Confined Spaces

Planning Entry and Working Safely in a Confined Space

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Confined spaces — serial killer

Confined spaces have been likened to a serial killer. 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:

- 1999: Three men died from lack of oxygen inside a sewer manhole.
- 1998: A man drowned in slurry after being suffocated by fermentation fumes in a tank used to mash pig feed.
- 1997: A winemaker inspecting a vat was suffocated by fumes from fermenting wine.
- 1997: A man steam cleaning the inside of a fuel tank died from lack of oxygen.

About this leaflet

Because work in a confined space is so hazardous, it is covered by a combined Australian-New Zealand standard: ASNZS 2865-1995 *Safe working in a confined space*. (The standard is presently under review.)

This leaflet 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 had specialist training as well.

What is a confined space?

A confined space is defined as an enclosed or partially enclosed space that is not intended as a place of work. It is liable to have an atmosphere that contains harmful contaminants or not contain a safe oxgen level. It may have contents that could cause engulfment. It may have restricted means for entry and exit.

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

What does the Standard require?

The standard follows the approach of the Health and Safety in Employment Act 1992. It requires employers (or persons in control of the place of work) to:

- Identify the hazards associated with working in the confined space.
- Assess the risks (i.e. determine if the hazards are significant).
- Control the risks by:
  - elimination;
  - substitution;
  - isolation;
  - engineering controls;
  - administrative controls; and
  - use of personal protective equipment.

Identifying and assessing hazards

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 brain damage and death. Oxygen deficiency can be caused by rust, fire, absorption by grain or soils, consumption by bacteria, and displacement by another gas.
- Toxic atmospheres, containing gases, vapours, dusts or fumes that have poisonous effects on the body. Cleaning, painting or welding may produce dangerous vapours or 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 dry bulk materials such as grain, sand, flour, fertiliser and sawdust.
- Operation of moving parts, e.g. 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, e.g. 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 substitution, etc.) These are summarised as follows:

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, e.g. steam, water, 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 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, atmospheric testing should be carried out without entering the confined space.

Test the atmosphere for toxic and combustible contaminants.

Test for toxic contaminants (e.g. hydrogen sulphide, methane, carbon monoxide) and combustible contaminants (e.g. petroleum vapours).

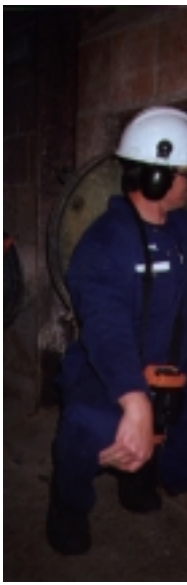
You need to use appropriate detection equipment, which should be correctly calibrated at regular intervals.

Ventilate the confined space if necessary.

Ventilate the confined space by using a fan, by blowing air in with a compressor, or by opening more manhole covers or other entry or exit points. 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 (e.g. hot work, painting, sludge removal), a suitable self-contained breathing apparatus or supplied-air respirator should be used.



Select personal protective and safety equipment.

As well as breathing apparatus, this could include items such as safety helmet, gloves, hearing protectors, safety harness and lifeline.

Personal protective equipment should only be used either as a last

resort, or when all other control measures fail to control the risk, or in an emergency response.

Issue a written authority for entry to work.

The employer 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.

Where necessary, have a trained stand-by person outside the confined space.

The stand-by person's role is 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.

Where 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.

For further information

This leaflet is a brief summary only of the Standard, and does not provide all the information required for safe working in a confined space.

For more information see:

- Australian Standard AS 2865-1995 *Safe Working in a Confined Space*. (Available from Standards New Zealand. Price: $69.75 (Retail) $55.80 (Members))
- *Safe Working in a Confined Space*. (Information folder available from Occupational Safety & Health Service offices, price: $10.)

Organisations that can provide training in confined space safety are listed in the *Safeguard Buyer's Guide*.

Photos courtesy of Safety and Environmental Solutions Ltd. and New Zealand Safety Ltd.

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