



# Occupational Safety and Health

## Permit- Required Confined Spaced Entry Hazards of Spaces

[29 CFR 1910.146]

### ATMOSPHERIC HAZARDS

Approximately 90 percent of employee injuries and deaths in confined spaces occur as a result of atmospheric hazards.

#### Oxygen Deficiency

The normal oxygen concentration in air is approximately **20.9 percent** by volume. An oxygen-deficient atmosphere is considered to exist when the oxygen level falls below **19.5 percent** by volume. This can occur by oxygen consumption by individuals; decomposition of organic matter (e.g., rotting material); displacement of oxygen by gases and vapors (e.g., nitrogen, methane gas, carbon dioxide, helium, argon and other inert gases);oxidation of metals (e.g., rusting); or combustion (e.g., welding, fire, etc.)

#### Oxygen Enrichment

Oxygen enrichment levels greater than **23.5 percent** by volume present a serious fire hazard in permit spaces. This condition could result from leaking oxygen cylinders or lines brought into a space.

**Carbon Monoxide(CO)** Carbon monoxide (CO) is a very toxic, colorless, odorless, combustible gas that is a product of incomplete combustion. It is generated by many sources such as gasoline-powered internal combustion engines, arc welding where carbon dioxide is used as an inert gas and fires.

**Hydrogen Sulfide(H2S)** Hydrogen sulfide is a flammable, colorless gas with characteristic rotten-egg odor and is released during the decay of sulfur-containing organic matter, and is encountered in sewers and sewage treatment plants. Hydrogen sulfide is heavier than air and is generally found at the bottom of a space.

**Methane** Methane is the major component of natural gas, about 87% by volume. Methane is not toxic; however, it is highly flammable and may form explosive mixtures with air. Methane is also an asphyxiant and may displace oxygen in an enclosed space. Methane is lighter than air and is generally found at the opening of a space.

**Flammable/Combustible Atmospheres** Combustible and flammable gases, vapors and dusts can pose a significant threat of fires and/or explosion in some permit spaces. In order for an explosion or fire to occur, all components of the “fire triangle” must be present in the right combination: fuel, oxygen and an ignition source.

### Other Hazards

- |                      |                         |
|----------------------|-------------------------|
| Engulfment           | Entrapment Hazards      |
| Mechanical Hazards   | Corrosive Chemicals     |
| Electrical Equipment | Noise                   |
| Poor Lighting        | Slips, Trips, and Falls |
| Hot Surfaces         | Temperature Stress      |

### Routes of Exposure

- Inhalation
- Absorption
- Puncture or Injection
- Ingestion

A **Confined Space** is a space that is:

- 1) Large enough and shaped so that an employee can enter and perform work; and
- 2) Has limited or restricted means of entry or exit; and
- 3) Is **NOT** designed for continuous human occupancy.

A **Permit-Required Confined Space** is a space that meets the above definition of a confined space; and has one or more of the following:

- a) contains or **has the potential** to contain a hazardous atmosphere;
- b) contains a material that has the potential to engulf the entrant;
- c) is configured that an entrant could become trapped or asphyxiated;
- d) contains any other recognized safety or health hazard.

For more information on Occupational Safety and Health issues, please visit our website: [www.csealocal1000.org/osh.php](http://www.csealocal1000.org/osh.php)

