

SAFETY AT WORK

Hazardous Atmospheres in Confined Spaces

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What hazards could be found in a Confined Space?

Confined spaces can have a lot of different hazards in them. The main categories of hazards are:

1. A **hazardous atmosphere**,
2. Materials that could engulf a person,
3. A space that has an internal configuration that narrows down to a small area where a person could be trapped or asphyxiated, and
4. A space that contains any other recognized serious safety or health hazard.

Hazardous Atmospheres

A space that contains or has the potential to contain a hazardous atmosphere can be deadly! If the atmosphere can cause death, incapacitation, impairment of the ability to self-rescue, serious injury or acute illness, it is a serious problem in a confined space.

These atmospheres must be addressed and made safe before an entry can begin.

There are several ways an atmosphere inside a confined space can be hazardous.



- 1) A flammable gas, vapor, or mist that is in excess of 10% of its lower explosive limit (LEL).

In a flammable atmosphere, a small spark occurring inside or outside the space can ignite the space instantly.

The flammable substance could come from:

- Fumes of chemicals left on the inner surfaces of the space;
- Rotting organic materials in the space;
- Leaks in pipes or hoses inside or outside the space;
- By-products of work being performed in the space (like brazing, painting, cleaning or degreasing, de-scaling);
- Vaporization of flammable liquids in the space.

- 2) A concentration of combustible dust in the air that is at or above its LEL.

- “Rule of thumb” - Where dust obscures your vision at a distance of 5 feet or less a dust explosion could occur.

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3) **An oxygen concentration that is below 19.5% or above 23.5%.**

- Oxygen can be **consumed** by:
 - The process of combustion when there is welding, cutting, or brazing in the space;
 - The fermentation process in a space;
 - A chemical reaction, like the formation of rust that consumes oxygen.
- Oxygen can be **displaced** by other substances pushing the oxygen out, such as:
 - Methane, carbon dioxide, methane, argon, etc.
- Oxygen levels can be **elevated** by:
 - Using oxygen to ventilate the space;
 - Taking compressed oxygen tanks into the space, or having a leak in an oxygen supply hose in the space.

4) **The concentration of any chemical or substance is in excess of it's Short Term Exposure Limit (STEL).**

Chemicals can burn your skin, eyes, and respiratory system;

You can inhale chemicals that will damage your nervous system and other internal organs;

Some chemicals can cause you to pass out, stop breathing, and die very quickly.

Chemicals in the space could come from:

- Chemicals left on inner surfaces;
- Decomposition of materials in the space;
- Leaks in hoses or pipes;
- Chemicals being released while working in the space;
- Chemicals put in the space to make the space non-flammable;
- Chemical reactions during work.

5) **Any other atmospheric condition that is Immediately Dangerous To Life and Health (IDLH).**

Exposure to any chemical that can cause an immediate or delayed threat to life or health is a threat in a confined space.

- Some chemical effects can be delayed 12 to 72 hours.
- Some chemicals can cause irreversible health effects that do not show up immediately.

The Number 1 Cause of Deaths in Confined Spaces is Oxygen Deficiency

Always test the atmosphere to make sure there is enough oxygen in the space!

The Number 2 Cause of Deaths in Confined Spaces is Flammable Explosions

Always test the atmosphere to make sure the flammable content in the spaces is less than 10% of the LEL!