Learner Guide

Enter and Work in Confined Spaces Courses

RIIWHS202E Enter and Work in Confined Spaces

MSMPER200 Work in Accordance with an Issued Permit

National Courses PTY LTD

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Learner Guide

1.1 Introduction

These training materials are based on the National Unit of Competency **RIIWHS202E Enter and Work in Confined Spaces**.

1.1.1 Overview

You will learn about:

- How to identify a confined space.
- Planning out confined spaces work.
- Confined spaces entry permits.
- Choosing and checking safety equipment.
- Preparing and working safely in a confined space.
- Exiting the confined space and finishing the work.

1.1.2 What is a Confined Space?

A confined space is determined by the hazards associated with a set of specific circumstances and not just because work is performed in a small space.

The Code of Practice defines a confined space as an enclosed or partially enclosed space that:

- Is not designed or intended to be occupied by a person, and
- Is, or is designed or intended to be, at normal atmospheric pressure while any person is in the space; and

- Is, or is likely to be a risk to health and safety from:
  - An atmosphere that does not have a safe oxygen level, or
  - Contaminants, including airborne gases, vapours and dusts, that may cause injury from fire or explosion, or
  - Harmful concentrations of any airborne contaminants, or
  - Engulfment.
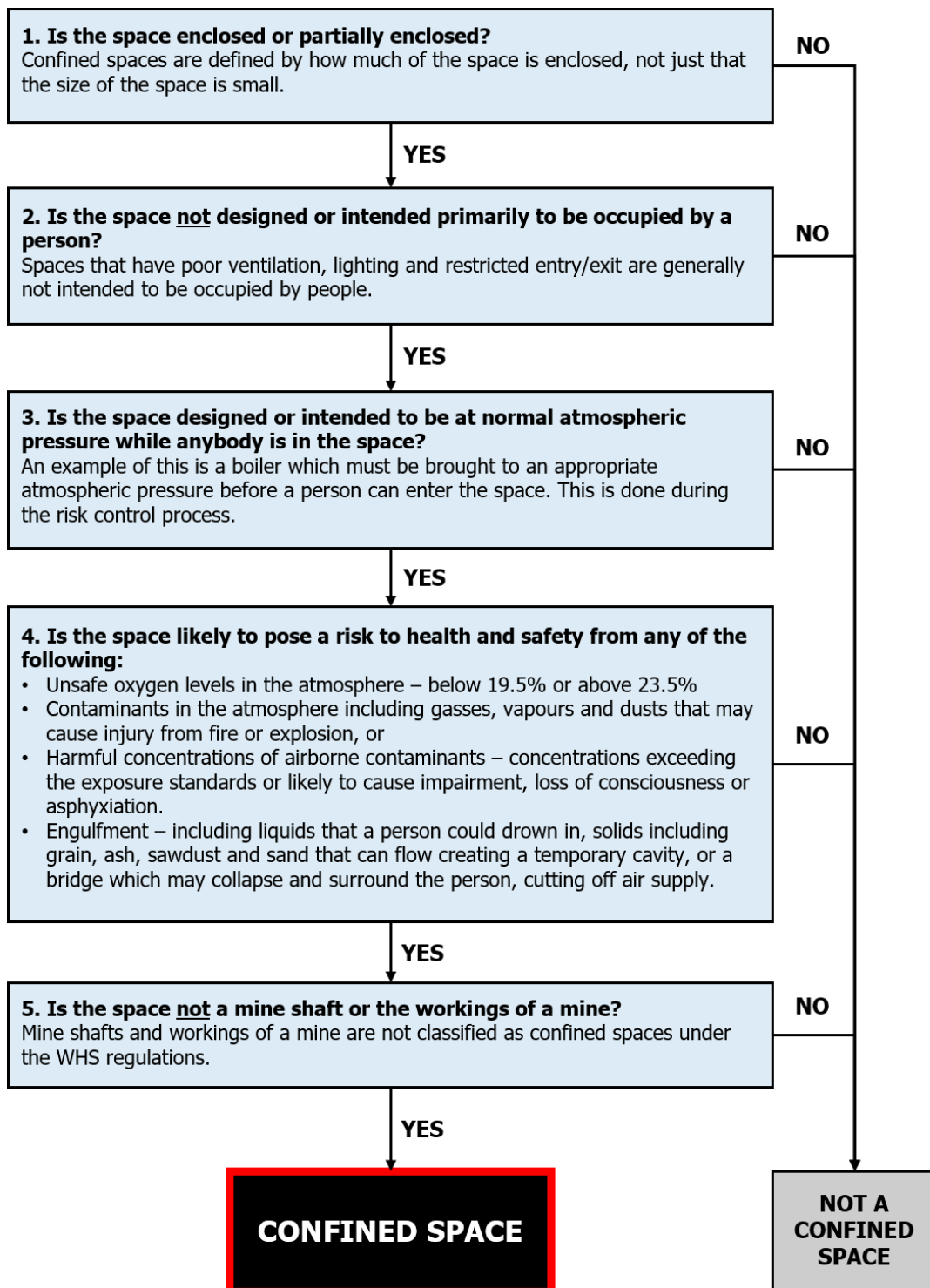- Is not a mine shaft or workings of a mine.

Confined spaces may be found in:

- Culverts and storm water systems.
- Pipes and live or inactive underground sewer mains.
- Shafts, ducts and access chambers.
- Pits or trenches.
- Wet or dry wells.
- Flues and chimneys.
- Environmental traps and tanks.
- Box girders and bridge voids.
- Storage tanks, process vessels, boilers, pressure vessels, silos and other tank-like compartments and containers.
- Tunnels or other similar enclosed or partially enclosed structures, when these examples meet the definition of a confined space in the WHS Regulations.

Entry into a confined space means a person's head or upper body is in the confined space or within the boundary of the confined space.

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You can use a chart like the one shown below to work out if the work area is a confined space.

