

ATMOSPHERIC HAZARDS

Responsible for 90% of worker injuries or death in confined spaces. They are particularly dangerous because they most often cannot be detected by the human senses.

1. Oxygen deficiency- below 19.5%
2. Oxygen enriched atmosphere – above 23%
3. Flammable or explosive atmosphere – Lower Explosive Limit (LEL), Upper Explosive Limit (UEL)
4. Toxic atmosphere – Occupational Exposure Limit (OEL)

Common Atmospheric Hazards		
Hazard	How It Occurs	Why You Should Be Concerned
Oxygen deficiency (less than 19.5% oxygen)	Chemical or biological reactions consume oxygen.	Oxygen-deficient atmospheres affect heart rate, muscle coordination, and breathing. Eventually, they lead to death.
Oxygen enrichment (greater than 23.0%)	Results from welding tasks and from the improper use of oxygen for breathing air.	Oxygen-enriched atmospheres increase the risk of fire or explosions.
Flammable atmospheres	Fuel, oxygen, and a source of ignition cause fires and explosions.	Flammable gases such as acetylene, butane, propane, hydrogen, and methane are often common in confined spaces. Grain, nitrated fertilizers, and ground chemicals can produce combustible dusts.
Toxic atmospheres	Accumulates through some manufacturing, biological, or chemical reactions. Released during work or tasks such as welding and cleaning.	Many manufacturing processes, stored materials, and work tasks produce toxic gases, vapours, or dusts.
Corrosive atmospheres	Accumulates from some manufacturing processes, biological, or chemical reactions.	Corrosive substances destroy living tissue. Some cause immediate damage to skin and eyes; some have no immediate effect, but cause cancer with prolonged exposure.

COMMON CONFINED SPACE NON-ATMOSPHERIC HAZARDS

Physical Hazards

Usually simple to recognize and easier to deal with than Atmospheric Hazards. Some examples of physical hazards are:

- Physical layout of the confined space – Small openings, piping, or other obstacles to movement within the space.
- Falls from height/ top entry – See Fall Protection Code of Practice.
- Moving Parts – Machinery, fans, belts, etc. See the Control of Hazardous Energy (lock out / tag out) Code of Practice for dealing with these hazards.
- Corrosive materials – Protection for a workers skin, eyes and respiratory system required
- Stored energy – Must be secured or released such as batteries, capacitors, live wires, compressed air, hydraulics, springs, and gravity.
- Floor surface – Poor housekeeping, slippery surfaces, slips, trips and falls.
- Engulfment – A worker can be trapped, buried or drowned by liquids, or finely divided solids (soil, grain, cement, gravel). This is the number two cause of death in confined spaces.

- Biological effect – Mildew molds, bacteria, viruses, insects and animals.
- Temperature – High temperatures resulting in heatstroke, cramps, heat exhaustion. Fans, cooling vests and drinking water may be necessary. Extreme and or prolonged exposure to cold resulting in hypothermia, frost bite and/or impaired movement and dexterity.
- Radiation

OTHER HAZARDS

Some hazards do not necessarily fit into the categories of atmospheric and/or physical but must still be eliminated or controlled to prevent injury or death.

- Limited visibility – Workers rely primarily on their vision, if visibility is compromised they may become disoriented and /or overlook hazards.
- Noise levels – Excessive noise levels can not only be damaging in and of themselves, but may distract, disorient and/or effect communication. By the nature of the physical characteristics of a confined space noise is often amplified.
- Changing conditions – Conditions may change over time or rapidly after hazards other hazards have been identified and controlled. Workers must be aware of their work environment. Examples of changing conditions are rain/runoff filling a manhole or causing slippery conditions. Welding and grinding causing toxic fumes or oxygen consumption. A worker consuming available oxygen in an unventilated space.

Common Hazards		
Hazard	How It Occurs	Why You Should Be Concerned
Engulfment	Loose material drawn from the bottoms of storage bins can suffocate or bury an entrant. Liquids or materials are suddenly released into the space.	Liquid or loose materials can trap or bury a worker in seconds.
Mechanical and hydraulic energy	Mechanical and hydraulic equipment start or move unexpectedly.	Entrants servicing mechanical and hydraulic equipment can be seriously injured or killed if the energy is not properly controlled.
Noise	Confined space can amplify sounds produced by tools and equipment.	Noise interferes with essential communication between entrants and attendants.
Falling objects	Objects fall into space because topside openings are unguarded or improperly guarded.	
Extreme temperatures	The space's location and the equipment it contains make it very hot or cold.	Hot environments put workers at risk for heat stress, especially if they are doing strenuous work or wearing protective clothing – cold environment make tasks more difficult to accomplish.
Slippery surfaces	Leaks, spills, and condensation make walking surfaces slippery.	Wet surfaces are usually slippery. They increase the risk of falls.
Corrosive chemicals	Corrosive chemicals are stored in the space, or entrants use them to do tasks.	Corrosive chemicals can cause severe eye or skin irritation if exposed workers are not wearing protective clothing.
Access problems	Confined spaces are difficult to enter and exit.	In an emergency, entrants may not be able to exit quickly.
Illumination problems	Most confined spaces are dark places.	Poor lighting makes it difficult for workers to enter, exit, and work in a confined space.