

Fall protection and confined space - what you need to know



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By their very nature, confined spaces are difficult working environments. In situations requiring removal of a trapped, injured or unconscious individual, the dangers are further amplified. This demands a practical and effective confined spaces work program from any employer whose workers are exposed. Part of that process is identification of potential risk scenarios to determine adequate product selection for the task, including fall protection equipment such as harnesses, lanyards and self-retracting devices.

In Australia, working in these locations is governed by AS 2865, the Confined Spaces Standard, and guided by Safe Work Australia's Confined Spaces Code of Practice. Both documents outline employer requirements with respect to safety and measures for persons entering and conducting tasks in a confined space, including development of a plan for rescue and emergency procedures.

What constitutes confined space?

AS 2865 defines a confined space as: an enclosed or partially enclosed space that is not intended or designed primarily for human occupancy, within which there is a risk of one or more of the following:

- An oxygen concentration outside the safe oxygen range.
- A concentration of airborne contaminant that may cause impairment, loss of consciousness or asphyxiation.
- A concentration of flammable airborne contaminant that may cause injury from fire or explosion.
- Engulfment in a stored free-flowing solid or a rising level of liquid that may cause suffocation or drowning.

Confined spaces can include: boilers, vats, tanks, pits, pipes, ducts, flues, chimneys, silos, containers, pressure vessels, underground sewers, wet or dry wells, shafts, trenches and tunnels - or any other location involving a cramped workspace or restricted entry and exit access.

As part of a defined program, written authority (Confined Space Entry Permit) is required for entry. Under AS 2865, an Entry Permit is issued "where any person is required, either wholly or partially, to enter an enclosed vessel or space, which may be considered dangerous. It is not an authorisation to carry out work in a confined space."

Any entry, for any purpose, requires this authority. This may only be waived in an emergency situation and then only for the duration of that incident.



The problem this poses

Permit-required spaces present a deadly combination: difficult access and a propensity for insufficient ventilation and/or the presence of noxious air. These conditions are inherently treacherous and additionally impede on rescue attempts in an emergency situation. The majority of deaths and critical medical situations arising from confined space rescues apply not to the original occupant, but to the individuals attempting to recover an injured or unconscious worker.

This highlights issues beyond identification of a confined space and subsequent working conditions; an emergency plan, thorough training and ready availability of equipment to facilitate a rescue are vital elements.

Fall protection requirements

Access to confined spaces often necessitates fall protection equipment. Removal of a manhole or hatch cover

to access a space presents an immediate hazard to nearby workers, so some form of restraint must be implemented to prevent accidental access. Opening a manhole calls for a temporary cover, railing or barrier to be employed. Additionally, steps should be taken to inhibit falls; anyone working near the opening should wear a restraint line or lanyard to prevent them from reaching the edge of the opening and to protect them from the onset of a fall. An employee preparing to enter the space for atmospheric testing could be rendered unconscious in the presence of harmful fumes, creating a need for a fall arrest lanyard or device which stops a fall in progress.

AS 2865 recommends safety harnesses, safety lines and rescue lines comply with AS/NZS 1891. It dictates requirements in a rescue or retrieval as follows:

“Removal of trapped, injured or unconscious persons from confined spaces is extremely difficult. The use of mechanical lifting equipment or emergency response equipment should be considered and, where appropriate, be on-site before entry to the confined space is permitted.”

Considerations for entry

Entry into confined spaces requires additional equipment, usually a ladder or tripod/davit arm and a mechanical lifting device, which can create a requirement for additional fall protection devices. In the case of descent via a fixed ladder, the ladder essentially becomes the primary means of fall protection, with a self-retracting lanyard (SRL) and mechanical lifting device serving as back-up protection methods.

As with all equipment designed to facilitate a safe work environment, thorough documentation and training on the inspection and use of fall protection equipment (as well as general fall protection issues) should be provided to all employees.

What equipment should you use?

Fall protection equipment selection for confined space is determined by the space itself and the requirement for entry, exit and rescue. It should follow the principles of the A+B+C+R of safety at heights where:

- A = Anchorage connection
- B = Body support
- C = Connection means
- R = Rescue plan

Anchorage connection

Vertical entry spaces without a fixed ladder will require either a tripod or davit arm. Tripods are suitable for



task-specific work (such as manhole entry), are easily transported and can be set up by one person.

Davit arms or posts are more versatile and are supplied with various base configurations specifically suited to the site and the task. Adjustable bases hoist workers over larger openings, while others featuring a fixed 'V' shape can be placed adjacent to the access point. Davit systems are additionally available with either portable or fixed position bases.

A counterweight system may be required where tripod legs or davit arm positioning over (or adjacent to) the point of entry is not possible, providing balance to the worker being lowered.

In the case of horizontal entry, such as the opening on the side of a tank or silo, a side-entry system is required. These clamp to the access point to provide an anchorage and base for attachment of a mechanical lifting device.

Body support

Circumstance dictates the most appropriate body support option. Basic harnesses are an economical option, but are only suited to situations where confined space access is required infrequently or for short periods.

Working in confined spaces for long stretches of time, or at multiple locations, requires equipment that is comfortable and can withstand the rigours of the application. Full body harnesses should include built-in padding on the shoulders, back and legs, and soft edging to prevent discomfort. Harsh environments may necessitate harnesses that are resistant to dirt, grease and grime.

Confined space entry and retrieval demands specialised harnesses that feature shoulder loops on each shoulder strap. These loops are connected by a spreader bar to the line of the mechanical lifting device, so a worker can be raised and lowered in a fully vertical position.

Connection means

Connection is via a mechanical lifting device. This would feature a steel line and a crank (to release or recoil the line) and connect to the tripod or davit to provide lifting and lowering capability. The advantage of this system is ease of use, as one worker can lift another, along with a braking system that ensures falls do not occur in the event of operator error. Some products include two modes: retrieval and fall arrest, providing further flexibility, and others are rated for lifting and lowering heavy material loads, eliminating the need for additional equipment.

Alternatively, a rope rescue retrieval system will also perform the task and provide a mechanical advantage, but will require more of a manual pull to retrieve the worker.

The stand-by person who is responsible for lifting and lowering another must be protected against a fall into the opened confined space, which is accomplished by connecting a lanyard to a correctly rated anchorage connector.

Rescue plan

A quick, safe rescue is essential in confined space operations, so the equipment used must be fit for purpose. A rescue plan needs to be determined before any work is conducted in and around a confined space and must be thoroughly understood by all workers.

Different situations require different methods. Circumstances where the worker is physically incapable of assisting in the rescue and a non-entry rescue retrieval is required will need to be thought out well in advance.

Prevention is better than cure

Unfortunately, serious accidents and situations requiring emergency response in confined spaces are all too common. In November 2013, three people were left in a critical condition and six others hurt after ammonia was used to clean a stock feed tank on a Victorian dairy farm. Initial reports stated it was unclear whether the three were overcome by fumes or suffered a loss of oxygen, but an additional six people (including a paramedic and police officers) became ill as they tried to assist.

This situation perfectly illustrates the preventable nature of these accidents and highlights the importance of preparation and planning. While safety in permit-required confined spaces is largely governed by law in terms of hazard identification and work program development, the identification and selection of appropriate equipment should never be underestimated, as it literally saves lives.

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