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┌─────────────────────────────────────────────────────────┐
│ 1. Is the space enclosed or partially enclosed?          │ ──NO──┐
│ Confined spaces are defined by how much of the space is  │       │
│ enclosed, not just that the size of the space is small.  │       │
└─────────────────────────────────────────────────────────┘       │
                        │ YES                                      │
┌─────────────────────────────────────────────────────────┐       │
│ 2. Is the space not designed or intended primarily to be │ ──NO──┤
│ occupied by a person?                                    │       │
│ Spaces that have poor ventilation, lighting and          │       │
│ restricted entry/exit are generally not intended to be   │       │
│ occupied by people.                                      │       │
└─────────────────────────────────────────────────────────┘       │
                        │ YES                                      │
┌─────────────────────────────────────────────────────────┐       │
│ 3. Is the space designed or intended to be at normal     │ ──NO──┤
│ atmospheric pressure while anybody is in the space?      │       │
│ An example of this is a boiler which must be brought to   │       │
│ an appropriate atmospheric pressure before a person can  │       │
│ enter the space. This is done during the risk control    │       │
│ process.                                                 │       │
└─────────────────────────────────────────────────────────┘       │
                        │ YES                                      │
┌─────────────────────────────────────────────────────────┐       │
│ 4. Is the space likely to pose a risk to health and      │ ──NO──┤
│ safety from any of the following:                        │       │
└─────────────────────────────────────────────────────────┘       │
                        │ YES                                      │
┌─────────────────────────────────────────────────────────┐       │
│ 5. Is the space not a mine shaft or the workings of a    │ ──NO──┤
│ mine?                                                    │       │
└─────────────────────────────────────────────────────────┘       │
                        │ YES                                      │
              ┌──────────────────┐          ┌──────────────┐
              │ CONFINED SPACE   │          │  NOT A       │
              └──────────────────┘          │  CONFINED    │
                                            │  SPACE       │
                                            └──────────────┘
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1. Is the space enclosed or partially enclosed?
Confined spaces are defined by how much of the space is enclosed, not just that the size of the space is small.

2. Is the space <u>not</u> designed or intended primarily to be occupied by a person?
Spaces that have poor ventilation, lighting and restricted entry/exit are generally not intended to be occupied by people.

3. Is the space designed or intended to be at normal atmospheric pressure while anybody is in the space?
An example of this is a boiler which must be brought to an appropriate atmospheric pressure before a person can enter the space. This is done during the risk control process.

4. Is the space likely to pose a risk to health and safety from any of the following:
- Unsafe oxygen levels in the atmosphere – below 19.5% or above 23.5%
- Contaminants in the atmosphere including gasses, vapours and dusts that may cause injury from fire or explosion, or
- Harmful concentrations of airborne contaminants – concentrations exceeding the exposure standards or likely to cause impairment, loss of consciousness or asphyxiation.
- Engulfment – including liquids that a person could drown in, solids including grain, ash, sawdust and sand that can flow creating a temporary cavity, or a bridge which may collapse and surround the person, cutting off air supply.

5. Is the space <u>not</u> a mine shaft or the workings of a mine?
Mine shafts and workings of a mine are not classified as confined spaces under the WHS regulations.

CONFINED SPACE

NOT A CONFINED SPACE

NOTE: This chart reflects the definition of a confined space as it appears in the model code of practice and Work Health & Safety (WHS) regulations.

1.1.3 What is Not Classified as a Confined Space?

Sometimes when a space is small we might think of it as a confined space, but that is not always the case. The following are examples of spaces that are not classified as a confined space in the WHS regulations:

Example	Reason Why it is Not Classed as a Confined Space
Mine shafts or workings of a mine.	They are spaces intended to be occupied by personnel and fall under a different classification in the regulations. They are governed by specific risk assessment and treatment requirements.
Offices and workshops.	They are spaces intended for people to occupy them and generally have adequate ventilation, lighting and safe means of entry or exit.
Abrasive blasting or spray-painting booths.	While it has harmful airborne contaminants at times, it is primarily designed for a person to occupy.
Enclosed or partially enclosed spaces (e.g. a cool room or shipping container).	They generally have easily accessible means for entry and exit.
Trenches.	The risk of collapse alone is not enough to be classified as a confined space. However, if there are unsafe concentrations of airborne contaminants that classification would change.

1.2 Confined Space Hazards

There are a range of hazards that may exist in confined spaces:

- Unsafe oxygen levels.
- Fires and explosions.
- Atmospheric hazards.
- The effect of irrespirable atmospheres on the respiratory system.
- Other hazards.

You need to be aware of the different hazards that can exist in a confined space and the effect they

can have.

1.2.1. Unsafe Oxygen Levels

Levels of oxygen within a confined space that are too low (below 19.5%) or too high (above 23.5%) are a major hazard.

The oxygen levels inside a confined space may fall below a safe level for the following reasons:

- The combustion of flammable materials (for example welding or cutting).
- Slow bacterial reactions of organic substances (for example sewerage).
- Reaction of inorganic substances (for example rust).
- Oxygen absorbed by materials (for example grain in silos).
- Oxygen displaced by another gas (for example nitrogen used to remove toxic fumes).
- High oxygen consumption rate (for example many people working in a small confined space).
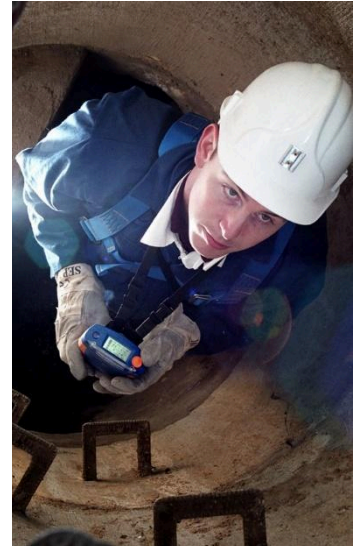
Leakage from oxygen lines, pipes, and fittings can raise the level of the atmosphere causing a fire, explosion or breathing hazard.

1.2.2. Fires and Explosions

'Hot work' like welding and thermal or oxygen cutting can create excessive heat, sparks and increase the risk of fires or explosions.

Fires and explosions can be caused by:

Open flames (for example welding torches).

Hot surfaces (for example steam lines).

Frictional sparks (for example a metal tool striking another object).

Incorrectly installed wires or overloaded fittings.

Static electricity sparks (for example from synthetic clothing).

