



DEVELOPING WORKPLACE HEALTH & SAFETY GUIDANCE

for the

RECREATIONAL & LIGHT COMMERCIAL
BOATING INDUSTRIES

WHS GUIDANCE MATERIAL

SECTION 4

WORKING IN CONFINED &

ENCLOSED SPACE

Prepared between January 2010 & October 2011 with the generous support & assistance of individuals and businesses within the membership of the Boating Industry Association of NSW (BIA).

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Note: This material provides a brief overview of some of the key issues and readers are directed to the further guidance material provided and to seek expert advice as required. Each business should utilise risk management principles, including consulting relevant workers, to ensure any control measures implemented are properly tailored to the site, workers and tasks.

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Introduction

Achieving a safe site with safe work practices requires a business's ongoing commitment and action. It is process of continual improvement to adapt to changes in technologies, changes in plant and equipment, taking on new personnel, as well as to meet requirements under various health and safety regulations, codes of practice and Australian Standards.

Australia is moving towards a national model of managing health and safety at workplaces, and from 2012 it is planned that all states and territories will be adopting the new:

- Work Health and Safety Act
- Work Health and Safety Regulations and
- Codes of Practice.

These laws will replace the NSW Occupational Health and Safety Act (2000) and the NSW Occupational Health and Safety Regulation (2001)

The following guidance material has been prepared for BIA members to provide information on managing selected 'hazardous' issues in the industry:

- height safety
- undertaking hazardous manual tasks
- working in confined or enclosed spaces and
- moving boats.

In each section there is:

- an overview of the hazard
- an outline of the legal requirements for addressing each of the hazard areas
- case studies from BIA members illustrating how different businesses have tackled the hazards
- lists of other potential options that could also be considered for controlling risks
- references for where to look for further guidance and more technical information

This guidance is not 'prescriptive' but rather provides BIA members with suggestions and options from businesses that face similar health and safety challenges. It encourages the user to follow the risk management approach to identify hazards, assess the risks and to eliminate or otherwise control the risks so far as reasonably practicable. Under the WHS Act this means *"that which is, or was at a particular time, reasonably able to be done in relation to ensuring health and safety of workers, taking into account and weighing up all relevant matters including:*

- (a) the likelihood of the hazard or the risk concerned occurring; and*
- (b) the degree of harm that might result from the hazard or the risk; and*
- (c) what the person concerned knows, or ought reasonably to know, about:*

- (i) the hazard or the risk; and*
- (ii) ways of eliminating or minimising the risk; and*
- (d) the availability and suitability of ways to eliminate or minimise the risk; and*
- (e) after assessing the extent of the risk and the available ways of eliminating or minimising the risk, the cost associated with available ways of eliminating or minimising the risk, including whether the cost is grossly disproportionate to the risk"*

When undertaking risk assessments in the workplace it is a legislative requirement that consultation with workers is carried out as part of the process. By drawing on the experience, knowledge and ideas of the workers a business is more likely to identify all hazards in the workplace and choose effective control measures.

When implementing control measures within a workplace the Hierarchy of Control should be utilised. The Hierarchy of Control ranks the levels of control from the highest level of protection and reliability to the lowest level of protection and reliability.

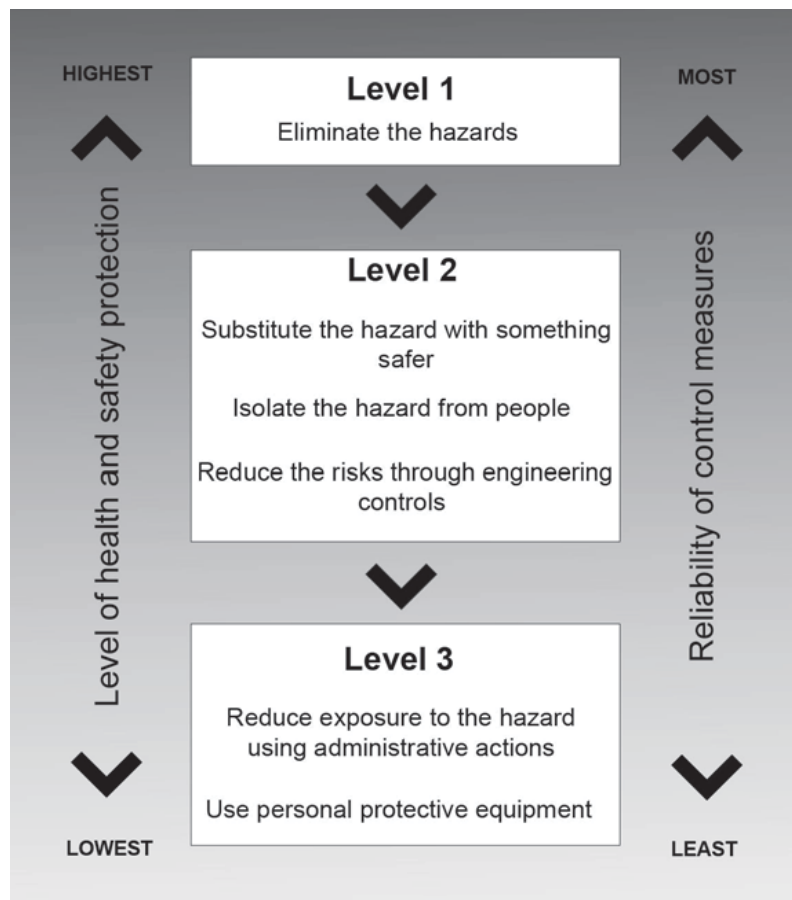


Diagram 1 - Hierarchy of Control (Model Code of Practice – How to Manage Work Health and Safety Risks)

