

Working Safely in Confined Spaces (For Employers)

Never trust your senses to determine if the air in a confined space is safe! You cannot see or smell many toxic or flammable gases and vapours, or sense the oxygen levels. Workers who ignore, underrate or don't know the hazards, face the risk of serious injury or death when working in a confined space.

What is a confined space

A confined space is any area:

- not intended or designed primarily as a place of work; and
- with restricted entry and exit; and
- at atmospheric pressure; and
- where the potential for engulfment, inadequate ventilation, a contaminated atmosphere or oxygen deficient atmosphere may exist.

Is there a law for work in confined spaces?

In Queensland, work in a confined space is covered by the *(Part 15 - Confined Spaces) Workplace Health and Safety Regulation 1997*. It requires people to take suitable precautions to minimise the risks from exposure to confined space hazards and prevent death and injury.

Why are confined spaces hazardous?

Confined spaces present a risk to your health and safety whenever you have to enter them. A worker whose upper body or head is within a confined space is considered to have entered the confined space.

Confined spaces potentially contain many hazards. These are often invisible and cannot be detected without special equipment. There may be one or more hazards present.

What hazards are present in confined spaces?

Oxygen deficient atmospheres

A lack of oxygen can cause brain damage and death. Warning symptoms include breathing problems, loss of muscle control, drowsiness and euphoria. Oxygen deficiency can be caused by rust, fire, absorption by grains, soils, consumption by bacteria and displacement by another gas.

Toxic atmospheres

Toxic atmospheres contain gases, vapours, dusts or fumes known to have poisonous effects on the body. Many toxic gases cannot be detected by sight or smell, so workers do not have enough time to react to the situation. Cleaning, painting or welding may produce dangerous vapours or fumes.

Flammable or explosive atmospheres

Flammable or explosive atmospheres contain flammable gases, vapours or dusts, which could be ignited by a spark or open flame. The risk of explosion or spontaneous combustion is increased if an oxygen enriched atmosphere exists where the oxygen content is greater than 23.5%.

Engulfment

Workers can be trapped or buried by dry bulk materials or liquids or may even suffocate through inhalation or compression of the torso. Materials that may cause engulfment include grain, sand, flour, fertiliser and sawdust.

Mechanical equipment

All moving equipment, such as mixers, agitators, augers and conveyor belts must be isolated. Otherwise the worker is at risk of being crushed or trapped by the moving parts.

Other hazards

Other hazards could result from the work being done. These include noise, vibration, extremes of temperature, radiation, manual handling and falls.

How should the risks be assessed?

The employer must complete a risk assessment before any work involving entry into a confined space is performed. When assessing the potential risks to workers, the employer should consider:

- the work to be done
- whether entry into the confined space is necessary to do the work
- hazards involved and the associated risks

- type of testing to be undertaken before entry
- number of workers required
- whether the confined space needs to be ventilated prior to entry
- whether personal protective equipment or clothing is necessary
- whether special tools and techniques are necessary to work in the confined space
- emergency and rescue procedures and equipment.

How should the risks be controlled?

Eliminate the need to enter the confined space.

e.g. use remote control cameras in the investigation of sewer lines

Substitute a material or process for a less hazardous one.

e.g. use a non-flammable solvent in place of a flammable solvent, use a water-based paint in place of an organic solvent-based paint or drill a hole rather than using flame cutting equipment

Isolate the confined space to avoid the introduction of harmful substances or activation of moving parts in the confined space.

e.g. isolate the confined space from power sources, remove valves, or lock and tag all moveable components

Engineering controls can help maintain a safe atmosphere or allow work to be carried out safely.

e.g. mechanically ventilate the confined space to remove a hazardous contaminant produced by the work being done in the confined space, or use non-

sparking tools in a flammable atmosphere

Administrative controls involve changing work practices so the time or conditions of exposure to the risks are reduced.

e.g. an entry permit for a confined space may state the period of time a person may enter the confined space

Personal protective equipment (PPE) should only be used when one or all of the other control measures cannot reduce the risk to an acceptable level. PPE can be used in conjunction with other control measures.

Safety Procedures

You must complete these safety procedures before entry to a confined space.

Entry permit

A written entry permit from employer must be obtained before commencing work in a confined space. This must only be issued after testing the atmosphere of the confined space and ensuring it is safe to enter. The permit should indicate the work to be performed in the space and the necessary precautions.