A spark or heat produced by electrical equipment (for example a mobile phone or flashlight).
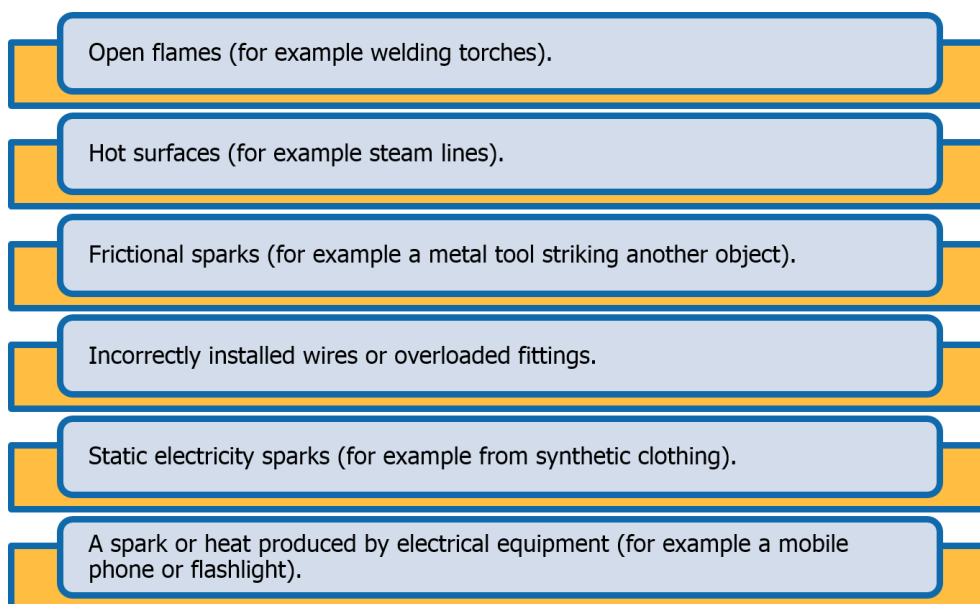
Combustible or flammable dusts can also be found in confined spaces like storage bins or grain silos.

1.2.3 Atmospheric Hazards

Dusts, gases, fumes, mists and vapours are common hazards in workplace air. These can seriously affect the health of workers.

Hazardous dusts, gases, fumes, mists and vapours can occur in a confined space because of:

- The work processes being done (for example spray painting).
- Spills or leaks from pipes or machinery.
- Disturbance of materials (for example walking through a shallow liquid substance).
- The storage or transfer of materials (for example grain).
- Gases in stormwater drains and sewers.
- Chemical reactions between substances.
- Exhaust gases from pumps or other machinery being drawn into the confined space by ventilation fans.

Residue left in confined spaces such as empty tanks and containers can cause a build-up of toxic or explosive gases.

Toxic gases can quickly overcome and kill an unprotected worker.

Inhaling some chemicals, such as solvents, can damage many parts of the body including the brain. Welding fumes, smoke and mists from spray painting are also serious respiratory hazards and workers should be adequately protected from exposure to any of them.
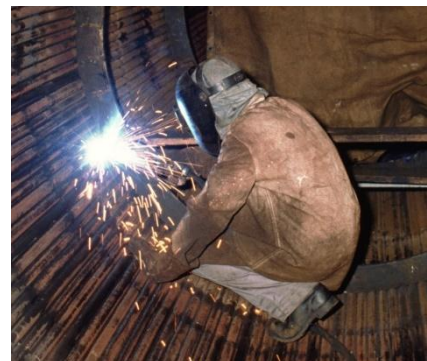
Confined spaces must be monitored for dangerous gases or unsafe oxygen levels, which cause irrespirable atmospheres.

Irrespirable atmospheres are atmospheres that are unfit for breathing, or are incapable of supporting life.

Types of Irrespirable Atmospheres	Description
Asphyxiating Atmospheres	Asphyxiating atmospheres have low levels of oxygen. You will not be able to breath properly in any atmosphere that has less than 19.5% oxygen.
	Hypoxia is the result of inadequate oxygen. Signs of hypoxia include

	rapid breathing, gasping for air, blueness of skin, confusion, irritability, unconsciousness and death.
Toxic Atmospheres	Toxic atmospheres can occur due to the release of toxins and poisons in materials that have been burnt in a fire.
Air Contaminated with Smoke or Suspended Particles	Air that is contaminated with smoke or particles is unbreathable. Particles can settle in the lungs and will restrict the amount of oxygen that can be taken into the body. These particles within the lungs may then develop into other respiratory problems.

1.2.3.1 Types of Contaminants and Toxic Substances

Many toxic substances are commonly encountered in industry. The presence of toxic substances may be due to materials being stored or used, the work being performed, or may be generated by natural processes.

Exposure to toxic substances can produce disease, bodily injury, or death in unprotected workers.

Common gases or substances you will be monitoring for will include:

Chemical Asphyxiates
Hydrocarbons, carbon dioxide, carbon monoxide, hydrogen cyanide, and hydrogen sulphide.

Irritants and Corrosives
Chlorine, ammonia, and acid bases.

Flammable Gases
Acetylene, petroleum, methane, ethane, propane, and butane.

Narcotics
Can be explosive as well as cause respiratory issues.

It is important to determine the amounts of any toxic materials and substances potentially present in the workplace.

Unprotected workers must not be exposed to levels of toxic contaminants that exceed Permissible Exposure Limit (PEL) concentrations.

Ongoing monitoring is necessary to ensure that exposure levels have not changed in a way that requires the use of different or more rigorous procedures or equipment.

1.2.4 The Effect of Irrespirable Atmospheres on the Respiratory System

The respiratory system is made up of the mouth, nose, windpipe, lungs and pulmonary blood vessels that surround the lungs. In this body system, oxygen is put into the blood while carbon dioxide is breathed out. Without the respiratory system working properly you will die.

Respiration in healthy adults is normally approximately 16-20 breaths per minute. However, breathing rates can increase significantly when the body is exercising, stressed, or in poor atmospheres.

The lungs cannot keep breathing in irrespirable atmospheres for long periods (depending upon the type of atmosphere). Some atmospheres can burn the lungs, while others can cause problems such as hypoxia (a lack of oxygen), which can be deadly. It is for these reasons that a breathing apparatus is used when you need to work in an irrespirable atmosphere.

1.2.5 Other Hazards

Some materials stored in or around a confined space like grains, sawdust, or soil can completely surround and trap (engulf) a person in seconds. If they are not rescued immediately they will die within a few minutes.

It is important not to forget about psychological hazards such as stress and claustrophobia (fear of confined spaces). It can cause a person to panic, make poor decisions and use up oxygen quicker than somebody who is calm.

Other common hazards that you may find while working in or around confined spaces include:
- Underground services, such as water and waste pipes, electrical cables and gas pipelines.
- Excavations.
- Traffic.
- Entrapment.
- Uncontrolled introduction of substances.
- Environmental hazards such as poor lighting or heat and cold temperatures.
- Biological hazards such as viruses, bacteria or fungi.
- Limited head space or overhangs.
- Noise, rotational equipment or vibration.
- Sharp edges, protrusions or obstructions.
- Equipment or product mass.
- Mechanical hazards (for example injury from moving mechanical parts).
- Electrical hazards.
- Slippery surfaces, spills or leaks.
- Manual handling hazards.
- Restricted access and egress (entry and exit).