Methods used by other businesses to eliminate or control risks may be easy to copy, or may need to be adapted to suit, or may not suit the conditions and personnel at other businesses. Regardless of which option is the best fit for individual businesses it is hoped that this guidance will assist BIA's members to review and upgrade their existing health and safety management and generate new ideas for managing hazards at work.

Further Guidance

Work Health and Safety Act 2011

Work Health and Safety Regulation, Safe Work Australia

Model Code of Practice – How to Manage Work Health and Safety Risks, Safe Work Australia

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WORK HEALTH AND SAFETY ISSUE – CONFINED/ENCLOSED SPACES



The Risk

Undertaking work on or within a boat can lead to the hazard of working in a confined space. Exposure to chemicals or fumes, the presence of a flammable atmosphere or a lack of oxygen can present a serious risk to the safety of individuals employed in the boating industry.

Defining what is and what is not a confined space on a boat has been a task that members of the BIA have difficulty with due to the nature of the Business. A large number of tasks are undertaken within enclosed areas of a boat and depending on the nature of that task may turn a non confined space into a confined space.

The key risks when working within confined spaces in the marine industry are when a person is required to:

- Use a flammable liquid within an area.
- Use a chemical that generates gases
- Undertake a task that generate fumes e.g. welding
- Undertakes a task that uses up oxygen e.g. welding
- Disturbs stagnate water

The consequence

The consequences of not controlling the risks when working in confined spaces can be fatal or result in serious injury or impairment.

The law

Working in confined spaces is controlled by the WHS Act and Regulations and the Australian Standard 2865 Confined Spaces.

A confined space is defined as an enclosed or partially enclosed space that:

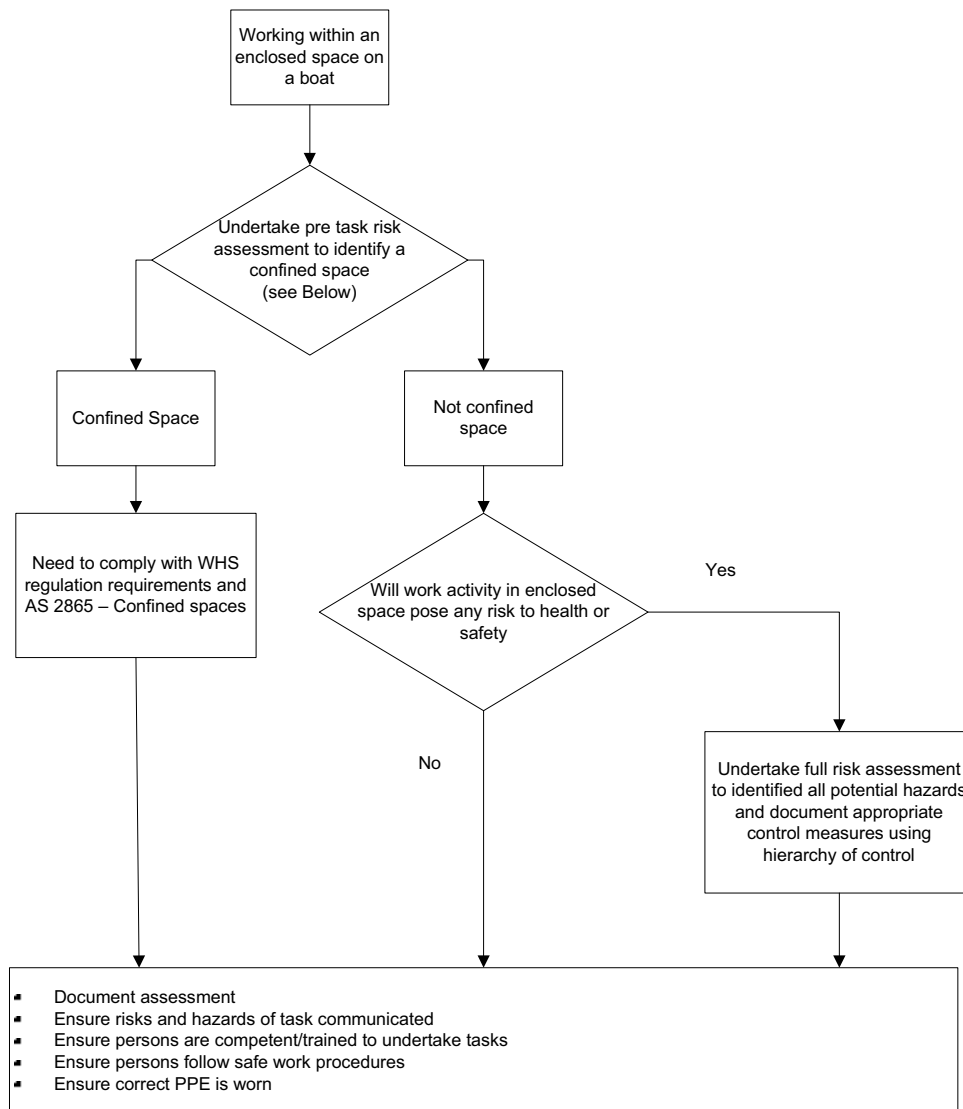
- is not designed or intended primarily to be occupied or entered by a person; and
- is, or is designed or intended to be, at normal atmospheric pressure while any person is in the space; and
- presents a risk to health and safety from:
 - a) an atmosphere that does not have a safe oxygen level, or
 - b) contaminants, including airborne gases, vapours and dusts, that may cause injury from fire or explosion, or
 - c) harmful concentrations of any airborne contaminants, or
 - d) engulfment.

