carbon Dioxide Supply Systems*, and the original equipment manufacturer for more detailed information [1].

Reference

[1] CGA G-6.5, *Standard for Small, Stationary, Insulated Carbon Dioxide Supply Systems*, Compressed Gas Association, Inc., 14501 George Carter Way, Suite 103, VA 20151. www.cganet.com