Once a hazard has been identified look for any workplace instructions that describe how to eliminate or control it.

Talk to other workers, your manager, supervisor, team leader or health & safety representative to find out if the hazard has already been addressed, or what methods are available for you to deal with it.

1.3 Work Safely

You must follow all safety rules and instructions when working in a confined space.

If you are not sure about what you should do, ask your boss or supervisor. They will tell you where you can find the information you need.

1.3.1 Health and Safety Rules

Every workplace has to follow laws and rules to keep everyone safe. There are 4 main types:

Acts and Legislation	These are laws that you have to follow.
Regulations	These explain what the law means.
Codes of Practice	These are instructions on how to follow the law, based on industry standards. There is a Code of Practice written for working safely in confined spaces that includes information about atmospheric testing and working with confined space permits.
Australian Standards	These tell you what the minimum requirement is for a job, product or hazard. AS2865 is the Australian Standard for working in confined spaces.

These requirements are the basis of all policies, procedures and safe work practices within a company and/or workplace.

1.3.2 Technical and Safety Information

Like laws and rules, technical and safety information is an important part of all procedures and practices for working safely.

Before starting any work in a confined space you need to make sure you have all technical and safety information for the job. This will help you to do your work in the safest way.

Technical and Safety Information	Description
Site Details	The information and safety requirements of the workplace environment (where you will be working) including isolation of

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Technical and Safety Information	Description
	services.
Hazard Details	Any hazards in the work area or related to the confined space. This could also include instructions on how to handle dangerous or hazardous materials.
Task Details	Instructions of what the work is or what you will be doing (this includes confined space work permits).
Manufacturers' Guidelines and Specifications	How to use and maintain tools, equipment and safety devices and systems.
Faulty Equipment Procedures	Isolation procedures to follow or forms to fill out.
Signage Requirements	Site signage used to warn others that some areas are not safe to be in, or that work is being completed.
Emergency Procedures	Instructions on what to do in emergency situations, for example if there is fire, or if first aid is needed.
Communication Procedures	Technical and safety information could also include workplace procedures for communication.

1.4 Get Your Work Details

You need to be clear about what work you will be doing. Make sure you have everything about the job to apply for a confined spaces permit before you start. This includes what you will be doing, how you will be doing it and what equipment you will be using.

You need to know why you are entering the confined space to identify any dangers and work out the details for a work permit.

There are many reasons why you would need to enter a confined space:

- Cleaning and removing waste.
- Repair work, for example welding or cutting.
- Installing pumps and motors.
- Painting, sand blasting or applying surface coatings.
- Reading meters, gauges and dials.
- Installing, repairing or inspecting telephone, electrical or fibre optic cables.
- Tapping, coating or testing steam, water or sewage systems.
- Inspecting plant or equipment.

- Constructing a confined space, for example an industrial boiler.
- Rescuing people from a confined space.

1.4.1 Keeping Everyone Safe

Work health and safety (WHS) laws say that all companies and workers need to keep themselves and other people safe while they work. This is called a duty of care.

To keep yourself and other workers safe you need to:

- Follow your instructions.
- Follow all workplace rules.
- Make sure all equipment is safe to use.
- Carry out your work safely.
- Report any problems.
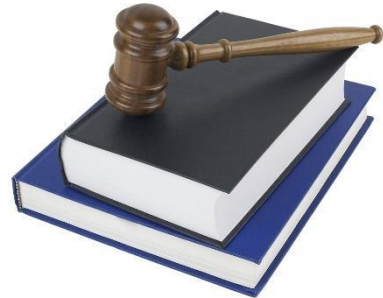
You can get this information from:

- Worksite policies, procedures, bulletins and memos
- Federal, state and local regulatory authorities.
- Australian Standards and legislative requirements relating to work in confined spaces.
- Instructions, plans, charts, diagrams, maps and engineer's drawings.
- Signage and labels.
- Safety Data Sheets (SDS) and manufacturers' instructions.
- Safe Operating Procedures (SOP)/Job Safety Analysis (JSA)/ Work Method Statements (WMS).

If you think something is dangerous, tell your boss or supervisor as soon as possible.

1.4.1.1 Safety Data Sheets

A Safety Data Sheet (SDS) has important information about a hazardous chemical (which may be hazardous substance and/or dangerous goods) and must include details about:

- The hazardous substance's product name.
- The chemical and generic name of certain ingredients.
- The chemical and physical properties of the hazardous substance.
- Health hazard information.
- Precautions for safe use and handling.
- The manufacturer's or importer's name, Australian address and telephone number.

The SDS gives you information on what to do if there is exposure to the hazardous material, for example if there is a spill, or if you are working with the substance.

1.4.1.2 Identify Isolation Requirements

The confined space needs to be isolated from other workers who are not involved in the confined spaces work.

Signage and barriers can be used to stop unauthorised entry into the confined space.

Signage may include:

- Site safety signage.
- Temporary signage for motorists and pedestrians.
- Barricades.

1.5 Work Permits

There are a number of jobs that can require a work permit including:

- Working in a confined space.
- Working at heights.
- Cold work/general permit to work – work that WILL NOT generate any source of ignition such as a flame, spark or temperature high enough to ignite flammable material.
- Hot work – work that WILL generate a source of ignition such as a flame, spark or temperature high enough to ignite flammable material.
- Excavation – issued for the penetration of any ground surface with mechanical excavating equipment.
- Operation of plant.
- Minor repairs.
- Other special permits such as plumbing/gas/electrical work.

All confined spaces work must be done in line with a confined space work permit.

This permit will outline every part of the job (who, what, where, when, why and how the job will be done) and all of the safety measures that must be taken.

The permit must be kept until the work has been completed or for at least 2 years if a serious (notifiable) incident occurs.

1.5.1 Work Permit Details

The details in the permit should cover the hazards and hazard controls that have been identified.

A confined space permit should include the following:

- Location, description and duration of work to be done.
- Hazards that may be encountered.
- Atmospheric test and monitoring requirements and results.
- Hot work.
- Authorisation for work to be done.
- Isolation, lock-out and tagging processes.
- Hazard control measures (for example signs, barriers, ventilation and purging).
- Personal protective equipment and clothing needed for the job.
- Size of work crew.
- Stand-by personnel and emergency response and rescue arrangements.
- Other requirements determined by a risk assessment and in accordance with the code of practice and AS2865.