Owners, Managers and Operators of marine facilities' need to identify confined or potential confined spaces within their workplaces. Safe Work Australia Code of Practice on Confined Spaces and Australian Standard 2865 Confined Space can help in the identification of a confined space.

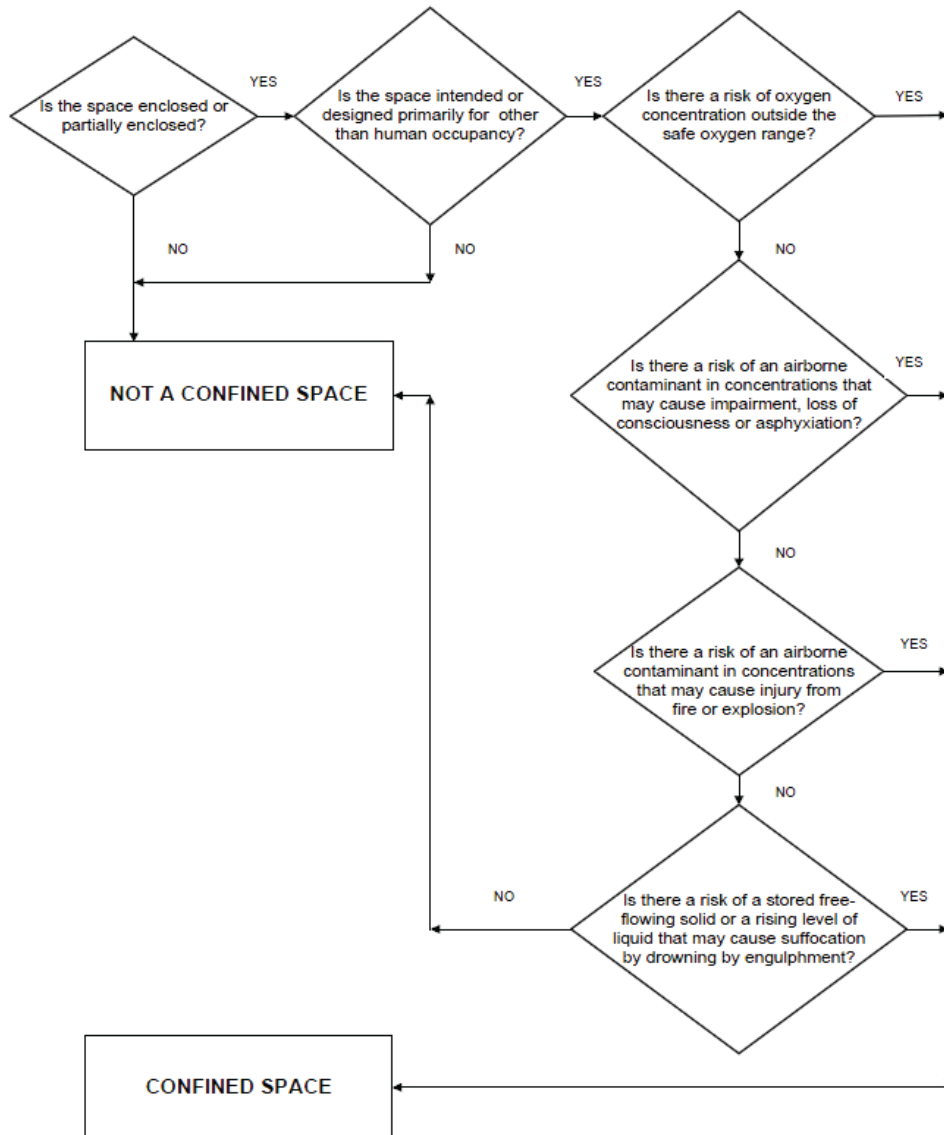
If an area is classified as a confined space then Owners, Managers and Operators of marine facilities' have to ensure that persons can work safely. This includes

- Identifying all the hazards and risks of working in a confined spaces

- Eliminating the need to work in a confined space
- If not able to eliminate the need to work in a confined space then minimising the risks
- Ensuring all persons entering the confined space are trained and competent
- The completion of a confined spaces entry permit
- Ensuring adequate emergency and rescues procedures are in place should something go wrong
- Keeping relevant documentation relating to confined space entry.



