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Confined spaces



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What your site and employer should do for you

1. Assess the project, identify any work that will need workers to enter or work in a confined space, and tell you.
2. Assess the hazards and risks from confined space work and develop safe systems of work, with rescue plans.
3. Make sure suitable confined space training is provided for supervisors, workers and rescuers.
4. Make sure that anyone entering a confined space is properly trained and adequately resourced with rescue equipment and trained rescuers.
5. Carry out safety inspections.

What you should do for your site and employer

1. Do not enter a confined space unless a safe system of work is in place and you are trained, competent and authorised to do so.
2. Do not take any risks.
3. Do not leave any confined space open or unguarded.
4. Report any safety concerns to your supervisor.
5. If you feel unwell, leave the area immediately and tell your supervisor.

Introduction

Workers can become trapped or overcome by fumes, vapours, poisonous or explosive gases when working in confined spaces. This can lead to people dying.



Many workers who tried to rescue workmates without a proper rescue plan and the necessary equipment have been overcome by toxic or suffocating gas and fumes, or a lack of oxygen, and have collapsed and died, adding to the tragedy.

What is a confined space?

Confined spaces are not just tanks, vessels or chambers. They do not have to be totally enclosed.

They can be any place where there is a risk of the following.

- Reduced or increased levels of oxygen in the air.
- The presence or build up of poisonous gases, fumes or vapours.
- The presence or build up of flammable or explosive gases or vapours.
- Drowning due to an inrush of liquid, or being engulfed or buried in free flowing solids (such as sand).

Depending upon the work hazards many places could be classed as a confined space. Some examples are listed below.

- Excavations and trenches.
- Inspection chambers, sewers and soakaways.
- Service tunnels and shafts, plant rooms and boiler rooms.
- Basements, voids and staircases.
- Lofts, roof voids and attic spaces.
- Unventilated rooms and rooms with sealed windows.
- Oil storage tanks or water tanks above or below ground.

An unventilated room may not seem like a confined space. However, if you are using a substance in the room that gives off toxic or hazardous vapours then you could be overcome and fall unconscious.



Toxic paint remover fumes cause death of worker

A worker died after breathing in toxic fumes while carrying out restoration work in a bathroom at a flat in South West London. The worker was using an industrial paint and varnish remover to strip resin coating from the bath. The room did not have enough ventilation and the 55-year-old victim was overcome by the fumes. He died at the scene and was discovered later by the occupant of the flat.

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Depending upon the work activity, any space can become a confined space



Entry to confined space with lifeline and rescue equipment

Hazards

A lack of oxygen

The air that we breathe contains around 21% oxygen and, at that level, people can work without difficulty. If the oxygen level falls below 10% it will cause breathing difficulties, unconsciousness and possibly death.

A reduction in oxygen can be caused by the following.

- Hot works or machinery that burns up the oxygen.
- People breathing.
- Rust (oxidisation) inside enclosed tanks.

Too much oxygen

If the air contains too much oxygen this can be a major hazard. Organic materials (such as oil and wood) will be able to catch fire and burn more easily, and ordinary materials (such as paper and clothing) will burn more fiercely.

An increase of only 4% oxygen is enough to create a hazard. This may happen by accident.

- In oxyacetylene and oxypropane processes, sometimes not all of the oxygen supplied to a cutting torch is used. Some may be released, increasing the atmospheric oxygen above the normal 21%.
- Leakage from torches or hoses may go unnoticed (such as during meal breaks or overnight). For this reason, they should be removed and properly isolated at every break time.

Toxic and flammable atmospheres

Oxygen can be replaced by asphyxiating, toxic or flammable gases in the following ways.

- By stirring up sludge or slurry in excavations, which may release methane or hydrogen sulphide (H₂S).
- Natural methane venting from the ground or rotting vegetation.
- Using substances that give off fumes or vapours (such as solvents, paints and resins).
- Sewage, giving off hydrogen sulphide, which smells like rotten eggs and will drive out or dilute the oxygen in the air.
- Chalky ground, which gives off carbon dioxide (CO₂), especially when wetted by acidic rain.
- People breathing out carbon dioxide.
- Gases (such as liquefied petroleum gas (LPG), methane or oxygen enrichment), which build up to form a highly flammable atmosphere.

An overturned tanker or a large spill may release petrol or dangerous chemicals into the drainage system. The vapours can travel hundreds of metres.

Hostile environments

Apart from the hazards mentioned, other dangers may arise within a confined space. Some examples are listed below.

- Difficulty using electrical and mechanical equipment in a confined space, and exposure to higher-than-usual levels of noise from the equipment.
- Extremes of heat, which can have harmful effects and may be intensified in a confined space.
- High humidity levels, which can interfere with the body's natural cooling mechanism, preventing sweat from evaporating.
- Excessive sweating, which will cause the body to lose vital salts.
- Difficulty getting into, or out of, and working in a confined space, which may involve working at height.

The potential hazard of an inrush of water, gas, sludge and so on, due to a failure of walls or barriers, or leakage from valves, flanges or blanks, must all be considered at the risk assessment stage.

Working in a confined space

Your employer should identify if the work activity, hazards and area of work is, or should be, classed as a confined space. Anyone working in a confined space must be properly trained.

Work in a confined space needs the following safety documentation to produce a safe system of work.

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- A suitable and sufficient task and site specific risk assessment.
- A method statement, including a rescue plan.
- A permit to work (to manage and control entry).

The safe system of work will identify important issues, such as those listed below.

- Who the supervisor will be. (The supervisor should make sure the task has been properly planned and check safety at each stage. They will need to be present while work is underway.)
- Safe access and egress (how to get in and out safely).
- What tools and materials to use, and how they should be used.
- The type of air and gas monitoring equipment and alarm system.
- Who can enter and for how long (time limits).
- What personal protective equipment (PPE) and respiratory protective equipment (RPE) to use.
- The emergency arrangements.
- The rescue equipment and trained rescue team.



Emergency exit from a confined space using escape breathing apparatus (EBA)

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The air within the space must be tested before entry, and constantly monitored while the space is occupied using a meter with an audible and visual alarm. If the alarm sounds, the area must be evacuated as quickly and safely as possible. There should be one person (known as the attendant) at the entrance to the confined space, whose job is to raise the alarm and start the rescue plan if things go wrong.

There must always be a clear means of communication between workers inside the space and those outside.

In some cases, it may be necessary for site management to provide information about the confined space work to the emergency services, in case they may need to be called or involved in the event of an emergency.



Never try to rescue someone unless you are part of a properly trained and equipped rescue team. Use the time to get expert help and call the emergency services.



Workers die in an open-topped inspection shaft

At Carsington Reservoir in Derbyshire, four young, physically fit men, aged between 20 and 30, died at the bottom of an open-topped inspection shaft. Naturally evolved carbon dioxide had displaced the oxygen, but no tests were made before the first man entered. He collapsed and the three other men in turn climbed down, trying to rescue their colleagues. They were overcome by the lack of oxygen and later died.

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