Once issued, you will need to check that the details in the work permit match the job including hazards, control measures and equipment.

Changes to work conditions or identifying new hazards can mean the permit has to be cancelled before the work has been finished. The permit may have to be re-issued to address the latest information.

An example Confined Spaces Work Permit can be found in **Appendix A**.

1.6 Confirm the Emergency Response Plan

An emergency response plan needs to be finalised before any confined space operations are done. The emergency response plan includes the roles and responsibilities of all workers involved in the confined spaces work.

Before starting any confined spaces work you need to make sure the emergency response plan is right for the work situation and that the stand-by person understands the emergency response procedures.

It is also important to make sure that the entry/exit openings are large enough to allow for emergency access and that they are not obstructed.

It is important to confirm your own role in an emergency so that you know what to do and how to react quickly before the situation gets worse. Talk to your supervisor about what you will need to do in an emergency and make sure that you have been trained to carry out the task.

6.1. Stand-By Person

A stand-by person (or sentry) should stay as close as possible to the confined space.

A stand-by person must:
- Be fully trained and competent.
- Be in continuous communication and if possible visual contact with workers inside the confined space.
- Be ready to immediately start emergency response procedures.
- Continuously monitor hazards both inside and outside the confined space.
- Maintain clear access and egress (entry and exit) to and from the confined space.
- Not be involved in any other work while personnel are within the confined space.

2.1 Select and Inspect Equipment

The equipment you use while working in a confined space will depend on the job, hazards and hazard controls that are put in place.

Equipment used for confined spaces work includes:

- Safety equipment.
- Rescue equipment.
- Atmospheric testing equipment such as portable gas detectors and monitors.
- Communication devices.
- Tools and equipment relevant to the work to be performed.
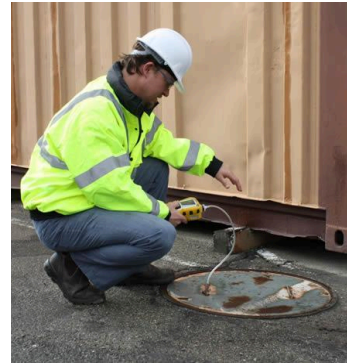
You need to make sure any torches or communication equipment is safe to use in a confined space.

2.1.1 Communication Equipment

Communications equipment could include:

Communication Equipment Type	Description ad Use
Integrated Radios	Integrated radios are built into the breathing apparatus.
Portable Radios	Portable radios will have limited usefulness when using breathing apparatus and may have limited range due to atmospheric conditions.
Communication Sets	This is the name given to the complete communication equipment. Communication sets are made up of a microphone, battery, cables, amplifier and built-in speakers.
	The way communication sets are used depends on the type of equipment and the manufacturer's operating guidelines. These instructions can vary so it is important that you check the manufacturer's operation manual for the equipment you are using.
Signal Lines	Depending on your organisation, signal lines may be a line similar to the main guideline, which will transmit predetermined signals. It may also be a communications cable, which can be connected to communications equipment.
Hand Signals	Hand signals must be understood for clear communications to occur. Most organisations will have signals that apply only to their worksites, or that have been designed for a particular task.
	If hand signals are going to be used during the work make sure you are familiar with them and that you practice them before entering any confined space.
Distress Signal Unit	Most Distress Signal Units (DSU) will have a dual activation system, which will trigger an alarm automatically if movement is not detected within a certain timeframe (up to 1 minute of no movement), or the alarm can be set off manually.
	The process for setting off your Distress Signal Unit will depend upon the make and model of equipment.

2.1.2 Lifting and Lowering Devices

Lifting and lowering devices include safety belts, harnesses, tripods, ropes and lifelines.

2.1.3 Fire Fighting Equipment

Fire fighting equipment could include fire blankets and fire extinguishers.

2.1.4 Personal Protective Equipment

Personal protective equipment (PPE) may include:
- Eye protection (e.g. goggles).
- Ear protection.
- Gloves.
- Protective clothing.
- Helmets.
- Safety footwear.
- Respirators and masks.

2.1.5 Respiratory Equipment

Where a confined space has an unsafe concentration of oxygen, or any airborne contaminant cannot be safely reduced or removed, workers must be equipped with supplied-air respiratory protection and PPE.

Respiratory protection devices include:
- Air purifying respirators.
- Self-contained compressed air breathing apparatus (SCBA).
- Supplied airline breathing apparatus.

● Escape breathing apparatus.

2.1.5.1 Limitations of Breathing Apparatus

There are limitations associated with all types of respiratory equipment and breathing apparatus. Some general limitations for different types of breathing apparatus include:

Equipment Type	Possible Limitations

Air Purifying Respirators	● Only protect against specific contaminants. For example, gas-/vapour-removing respirators don't protect against particulate contaminants and vice versa. Can be addressed by using a combination particulate- and vapour- and gas-removing respirator.
	● Do not protect against oxygen deficient atmospheres.
	● Do not prevent contaminants being absorbed through the skin (a full protective suit and mask/facepiece can provide this protection).
	● Limited time period for use based on:
	   – The type of respirator (canister, cartridge, or filter type).
	   – Concentration of contaminant.
	   – Humidity levels in the surrounding atmosphere.
	   – User's respiratory rate.

Self-Contained Breathing Apparatus (SCBA)	● Weight of the equipment:
	   – Can cause wearer to become fatigued more quickly.
	   – Can affect balance of wearer.
	● Bulk/size of the equipment can cause issues in confined spaces and limit movement and mobility in and through spaces.
	● Harness straps can limit movement and mobility of the wearer.
	● Do not prevent contaminants being absorbed through the skin (a full protective suit and mask/facepiece can provide this protection).
	● Reduced visibility caused by the facepiece.
	● Limited time period for use based on:
	   – User's respiratory rate.
	   – Amount of air/oxygen in the apparatus.

Supplied Airline Breathing Apparatus	● No protection for the user if the air supply fails. ● Hose can be pinched or severed, affecting air supply. ● User is limited to working within the length of the hose. ● User must exit the space by retracing steps/route of hose. ● Must be donned in respirable air.
Escape Breathing Apparatus	● Limited air supply with a short duration of use.

Always check and follow the manufacturer's specifications to make sure you are aware of and work within the limitations of the equipment you are using.

2.1.6 Atmospheric Testing and Monitoring Equipment

Each gas-testing instrument needs to be calibrated according to the manufacturer's instructions. Instruments that are not properly calibrated or that fail field checks cannot be used for atmospheric testing until they are properly calibrated.