Confined space identification



WA Water Corporation

Even though a space may not be a confined space undertaking work in the enclosed spaces of a boat may potentially cause harm to workers. Tasks involving things such as the use of hazardous and/or dangerous goods, noisy equipment, moving heavy objects or working in cramped surroundings may injure or potentially kill workers. Owners, Managers and Operators of marine facilities' need to ensure that the risks of any tasks undertaken in a boat are identified assessed and controlled.

WHS Legislation covers:-

- The use of Hazardous chemicals and Dangerous goods in a workplace
- Exposure to noise
- Hazardous Manual task

The attached guidance notes provide information that may help operators in the recreation and light commercial boating industry reduce injuries and increase compliance with NSW OHS requirements. They also provide real examples of how NSW BIA members can classify and/or control the risk of working in confined spaces.

Does your business comply?

Check how well YOUR business is currently managing confined and enclosed spaces utilising the information in the guidance material for working in confined and enclosed spaces. These tools also outline the elements of a good safety management system for dealing with the risks of working in confined or enclosed spaces.

By following the guidance you will achieve better safety for all people on your site, and better compliance with the work, health and safety laws.

References

- Work Health and Safety Act
- Work Health and Safety Regulation
- Australian Standard 2865 – 2009 Confined Spaces
- Draft Code of Practice – Confined Spaces, Safe Work Australia
- Code of Practice – Control of Workplace Hazardous Substances – WorkCover NSW
- Dangerous goods and hazardous substances - Chemicals in the workplace Fact Sheet – WorkCover NSW
- Code of Practice - Noise management and protection of Hearing at work – WorkCover NSW
- Draft Code of Practice – Hazardous Manual Tasks Safe Work Australia

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WORK HEALTH AND SAFETY INDUSTRY GUIDANCE



Defining a confined space

HAZARDOUS TASK Identified

WHS legislation defines a confined space as enclosed or partially enclosed space that:

- a) Is not designed or intended primarily to be occupied or entered by a person: and
- b) Is at normal atmospheric pressure; and
- c) Presents a risk to health and safety from:
 - I. an atmosphere that does not have a safe oxygen level; or
 - II. contaminants, including airborne gases, vapours and dusts that may cause injury from fire or explosion; or
 - III. harmful concentrations of any airborne contaminants; or
 - IV. engulfment.

Many areas aboard a boat could potentially be classified as a confined space depending on the nature of the tasks being undertaken. Some areas may change from a safe work environment to a confined space depending on the task being undertaken.

Owners, managers and operators of marine sites are required to assess the risks of the tasks being undertaken and if an area on a boat is classified as a confined space then there is a need to comply with WHS legislation and the Australian Standard relating to confined spaces.

Any space onboard a boat that is intended or designed primarily for human occupation is not classified as a confined space. This would include areas such as cabins, deck houses, heads, walk in engine rooms etc.

Some spaces onboard boats are not confined spaces when used for their intended purpose but may become confined spaces when certain tasks are undertaken. This may include underfloor engine compartments, inspection compartments etc.

Some spaces onboard boats are confined spaces. This would include fuel tanks, bilge spaces, behind collision bulk heads etc.

During the construction of a boat most spaces would not be considered confined spaces, however, there would be a need to control exposure to chemicals used in construction such as styrene, acetone and welding fumes.

Consultation is a legal requirement and an essential part of managing health and safety risks.

