

CONFINED SPACE ENTRY

INFORMATION AND RESOURCES ON ENTERING CONFINED AND PERMIT-REQUIRED CONFINED SPACES

When not properly assessed and controlled confined spaces can be deadly, however when proper precautions are taken, work can be done safely inside them. A **confined space** is a space that is **large enough for a worker to get into and perform their work, has a limited means of entry and egress and is not designed for continuous human occupancy**. A **permit-required confined space** must meet the above definition of a confined space **and** has one or more of the following:

- contains or has the potential to contain a hazardous atmosphere;
- contains a material that has the potential to engulf the entrant;
- is configured that an entrant could become trapped or asphyxiated;
- contains any other recognized safety or health hazard that could prohibit the entrant from self-rescue.



Atmospheric hazards account for about 90% of all hazards in a permit-required confined space.

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.)

OTHER HAZARDS

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

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) 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 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 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.

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 tetrahedron” must be present in the right combination: fuel, oxygen, an ignition source and a chemical chain reaction.



EMPLOYER REQUIREMENTS 1910.146 & 1926 AA

- Employers must create a written program.
- Employers must identify and evaluate all confined spaces and determine their classification.
- The employer shall inform exposed employees, by posting danger signs or by any other equally effective means, of the existence, location & the danger posed by permit spaces.
- They must develop safe entry procedures including a permit program.
- Atmospheric testing must be performed prior to entry and throughout a permit-required entry.
- Employers must provide hazard control measures based upon the hazards of the space.
- Employers must provide appropriate equipment for the work and safety equipment including non-entry rescue equipment for permit-required confined spaces.
- A team must be designated (entrant , attendant, entry supervisor) and they must provide at least one attendant during entry.
- Any employer with workers who perform any permit-required confined space duty (as an entrant, attendant, entry supervisor or rescue service) SHALL be trained on the understanding, knowledge and skills, necessary for the safe performance of the duties that they are assigned.
- The employer shall develop and implement procedures for summoning rescue and emergency services; rescuing entrants from permit spaces ; providing necessary emergency services to rescued employees; preventing unauthorized personnel from attempting a rescue.
- Employers must perform an annual program review.

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