All atmospheric testing equipment needs to be calibrated by the manufacturer annually. It also needs to be field checked just before use.

The field check needs to include checking with a test gas as per the manufacturer's instructions.

Atmospheric testing and monitoring equipment includes:
- Instruments used for pre-entry testing appropriate to the hazards.
- Continuous monitors appropriate for the hazards.
- Other devices used to test the confined space atmosphere as required by the permit conditions.

2.1.7 Rescue Equipment

There is always the chance of an emergency situation occurring when working in a confined space, such as a worker falling unconscious, a fire breaking out or a chemical spill. It is very important that you have a plan in place and incident response equipment on hand. All rescue personnel should be trained in their use.

The rescue equipment should be set up near the confined space and be ready to use at a moment's notice.

Rescue equipment includes:
- Rescue lines.
- First aid kits.
- Fire fighting equipment.
- Spill kits.
- Access equipment.

Review Questions

2.2 Report Faulty Equipment

If you find anything wrong during your checks you must:

1 Tag and isolate the damaged or defective item to stop anybody using it.

2 Record the problem in the logbook or on the inspection checklist. Give as much detail as possible.

3 Report the fault to your supervisor or other authorised person.

2.3 Environmental Protection Requirements

Any work done in a confined space should not have a negative effect on the environment.

Some environmental requirements are:

- Organisational or project environmental management plans.
- Waste management.
- Water quality protection.
- Noise, vibration, dust and clean-up management.

Contact the EPA for more information on how to work safely without impacting on the environment. Before any work is carried out you must make sure any environmental protection requirements are in place according to site procedures.

Check the confined spaces work permit for details of what is required to maintain the lowest possible impact on the environment.

2.4 Gain Access to the Confined Space

In accordance with the details in the confined spaces permit, you need to gain access to the confined space. This means getting safely

to the confined space entry point. In some cases this may mean you need to get up high to the entry point using access equipment (for example elevating work platforms, scaffolds or vertical rope systems), or organise to remove a hatch or cover to get to the confined space.

Each situation is different so make sure you have had a good look at the area and worked out the safest way to access the confined space. Talk to your supervisor and other workers and check the details in the work permit to make sure you are using the right method to access the confined space.

2.5 Atmospheric Testing

The air inside a confined space must be tested before any workers enter.

If work stops for a long period of time (over an hour) the space will need to be tested again.

Before a person enters a confined space make sure:

- The confined space contains an oxygen level between 19.5% and 23.5%.
- The atmospheric contaminants in the confined space are reduced to a safe level.
- There are no temperature extremes.
- The concentration of flammable gases in the atmosphere is below 5 per cent of its Lower Explosive Limit (LEL). The Lower Explosive Limit (LEL) is the concentration of flammable material in the air below which a flame will not ignite when in contact with an ignition source.

Initial testing needs to be done from outside of the hazardous atmosphere by inserting a sample probe at appropriately selected access holes, nozzles and openings.

All tests need to be completed in accordance with the manufacturer's specifications and directions for the equipment used.

Follow the required testing regime or sampling pattern.

Always ensure you are aware of what the requirements and procedures are for using the testing equipment available to you. If you have not used the equipment before or have not conducted tests of the required nature before, have someone check your readings to ensure the accuracy of the reading.

2.5.1 Conduct Sampling

Once you have determined which piece of equipment you will need to use to test and monitor the atmospheric conditions, and have calibrated the equipment as required, you will need to take the appropriate atmospheric readings.

The appropriate sample will depend upon:
- The type of equipment used.
- The contaminants being tested for.
- The operational requirements of your organisation.

You will find this information in the operator's manuals for the equipment you are using and the procedural manuals for your organisation.

As it is possible for contaminants to settle at different levels, the top, middle and bottom of the space needs to be tested.

For example, some gases (such as hydrogen sulphide) are heavier than air and in unventilated areas will settle to the bottom of the space, while other gases (such as methane) are lighter than air and will collect at the top of the space.
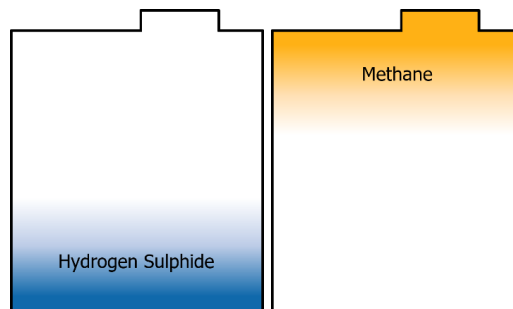
Tests need to be made at a sufficient number of points to accurately reflect areas of the space that are likely to be accessed.
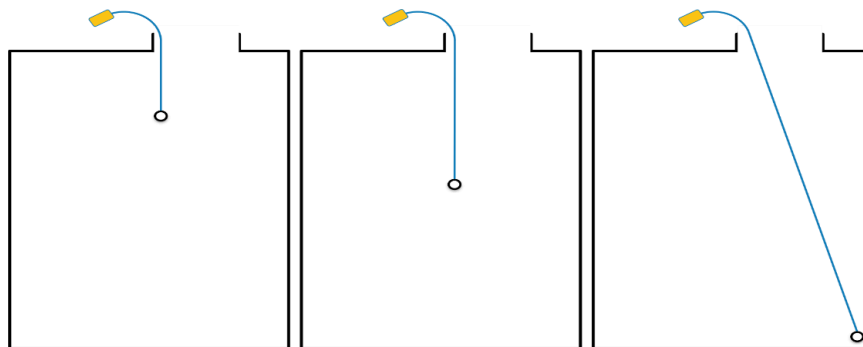
If it is necessary to enter the space to test remote regions away from entrances or access holes, then self-contained breathing apparatus needs to be worn and the entry needs to be undertaken in accordance with the regulations using an appropriate permit.

2.5.1.1 Liquids in a Confined Space
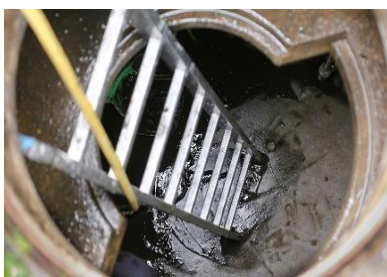
Any liquids should be pumped out of a confined space and liquid flow diverted from the space before testing for toxic gases is carried out.

If the liquid cannot be removed then it should be stirred as vigorously as possible while testing takes place. The stirring should be mechanical using a stirrer or pump, or by blowing compressed air through the bottom of the space.