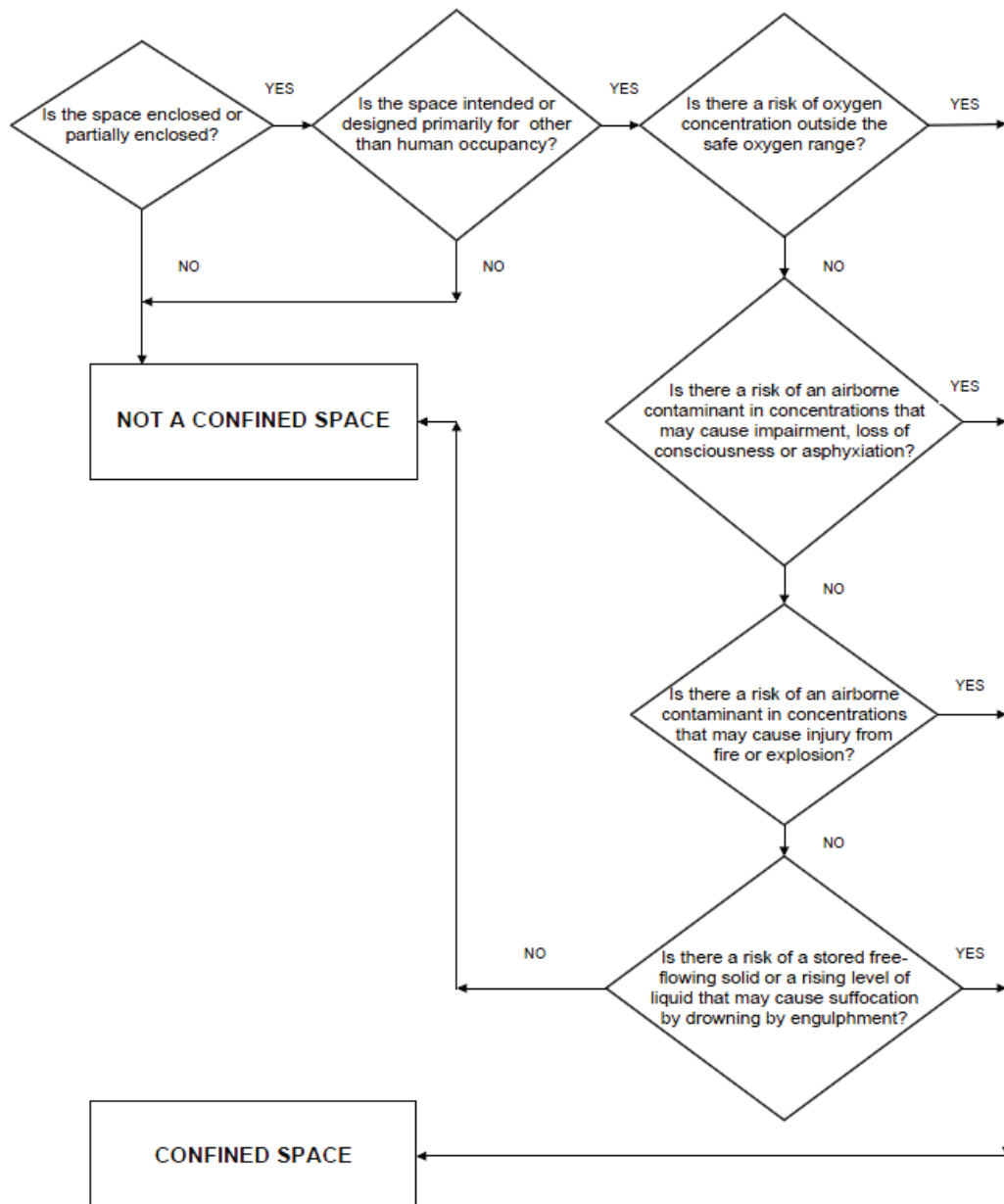
A safe workplace is more easily achieved when everyone involved in the work communicates with each other to identify hazards and risks, talks about any health and safety concerns and works together to find solutions. This includes cooperation between the people who manage or control the work and those who carry out the work or who are affected by the work. By drawing on the knowledge and experience of your workers, more informed decisions can be made about how the work should be carried out safely

RISKS to assess

Check the following to see if you are likely to be working in a confined space:-







- Is the space where you are working intended to be occupied/used by a person?
- Are there any likely contaminants present in the space? e.g. fuel vapours
- Are the tasks being carried out likely to create fumes? e.g. welding
- Is there a risk of an explosion or fire? e.g. using flammable substances, using electric power tool
- How do you get in and out of the space?

Confined space identification



RISK CONTROL options

Below are some typical boat spaces as examples of what could be classified as a confined space and what is not classified as a confined space.

| | | |
|---|---|---|
|  | | <p>Walk in engine room.</p> <ul style="list-style-type: none"> • Intended for human occupation • Not a confined space. • Need to assess risks when undertaking tasks using chemicals or hot work |
|  |  | <p>Engine room with fixed access.</p> <ul style="list-style-type: none"> • Intended for human occupation • Not a confined space. • Need to assess hazards of entry e.g. potential fuel vapours, exhaust gases • Need to assess task being undertaken in engine room |
|  |  | <p>Engine compartment access.</p> <ul style="list-style-type: none"> • If being used for intended purpose i.e. switch over battery isolators, maintain stern gland, and inspect fluids in engine not a confined space. • Need to assess risks of access the area e.g. potential fuel vapours • If undertaking work other than what access was intended for need to undertake risk assessment and determine if confined space |
|  | | <p>Cabin area</p> <ul style="list-style-type: none"> • Intended for human occupation • Not a confined space • If undertaking task using a hazardous or flammable substance need to undertake risk assessment |

| | | |
|--|---|---|
|  |  | <p>Storage locker</p> <ul style="list-style-type: none"> • Intended to be accessed by persons • Not a confined space • If undertaking tasks such as fibre glassing or solvent use need to undertake risk assessment. |
|  |  | <p>Boat steerage inspection compartment</p> <ul style="list-style-type: none"> • If entering for intended purpose then not a confined space i.e. inspection of steering mechanism. • If undertaking other task e.g. fibreglassing or hot work, potential confined space, undertake assessment to determine if a confined space. |
|  | | <p>Collision bulkhead entry</p> <ul style="list-style-type: none"> • Not intended for human occupation • Potential contamination of air • Potential confined space – Need to assess risks before entry • Undertaking tasks using hazardous substance need to comply with confined spaces requirements |

