



COMPRESSED GAS ASSOCIATION, INC.

SAFETY BULLETIN

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STATIC ELECTRICITY HAZARDS OF LIQUID OR SOLID CARBON DIOXIDE

Carbon dioxide is commonly used for fire protection, purging, and inerting. A generally unknown fact is that extremely high static electric charges can be generated during the expansion of liquid carbon dioxide to form solid carbon dioxide (also known as dry ice) and cold vapors. The dry ice, which can be used in either "snow," pellet, or block form, contains the static electric charge.

The static electricity in the dry ice can be as high as 150 000 volts, and it can generate sparks to grounded objects. The level of static present in the dry ice varies depending upon humidity, grounding of equipment, and the elapsed time since the dry ice was manufactured.

Dry ice is an electrical insulator that makes the grounding and dissipation of the resulting charges extremely difficult to eliminate. Grounding electrically conductive materials reduces but does not eliminate accumulated static charges.

There have been incidents where liquid carbon dioxide has been used to inert combustible or explosive atmospheres and as a result of static electric discharges has caused a fire or explosion. High static charges inherent in the formation of dry ice can create a fire or explosion when direct injection of expanding liquid or subliming dry ice is used to purge combustible mixtures.

The hazard is greatest when the liquid carbon dioxide or dry ice is initially added to the combustible atmosphere. As the carbon dioxide concentration increases, the risk of fire or explosion decreases. This is because the combustible materials are either displaced or diluted by the carbon dioxide vapors formed by sublimation of the dry ice to the point where a fire or explosion cannot take place. The carbon dioxide vapor does not pose any risk of generating static electricity.

When using liquid carbon dioxide for fire protection, purging, and inerting, the following precautions shall be taken:

- Direct expansion of liquid carbon dioxide shall not be used for direct inerting or purging of combustible or explosive mixtures;
- Carbon dioxide fire extinguishers shall not be used to purge fuel tanks or combustible mixtures where a fire does not already exist;
- Dry ice shall not be used where static electricity discharges can lead to explosion or combustion;
- Carbon dioxide vapor purging/inerting systems with in-line or direct-to-process liquid vaporizers shall incorporate controls that prevent liquid carbon dioxide from discharging into combustible atmospheres; and
- Dry ice manufacturing equipment shall be grounded.

The practice of using carbon dioxide vapor for purging and inerting of combustible materials is safe since there is no static electricity generated during discharge.

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Carbon Dioxide Committee

NOTE—No technical information has been changed from the 2005 edition. This reaffirmed edition may include minor editorial changes.

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