Stirring the liquid manually with a paddle will not give sufficient agitation to release the trapped gases.

2.5.2 Dealing with Unsafe Atmospheres

If initial testing shows that the space is not safe for a person to enter, you will need to take action.

This could be done a number of ways, such as:

- Purging the atmosphere by blowing air through the space; or
- Extracting toxic gases with a suitable exhaust system; or
- A combination of blowing and exhausting.

You need to be careful that people outside the confined space are not exposed to gas while the atmosphere inside the confined space is being purged. You also need to be careful when purging flammable gases.

Do not use pure oxygen or gases with a higher oxygen level of 21% for purging purposes. Ventilation such as exhaust fans can be used to remove hazardous gases and contaminants. Any purging of a confined space needs to be followed up with proper ventilation procedures.

Alternatively, people can enter the space if they wear an approved air-supplied respirator (self-contained breathing apparatus – SCBA), so long as there are no flammable gases present in the confined space. It is important that personnel are properly trained and experienced in the use of these breathing apparatus before entering the confined space.

Testing should be done prior to entering the confined space and needs to be done on a continuous basis while the work is carried out, or in accordance with the confined spaces permit.

2.6 Fit Personal Protective Equipment

Depending on the situation you may be required to wear a range of protective equipment. You need to make sure all equipment fits properly and is in good condition. Faulty protective equipment will not protect you properly.

If you find anything wrong with any of the equipment you need to report it and isolate the equipment to stop it from being used.

2.6.1 Check Atmospheric Test Results before Entering the Space

Always check that the results from the atmospheric testing show that the confined space is safe for entry before you begin work.

If the test results are inconsistent or do not provide enough solid information you must make sure further testing is completed with different or re-calibrated equipment.

2.7 Prepare the Confined Space for Entry

You will need to check that the worksite has been prepared in accordance with the work permit conditions including:

- Mechanical, electrical or other energy source isolations.
- De-energising all sources of energy or pressure.
- Purging of lines.
- Lock-out and tagging out procedures.
- Blinding or blanking lines as required.

The results of these checks should be reported to the appropriate workers. The confined space must be made ready for entry in compliance with workplace procedures, relevant laws and AS2865.

2.7.1 Hazard Controls

You need to make sure that any hazard controls outlined in the permit are in place before you start work.

Common hazard controls for confined spaces work are:

- Having a stand-by person outside the confined space.

- Isolating, tagging and lock-out procedures for liquid, gas, electric current or other stored energy, as well as erecting barriers and signage (site isolation).
- Purging gases or ventilation of the confined space.
- Using protective equipment and breathing apparatus.
- Any other requirements outlined in the confined space entry permit, AS2865 or other relevant sources.

2.7.2 Confirming the Confined Space is ready for Entry

Before entering the confined space make the following checks:

- Isolations are complete and appropriate.
- Isolation provides positive isolation.
- Atmosphere is safe (or if necessary relevant measures are in place to ensure safe entry into an unsafe atmosphere).
- Safe entry and exit methods are in place.
- Access points should:
    - Be large enough for people (including emergency personnel) and equipment to pass through.
    - Be provided with ladders, platforms or walkways.
    - Not be obstructed by equipment.
- There should be enough access points for emergency rescue and ventilation requirements.
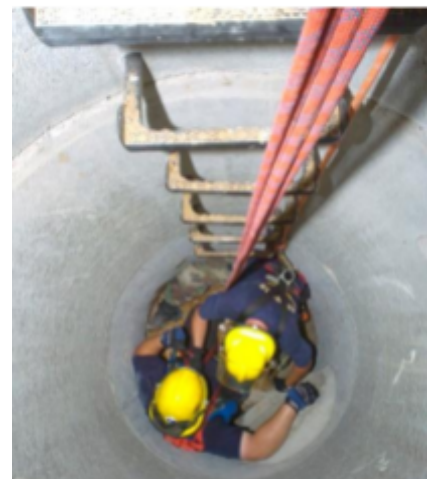
If you find that the confined space is not ready for entry you need to report the deficiencies to an authorised person to be fixed. Do not enter the confined space until the situation is corrected.

2.7.3 Role of the Entry Control Officer

An Entry Control Officer is a person who may be placed at an entry/exit point of the space to:

- Determine the donning location.
- Receive personnel details from the workers before they enter the space.
- Enter the time-in on the permit or other designated record or document.
- Check the cylinder content for each person wearing breathing apparatus.
- Calculate the time-out for each person.
- Place the time-out time on the permit or other designated record or document.
- Record which location workers are moving to.

- Keep your supervisor (or authorised person) up to date with any concerns or developments that may affect the work being done.

In some organisations the Entry Control Officer, supervisor or standby person will also be responsible for maintaining communication with workers, and responding to emergency or rescue activities.

3.1 Enter the Confined Space

No person may enter a confined space unless:

- All identified hazards have been addressed.
- They have written authority to enter the confined space (approved permit).
- The written authority includes relevant hazard control measures or precautions (including the number of standby people required) for the safe entry and execution of the work.
- They are made aware of, understand and comply with the written authority.
- A record of their presence in the confined space is made (including point and time of entry).
- Signs and barriers are erected to prevent unauthorised access.
- Arrangements have been made for emergency response and rescue of persons in the confined space.

Once all the preparation has been completed you may begin entering the confined space.

Open or remove the access cover as required. Make sure any access covers such as doors or hatches cannot fall back down and trap you.

Remember to be careful of hazards such as sharp edges or slippery surfaces when entering the confined space. Some confined spaces are very deep and a fall could cause serious injury.

You have officially entered a confined space once your head or upper part of your body is within the confined space. Putting your arm in to test the atmosphere does not count as entering the confined space.

3.2 Maintain Communication with Stand-By Person

Use communication equipment correctly to stay in constant, effective communication with other workers including the stand-by person at

all times. In some situations you may have to rely on hand signals. Make sure you have worked out these hand signals before entering the confined space to work.

If the stand-by person loses contact with you they may initiate the emergency plan so it is important to maintain some form of communication while you are doing your work.

If you find that the communication methods you have chosen are not working, or do not allow you to maintain regular contact with other workers you should re-assess the communication requirements of the situation and work out a better way to keep in contact with other workers.

3.3 Work in the Confined Space

You should always follow permit conditions while working in a confined space to make sure the work is completed as safely as possible.