Further guidance

- Work Health and Safety Regulations
- Draft Code of Practice – Confined spaces, Safe Work Australia
- Australian Standard 2865- 2009 - Confined Spaces

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WORK HEALTH AND SAFETY INDUSTRY GUIDANCE



Working within a confined space

HAZARDOUS TASK Identified

A confined space is defined as an enclosed or partially enclosed space that:

- a) Is not designed or intended primarily to be occupied or entered by a person: and
- b) Is at normal atmospheric pressure; and
- c) Presents a risk to health and safety from:
 - I. an atmosphere that does not have a safe oxygen level; or
 - II. contaminants, including airborne gases, vapours and dusts that may cause injury from fire or explosion; or
 - III. harmful concentrations of any airborne contaminants; or
 - IV. engulfment.

Many areas of a boat are enclosed but not all are confined spaces. There is a need to identify whether a space on board a boat is a confined space (See Defining a confined space). Once a space is classified as a confined space there is a need to manage the risk associated with working in that confined space. Where reasonably practicable, the risks of working in a confined space should be eliminated through redesign of the work space, redesign of the tasks or the use of remote work processes. If the risks cannot be eliminated other means such as engineering controls e.g. ventilation and administrative controls e.g. procedures and training should be utilised to minimise the risks.

Working in confined spaces may cause serious injury and/or death.

Consultation is a legal requirement and an essential part of managing health and safety risks.

A safe workplace is more easily achieved when everyone involved in the work communicates with each other to identify hazards and risks, talks about any health and safety concerns and works together to find solutions. This includes cooperation between the people who manage or control the work and those who carry out the work or who are affected by the work. By drawing on the knowledge and experience of your workers, more informed decisions can be made about how the work should be carried out safely

RISKS to assess

Check the following to see if you can work safely in a confined space:

- Can the need to work in the confined space be eliminated?
- Are there any likely contaminants present in the space? eg fuel vapours
- Are the tasks being carried out likely to create fumes? eg welding, fibre glassing
- Is there a risk of an explosion or fire? eg using flammable substances, using electric power tool, use of lights
- Is there enough oxygen or will the task being performed consume oxygen eg. Hotwork

- How do you get in and out of the space?
- How is communication with workers maintained?
- What is the noise level within the confined space?
- Is there a need for additional lighting?

RISK CONTROL options

WHS Legislation, Codes of Practice and Australian Standards require a risk assessment to be undertaken on work being carried out in a confined space. Owners, managers and operators of marine sites, in consultation with those undertaking the work, need to identify the risks of working in the confined space, the likelihood of the event occurring and the consequences if it occurred. The risks then need to be eliminated if practical or minimised. The risk assessment needs to be documented.

The risk assessment needs to be reviewed each time entry into the confined space is required to ensure that it is still covering all the hazards involved.

When working within a confined space the requirements of Australian Standard 2865 – 2009 Confined spaces, needs to be adhered to.

All persons must be trained and competent. Training should include:-

- Emergency Entry and Exit procedures
- First Aid
- Use of the personnel protective equipment (PPE) involved
- Lockout/tag out procedures
- Fire protection
- Monitoring equipment
- Communication Equipment

Before entering a confined space a documented entry permit needs to be completed and signed by the person controlling the entry. The Entry Permit will document the task being carried out, the control measures needed to allow entry into that confined space including PPE, the results of air monitoring within the space and any other precautions needed such as ventilation, barricades, signage etc. Records of entry permits must be kept for 2 years.

When undertaking work within a confined space a safety observer must be assigned to monitor those working in the confined space and initiate emergency procedures if required. The safety observer shall be:-

- a) trained and competent in all relevant aspects of emergency response procedures, including how, when and what procedures will be initiated,
- b) capable of being in communication with person inside the confined space which may include verbal, line of sight and/or two way radios, and
- c) where appropriate, able to operate and monitor equipment used to control risk. This may include:
 - a. operate atmospheric monitoring equipment which is used to monitor for the presence of harmful or flammable contaminants and oxygen levels;
 - b. interpret monitoring results so that appropriate control or emergency response measures can be taken;
 - c. operate and monitor ventilation equipment being used to provide continuous ventilation of the space; and
 - d. operate and monitor other equipment, for example, fall protection/retrieval equipment and air supplied respirator airlines and related air compressors.

The observer should not enter the confined space in an emergency unless they are appropriately trained and is capable of using the equipment provided for rescue e.g. breathing apparatus.