Testing of the atmosphere

- Atmosphere in confined space must be tested by suitable scientific means to determine whether the air is safe to breathe, and that any combustible gases, vapours or fumes are within safe limits.
- Testing should be performed from outside the confined space using a probe and from as many access holes and openings as are available before entry.

- Remote areas in the confined space may be tested once the area adjacent to the entry is declared safe.
- Testing of remote areas may need to be undertaken by workers wearing supplied-air respiratory protective equipment.

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Undertake the following procedures to test the atmosphere.

Oxygen level

- ▶ oxygen level must be between 19.5% and 23.5% while any person is in the confined space
- ▶ levels below the minimum create a risk of impaired function, illness or death, while levels above the maximum increase the flammability of combustible materials
- ▶ **Toxic gases, vapours or fumes**
- ▶ testing ensures any contaminants in the confined space are present at a concentration below the appropriate exposure standard for that contaminant
- ▶ workers need to know exactly what types of contaminant are likely to be present in the confined space so the correct testing equipment can be used

Flammable gases or vapours

- ▶ concentration of a flammable contaminant must be below 5% of its lower explosive limit (LEL) prior to entry (LEL is the level below which a flame will not form)

if contact occurs with an ignition source).

- ▶ **An employer must not allow a worker to enter the confined space if the concentration of a flammable contaminant is greater than 5% of its LEL.**
- ▶ **If continuous monitoring equipment is being used, workers may remain in the confined space at concentrations up to 10% of the contaminant's LEL, provided the air quality is maintained or supplied and breathing apparatus is used.**
- ▶ **Continuous-monitoring flammable gas detector should have audible alarms which sound to warn workers when the concentration exceeds 10% of the LEL.**

Ventilation and cleaning

- Unsafe levels of contaminants, which have been identified by testing the atmosphere, should be reduced to a safe level before entry.
- Cleaning should be carried out from outside the confined space and continue until the risk from the contaminants has been reduced to a safe level.
- Methods of cleaning include hydrojetting, steam cleaning, abrasive blasting and chemical cleaning.
- Because the cleaning process may create risks, select the method of cleaning most suitable for the contaminant in the confined space.
- Confined spaces must not be ventilated with pure oxygen or gas mixtures with oxygen at a concentration greater than 21% - use normal air where possible.

Isolation of sources of danger

- Confined space must be isolated before entry occurs and it may also be necessary to withdraw the confined space from service.
- Steps must be taken to ensure that no contaminants are introduced, and no equipment or services that could be hazardous are activated while a worker is in a confined space.

Stand-by person

- If a risk (e.g. low oxygen level) to health and safety exists in a confined space, no worker is to enter the confined space unless a stand-by person is present.
- Stand-by person must be trained in first aid, rescue procedures and the use of safety equipment - appropriate rescue equipment must be present.
- Communication and, where possible, observation should be maintained between the stand-by person and the worker in the confined space-if visual or oral communication is not possible another communication system, such as rope signals, should be used.

Personal protective equipment

- Employer must provide equipment appropriate to the work to be done and the hazards in the confined space.
- Equipment must be selected and fitted to suit the individual and maintained in proper working condition -inspect each piece of equipment before use.
- fail-arrest harnesses and/or lanyards should be worn where there is a risk of falling when entering or exiting a confined space, or where rescue by a direct route is possible
- supplied-air respiratory protective devices should also be worn if it is not

possible to obtain a safe atmosphere in the confined space

Emergency Procedures

Appropriate rescue and first aid procedures and provisions must be planned, established, rehearsed and followed at all times. The immediate reaction to enter a confined space to rescue a worker in an emergency situation should be resisted, as this may lead to the death or serious injury of the rescue worker.

Training

All workers associated with work in a confined space must be given training which includes:

- hazards of confined spaces
- assessment procedures
- control measures
- emergency procedures
- selection, use, fit and maintenance of personal protective equipment.

Safety Tips

Never enter a confined space without an entry permit

Enter the confined space safely at all times. Follow all instructions and safety procedures.

Leave immediately if you experience any dizziness, light-headedness or difficulties. Report any hazardous conditions or injuries.

Test for hazards - know how to use the equipment and interpret results.

Stay alert at all times - do not take your safety for granted.

Concentrate on the job you are doing. Handle all equipment safely.

Have emergency equipment available e.g. fire extinguisher, clean water supply for chemical accidents, resuscitation equipment.

Confined spaces legislation

Refer to the *(Part 15 - Confined Spaces) Workplace Health and Safety Regulation 1997*.