Safe and effective confined space operations includes doing the following:

- Constant monitoring of equipment and changes in the environment while work is being carried out. Damage to equipment, changes in the atmosphere and movement of workers can all create new hazards.
- New hazards that are identified while you are working within a confined space may require you to use new hazard controls and request re-issue of a permit.

If you are using a gas monitor and the alarm sounds all workers should leave the confined space immediately.

- Keep all PPE and safety equipment in place during the work.
- Handle all materials within the confined space properly and follow all instructions and safety data sheets.
- Do not work past the time allowed for the work to be done within the confined space. Keep an eye on the amount of time the work is taking. The allocated time will be shown on the confined spaces work permit.
- Complete confined space entry logs, making sure that all entry and re-entry of people working within the confined space are properly recorded.
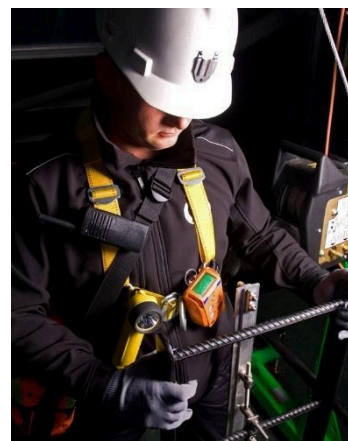
3.3.1 Dealing with New Hazards

If new hazards are identified during the confined space work you will need to take appropriate action depending on the situation.

This may include:

- Organising for the re-validation or re-issue of the work permit to reflect the change to the situation.
- Evacuating the confined space.
- Doing further testing of the confined space atmosphere and environment.
- Raising the alarm with other workers and isolating the confined space (depending on the circumstances).
- Initiating the emergency response plan and carrying out your own role and responsibilities.
- Any other action determined by your supervisor.

3.3.2 Emergency Response

It is important to stay calm and focused in an emergency. The quicker and more effectively everyone can act in an emergency, the better the outcome. Raise the alarm straight away if there is an emergency. If all procedures, equipment and workers are prepared, a rescue can be attempted without delay.

It may be necessary for a trained person to apply first aid. Emergency services may need to be telephoned – DIAL 000.

3.3.2.1 Entrapment Procedures

Becoming trapped within a confined space can happen quickly and without warning. Knowing your organisation's requirements and procedures for dealing with entrapment is important for your safety. Once you recognise that you are trapped follow these Steps:

Step	Actions
1) Stop All Non-Essential Strenuous Activities	Stopping all strenuous activities helps you to calm your breathing and air consumption, and conserves the air in your breathing apparatus.
2) Activate Your Distress Signal Unit	You will need to activate your Distress Signal Unit manually.
3) Relocate	By moving to the safest position possible, you will be less affected by hazards, and will be able to stay calm. While staying calm in an entrapment situation may be hard, it is important that you try to slow your breathing.
4) Call for Assistance	Using your communications equipment to call for help lets you tell the rescue team where you are, what the conditions are and if escape units or additional air cylinders need to be brought into the scene. Entrapment is a situation that can turn deadly without notice. The success of the entrapment procedures depends on regular practice and training.

3.4 Exit the Confined Space

Exit the confined space safely, being careful of sharp edges or when exiting a confined space at height. Wherever possible use fixed ladders, platforms and walkways to exit from the confined space.

Coordinate your exit from the confined space with the stand-by person so they can help you.

3.5 Return the Confined Space to Service

Once the confined space work has been completed you will need to:

- Conduct an inspection of the confined space.
- Recover all tools, equipment and materials from the confined space.
- Replace or close the access cover to prevent unauthorised entry to the confined space.
- Remove hazard controls including isolation, tagging and lock-out systems or signs and barriers that are no longer needed.
- Complete any details in the confined space entry log.
- Let the appropriate personnel know that the work in the confined space has been completed.

3.5.1 Inspecting and Cleaning Up

The confined space must be inspected to make sure all tasks have been completed and that all tools, equipment and materials have been recovered. You should also check that there has been no damage done to the environment. Also check to make sure that no workers have been left behind in the confined space.

All tools and equipment will need to be recovered from the confined space after you have completed the works. You need to leave the confined space as you found it. Also leaving tools or equipment in the space may interfere with its usual purpose and normal operation.

The work area will need to be cleared and cleaned after work has been completed. Make sure you wear the right PPE for the job.

Dispose of, or recycle, leftover materials in accordance with project environmental management plans.

3.5.2 Maintain Tools and Equipment

Tools, equipment and materials should be cleaned, checked, maintained and stored in accordance with manufacturers' recommendations and standard work practices.

After using tools and equipment, it is important to make sure they are:

Activity	Actions
Cleaned	By removing all dirt, mud, moisture or other contaminants, in accordance with manufacturers' specifications.
Checked	For any damage – If anything is wrong, apply tagging and lock-out procedures and report it to your supervisor.
Maintained	In line with manufacturers' recommendations or your worksite procedures.
Stored	Correctly in the right location – Most equipment will have storage instructions to make sure the items are kept free from damage and can be easily found the next time they are needed.

The procedures for cleaning, maintenance and storage should be followed regardless of the type of equipment and tools being used. Keeping them in the best possible condition prolongs their working life and ensures they are safe to use.

3.5.3 Removing Hazard Controls

If they are no longer needed, hazard controls need to be removed from the area. Signs and barriers used during the confined spaces work need to be cleaned and stored away.

The confined space may need to be sealed back up to stop unauthorised access and return it to service. This could include replacing and securing the cover, lid or hatch.

All tagging and lock-out devices used to isolate the confined space need to be removed in accordance with procedures to return the confined space to service.

These devices could include:
- Lock out appliances and devices.
- Tag outs.
- Isolation devices.
- Other site approved devices.

Check the work permit for details of any other tasks that need to be done to finalise the confined spaces work.

3.5.4 Complete Documentation

You will need to complete all documentation, including the confined space entry log, withdrawal of permits, and any records related to use and servicing of equipment.

Generally the withdrawal from a confined space operation requires the following information to be signed off:

- Names of all workers who have exited from the confined space.
- Date and time of all exits from the confined space.
- All workers and equipment are accounted for.
- All equipment has been checked and stored in accordance with procedures.

The person in direct control of the confined space operation will need to make the final sign-off of the withdrawal of the confined spaces work permit once all of the above information has been confirmed.

3.5.4.1 Report Any Issues

Report any issues that may have occurred such as:

- Feedback on the work and ways to improve the work process.
- Signs and symptoms of operational stress.
- Equipment malfunctions.
- Wear and tear of equipment and tools.
- Condition of safety and rescue equipment.
- Observations of the condition of the confined space.