All the requirements for entering confined spaces should be documented in written procedures and made available to those who have to work in and around confined spaces.

Consideration should also be given to the area around the confined space, including Issues such as:

- people falling through confined space entry points
- tasks being undertaken outside the confined space contaminating the space or
- exhaust from ventilating a confined space impacting on others needs.

Case study - Utilising existing control measures on board a boat.

Some boats already have ventilation systems installed that can be utilised to control the hazards of a confined space. Bilge blowers or extractor fans (such as below) could be utilised to remove contaminants from a space or create air flow to all allow fresh air into a space.



Boats may have gas detection systems installed (see picture below) that monitor levels of hydrocarbons within engine bays and other areas of the boat. These could be utilised in assessing the atmosphere of a space as part of a risk assessment into a work process. For entry into a confined space gas detection equipment must measure combustible gases, oxygen, carbon monoxide and hydrogen sulphide levels. All monitoring equipment needs to properly calibrated and regularly tested to make sure it is operating correctly



Further guidance

- Work Health and Safety Regulation – Confined Spaces
- Draft Code of Practice – Confined Spaces, Safe Work Australia
- Australian Standard 2865 – Confined Spaces
- National Core Training Elements for Safe Work in a Confined Space (NOHSC, 1996)

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EXAMPLE CHECKLIST

ASSESSMENT OF REQUIREMENTS FOR WORKING IN CONFINED SPACES

| Checklist | Yes/No (✓/✗) |
|---|--------------|
| Have employees been assessed for aptitude and fitness for task and confined space entry? | |
| Is there a system in place in compliance with the NSW WHS Regulation to ensure planning and supervision of work involving confined space entry? | |
| Have confined spaces been sign posted? | |
| Has there been an identification and assessment of all hazards associated with entering the confined space and performing the planned work? | |
| Are arrangements for rescue, first aid and resuscitation in place? | |
| Is a system in place to identify and control the number of persons entering the confined space? | |
| Is a system in place to identify the persons required outside the space to: <input type="checkbox"/> maintain equipment essential for the confined space task <input type="checkbox"/> ensure adequate communication with and observation of the persons within the confined space <input type="checkbox"/> properly initiate rescue procedures | |
| Is there a system in place to identify, assess and control all proposed operations and work procedures, especially those that: <input type="checkbox"/> may cause a change in the conditions in the confined space <input type="checkbox"/> are unusual or non-typical <input type="checkbox"/> include any personal protective equipment and mechanical or other equipment to be used | |
| Has the soundness and security of the overall structure and the need for illumination and visibility been assessed? | |
| Has the identity and nature of the substances that may be present in the confined space been confirmed? | |
| Has the availability and adequacy of : <input type="checkbox"/> appropriate personal protective equipment <input type="checkbox"/> protective clothing <input type="checkbox"/> rescue equipment for all persons likely to enter the confined space been assessed? | |
| Has the extent to which cleaning will be required in the confined space been assessed? | |
| Has the need for hot work to be undertaken within, or near, the confined space been assessed? | |

| Checklist | Yes/No (✓/✗) |
|--|--------------|
| <p>Have employees been trained in the following minimum requirements:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Emergency exit and entrance procedures <input type="checkbox"/> Use of applicable respiratory protection devices <input type="checkbox"/> First aid including cardio-pulmonary resuscitation (CPR) <input type="checkbox"/> Lockout procedures <input type="checkbox"/> Safety equipment use <input type="checkbox"/> Rescue drills <input type="checkbox"/> Fire protection <input type="checkbox"/> Communications | |
| <p>Have the relevant legislation, regulations, Codes of Practice and Australian Standards been taken into consideration when selecting and using the appropriate fall arrest devices, safety mesh, scaffolding safety nets and guardrails?</p> | |
| <p>Is there an entry permit system in place that conforms to the requirements of AS 2865 – Confined Spaces?</p> | |

WORK HEALTH AND SAFETY INDUSTRY GUIDANCE



Working within enclosed areas on and around boats

HAZARDOUS TASKS Identified

Although an enclosed area of a boat may not be a confined space, it may still pose a threat to the health and safety of individuals working in the area depending on the nature of the tasks being carried out.

The use of cleaning agents, undertaking welding, doing fibreglass work or the presence of petrol fumes can all potentially cause harm or, in extreme circumstances, death.

There is a need for owners, managers and operators of marine sites to assess the risks of the tasks being undertaken within the enclosed spaces on and around boats.

Employees can be working in enclosed spaces during the production of boats, during the maintenance of the inside of a boat and whilst undertaking work on the hull of a boat. Working within sheds can also pose risks to health and safety when certain tasks are undertaken.

Consultation is a legal requirement and an essential part of managing health and safety risks.

A safe workplace is more easily achieved when everyone involved in the work communicates with each other to identify hazards and risks, talks about any health and safety concerns and works together to find solutions. This includes cooperation between the people who manage or control the work and those who carry out the work or who are affected by the work. By drawing on the knowledge and experience of your workers, more informed decisions can be made about how the work should be carried out safely.

