WORKSAFE
Mahi Haumaru Aotearoa

HSWA

QUICK GUIDE

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Confined spaces: planning entry and working safely in a confined space

WorkSafe New Zealand accepts *AS 2865 Confined spaces* as the current state of knowledge on confined space entry work.

Confined spaces – what can go wrong

Year after year, people die when entering confined spaces to carry out work. In some cases, multiple fatalities occur when would-be rescuers enter the space and become victims themselves.

Consider these cases in New Zealand:

- A worker was killed after being engulfed in a silo containing sand.
- Two workers were hospitalised after inhaling hydrogen sulphide. One was cleaning inside a tank that previously stored a substance for cultivating mushrooms. When that worker lost consciousness, the second worker climbed in to rescue the first worker before also losing consciousness.
- Three workers died from lack of oxygen inside a sewer.
- A worker died in slurry after being suffocated by carbon dioxide in a tank used to mix pig feed.
- A winemaker inspecting a vat was suffocated by carbon dioxide from fermenting wine.
- A worker steam cleaning the inside of a fuel tank died from lack of oxygen.

About this quick guide

Confined space work is covered by an Australian standard: AS 2865 *Confined spaces*.

This quick guide will give you a brief overview of the requirements and procedures in the standard. It is not a substitute for the standard itself.

Anyone who carries out confined space work needs to be familiar with the standard, and should have specialist training as well.

What is a confined space?

A confined space:

- is an enclosed or partially enclosed space and
- is not intended or designed primarily for human occupancy and
- may present a risk from one or more of the following at any time:
  - unsafe concentration of harmful airborne contaminants
  - unsafe concentration of flammable substances
  - unsafe levels of oxygen
  - substances that can cause engulfment.

Examples include: storage tanks, tank cars, process vessels, boilers, silos, pits, pipes, sewers, shafts, ducts and shipboard spaces.

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What does the standard require?

The standard follows the approach of the Health and Safety at Work Act 2015 (HSWA). It requires persons conducting a business or undertaking (PCBUs) to:

- identify the hazards associated with working in the confined space and conduct a risk assessment
- control the risks posed by the hazards by:
  - elimination
  - minimisation, if elimination isn't reasonably practicable.

Identifying hazards and assessing risk

The standard gives detailed information on hazard identification and risk assessment.

Some of the hazards of confined spaces include:

- Oxygen-deficient atmospheres, which can cause unconsciousness, brain damage and death.
  - Oxygen deficiency can be caused by rust, fire, absorption by grain or soils, consumption by bacteria, or displacement by another gas.
- Toxic atmospheres, containing gases, vapours, dusts or fumes that have poisonous effects on the body. Some of these substances may be carcinogenic. Cleaning, painting or welding may produce dangerous vapours and fumes.
- Flammable or explosive atmospheres, containing 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 bulk materials such as grain, sand, flour, fertiliser and sawdust.
- Operation of moving parts (for example, being trapped or crushed by augers, mixers, agitators or conveyor belts).
- Uncontrolled introduction of steam, water, or other gas or liquid.
- Other hazards could result from the work being done (for example, noise, extremes of temperature, radiation, manual handling and falls).

Controlling the risks

The control measures should be applied in the order given earlier (beginning with elimination, followed by minimisation). Consider the following issues:

Can work be done without entry to the confined space?

Always, as a first step, check to see if the work can be done with equipment from outside the confined space. The golden rule is: Don't go in if you don't have to.

Isolate contaminants and moving parts

Prevent accidental introduction of materials (for example, steam, water or bulk materials, through piping, ducts, vents, etc). De-energise, lockout or tagout machinery.

Clean and purge the confined space if necessary

Use a suitable cleaning method to remove harmful solids or sludges. Purge with fresh air to remove harmful gases or vapours.

> **Warning**: Never use oxygen to purge a confined space: this can create a fire and explosion hazard.

Test the atmosphere for oxygen

Use a suitable detector to determine whether the confined space contains a safe oxygen level for breathing.

Where possible, carry out atmospheric testing without entering the confined space.

Test the atmosphere for toxic and flammable contaminants

Test for toxic contaminants (for example, hydrogen sulphide, methane, carbon monoxide) and flammable contaminants (for example, petroleum vapours).

You need to use appropriate detection equipment, which should be correctly calibrated at regular intervals.

Ventilating the confined space safely

Ventilate the confined space by using a blower designed for the purpose. When blowing air into the confined space, make sure high volume of air is blown in at a low speed – this can be provided by trunking and a blower made especially for this purpose.

Then test again for levels of oxygen and other gases to ensure that contaminants are reduced to below the Workplace Exposure Standard, or a safe level.

Select appropriate breathing apparatus if necessary

If the space can't be ventilated, or if the work will contaminate the atmosphere (for example, hot work, painting, sludge removal), use a suitable self-contained breathing apparatus or supplied-air respirator.

Selecting the right personal protective equipment (PPE)

PPE provides protection for workers when all other control measures can't eliminate or minimise the risk. PPE is the lowest control and shouldn't be the first or only control measure considered.

PPE can include:

- respiratory protective equipment (RPE)
- safety helmet
- gloves
- hearing protectors
- safety harness
- lifeline.

Take care when selecting the right PPE for an emergency response. As well as respiratory protective equipment (RPE), this could include items such as safety helmet, gloves, hearing protectors, safety harness and lifeline.

Issue a written authority for entry to work

The PCBU or person responsible for the work should issue a written authority – or confined space entry permit – as described in the Standard. Essentially, this permit is a safety checklist to make sure nothing is overlooked.

Working with a stand-by person

Have a trained stand-by person to monitor the safety of the person working inside the confined space and to take action if an emergency arises.

Ensure there is a reliable system of communication – by voice, radio, hand signals, hard-wired communication etc.

Monitor and maintain control measures

Test the air in a confined space constantly as oxygen and gas levels in a confined space can change quickly. Be alert for any change in conditions.

If conditions change, evacuate the confined space

If necessary, there should be a system for getting a worker out of the space quickly if anything goes wrong. This could include using a safety harness and lifeline attached to a tripod.

Training

Provide training for all workers who may be involved in confined space work, including stand-by persons, to ensure they have the skills to safely do this work. Regularly reassess their competency for working in confined spaces. Workers who use detectors to test whether the atmosphere is safe must be trained to use them correctly.

Confined space emergency procedures

Have a site-specific emergency procedure and emergency equipment for every confined space job. This will include:

- first aid
- firefighting equipment
- a rescue procedure for workers who may be injured or incapacitated
- PPE and RPE for rescuers
- emergency contact details register.

Rescue procedures should be tested to make sure they are safe and effective – it is not easy to extract a person from a confined space. When testing rescue procedures, make the situation as realistic as possible. The victim and the rescuer are likely to be wearing PPE and RPE that may make it more difficult to extract them.

For further information

This quick guide is a brief summary of the standard, and does not provide all the information required for safe working in a confined space.

AS 2865 Confined spaces. Available from SAI Global at: www.intertekinform.com

Personal protective equipment – a guide for businesses

Respiratory protective equipment (RPE) – advice for businesses