



COMPRESSED GAS ASSOCIATION, INC.

# SAFETY BULLETIN

**SB-15—2009**

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## MANAGING HAZARDS IN CONFINED WORK SPACES DURING MAINTENANCE, CONSTRUCTION, AND SIMILAR ACTIVITIES

Many workplaces contain spaces that are considered to be “confined” because they are small and have configurations that make it difficult for workers to enter and work in the spaces. In many instances, employees and/or contractors working in confined spaces also face an increased risk of exposure to serious injury from hazards including hazardous atmospheres.

Examples of confined spaces are tanks, vessels, acetylene generators, silos, pits, boilers, large-diameter pipe, and other enclosed areas. Since 90% of all incidents in confined spaces can be attributed to atmospheric conditions, it is important to know and understand the hazards.

Atmospheric hazards include:

- oxygen concentrations below 19.5% or above 23.5%;
- high concentrations of asphyxiants/inert gases;
- flammable levels in excess of 10% of the lower explosion limit (LEL) or lower flammability limit (LFL);
- toxic levels above their permissible exposure limits (PEL);
- airborne combustible dust at a concentration that meets or exceeds its LFL; and
- any other atmospheric condition that is immediately dangerous to life and health (IDLH).

Other hazards that may be present or introduced and must also be properly controlled are:

- hot work activities;
- engulfment hazards such as catalyst, perlite, etc.;
- solvent and epoxy use;
- working from an elevation;
- entrapment by the configuration of the space;
- energy sources; and
- thermal hazards including, but not limited to, heating/cooling systems associated with the vessel.

To protect personnel while working in confined spaces you should:

- provide proper training for attendants, entrants, permit issuers, and rescue personnel;
- identify all hazard areas and hazards;
- take measures to control or eliminate all hazards;
- disconnect, shut down, or control hazardous energy sources;
- isolate the space;
- ventilate the space as necessary;

- continuously monitor the atmosphere for applicable hazards;
- provide the proper personal protective equipment (PPE) and other safety equipment;
- provide an attendant outside the space;
- plan for any necessary rescue activities; and
- use a permit to work system for confined space entry work.

In addition it is essential to maintain safe entry conditions for the duration of the entry.

This bulletin is intended to give general guidance when working in a confined space. Refer to CGA SB-2, *Oxygen-Deficient Atmospheres*, and CGA P-39, *Oxygen-Rich Atmospheres*, concerning specific physical effects of oxygen-deficient or oxygen-rich atmospheres [1, 2]. Most work performed in confined spaces must be conducted in accordance with the OSHA requirements defined in Title 29 of the U.S. *Code of Federal Regulations*, Part 1910.146 and equivalent Canadian regulations [3]. Local regulations may also apply.

NOTE—Oxygen content above 23.5% is considered a hazard due to accelerated combustion in such an atmosphere. Do not enter such an area without observing all precautions regarding oxygen-rich atmospheres.

NOTE—If carbon dioxide is present, its level must be monitored by a carbon dioxide specific detector, rather than relying on oxygen monitoring. Carbon dioxide presents a unique hazard, since a dangerous concentration of carbon dioxide may exist even when there is apparently adequate oxygen to support life. For additional information, refer to G-6, *Carbon Dioxide* [4].

## References

Unless otherwise specified, the latest edition shall apply.

[1] CGA SB-2, *Oxygen-Deficient Atmospheres*, Compressed Gas Association, Inc., 4221 Walney Rd., 5th Floor, Chantilly, VA 20151. [www.cganet.com](http://www.cganet.com)

[2] CGA P-39, *Oxygen-Rich Atmospheres*, Compressed Gas Association, Inc., 4221 Walney Rd., 5th Floor, Chantilly, VA 20151. [www.cganet.com](http://www.cganet.com)

[3] *Code of Federal Regulations*, Title 29 (Labor), Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. [www.gpoaccess.gov](http://www.gpoaccess.gov)

[4] CGA G-6, *Carbon Dioxide*, Compressed Gas Association, Inc., 4221 Walney Rd., 5th Floor, Chantilly, VA 20151. [www.cganet.com](http://www.cganet.com)