RISKS to assess

Check the following to see if you can reduce the risks of the tasks being undertaken in enclosed spaces:

- Does the task require the use of hazardous substances? Check the label or the SDS to see if it is a hazardous substance
- Does the task involve the use of flammable substances? Could a fire start or an explosion occur?
- Is there adequate ventilation? Do fumes need to be removed or fresh air brought in?
- Does the task involve hot work e.g. welding, braising or grinding.
- Is there going to be noise generated whilst undertaking the task?
- Are heavy or awkward objects being moved around?
- Does the task require workers to adopt awkward positions?

RISK CONTROL options

If you are going to use a hazardous substance or dangerous good whilst working on a boat it is important that you understanding the risks and hazards involved in using that substance.

Read the label carefully and obtain a copy of the Safety Data Sheet (SDS). An SDS contains important information of the safe use of the substance.

All dangerous goods are labelled with a coloured diamond indicating the harmful properties of the product e.g. flammable, corrosive, toxic etc.

All hazardous substances should be clearly labelled as hazardous and state the risks to health.

The SDS for a hazardous substance contains important health and safety advice about a hazardous substance including the makeup of the substance, the risks of using the substance, the type of safety precautions needed to use the substance safely, the first aid requirements is someone is exposed to the substance, emergency instructions on how to deal with a spill and disposal of the substance. A SDS should be obtained for all hazardous substances used on site and they should be readily available to those who may use the substance.

A risk assessment needs to be undertaken for the use of any hazardous substances to ensure adequate control measures are put in place to reduce the risk. The risk assessment should be carried out in accordance with NSW Code of Practice for the Control of Workplace Hazardous Substances and in consultation with the workers involved in carrying out the task. Risk assessments need to be kept for a minimum of 5 years.

Workers may be exposed to hazardous substances throughout the life cycle of a boat.

During the production of a boat workers may be exposed to styrene, acetone, welding fumes, paint vapours and solvents. The risk from using these substances increases when the working within a hull, when the hull and deck are joined and when undertaking production and fit out within the interior of a boat. Adequate ventilation needs to be provided and appropriate PPE should be worn. This should be identified during a risk assessment.

During the maintenance of a boat workers may be exposed to solvents, cleaning agents, paints, welding fumes, fuels etc. If protective coatings, such as paints, are being removed using heat then decomposition products can affect workers. Workers may be in an enclosed space when working below decks or in an area enclosed by covers or clears. Adequate ventilation needs to be provided and appropriate PPE should be worn. This should be identified during a risk assessment.

As part of a hazardous substances risk assessment consideration should be given to substituting a hazardous substance for a less hazardous one. Consulting with a marine products or chemical supplier to understand what other alternative products are available for use could result in a safer working environment.

Case Study – Substitution of hazardous cleaning chemicals

Acetone is a widely used chemical in the boating industry as both a thinner and a cleaner. Acetone is a highly volatile solvent that when used within an enclosed area of a boat without adequate ventilation can quickly produce a hazardous and flammable atmosphere.

A NSW boat manufacture has substituted acetone as a cleaning solvent with a less hazardous and volatile solvent in around 80% of their cleaning tasks in and around the boats they are producing. Substituting acetone with a less hazardous chemical has reduced the exposure of employees to acetone, reduced the likelihood of creating flammable atmospheres within boats and reduced the environmental impact of using solvents.

When assessing the suitability of substituting one chemical with another, consult with the chemical supplier, obtain a safety data sheet, conduct a risk assessment and ensure all exposed employees are trained in how to use the chemical safely.

During the maintenance of a boat an enclosed space may be formed due to the use of tarps or other protective material to protect the boat from weather, contain contaminants, protect the boat from other processes around etc. Working on a boat inside a shed may also increase the risks of a task and should be taken into consideration when assessing the risks of a task.

Case study – Enclosed areas of a boat



The enclosed areas of a boat include those areas below deck such as cabin areas, walk in engine rooms, storage areas etc. The presence of covers, tarps, clears, boat covers etc. may also make an area of a boat enclosed or restrict ventilation. This needs to be taken into consideration when assessing the risks of a working around a boat.



When undertaking work in an enclosed area of a boat a risk assessment needs to be undertaken beforehand to ensure that all potential risks are identified and appropriate control measures are implemented. Tasks which may appear low risk when working outside of a boat, such as painting, cleaning or welding, may have an increased risk due to working in an enclosed space.

When working in an enclosed space using air movement to remove contaminants from the work area is a key control measure. Mechanical ventilation can be used to either extract the contaminants from the air or introduce fresh air to a space. Mechanical ventilation can take the form of inbuilt systems such as engine room and bilge blowers or portable units that can be moved from job to job. The ventilation can be used to remove a contaminant at the source, such as extracting fumes from a welding job, to remove contaminants from the surrounding area or to create air flow around or through an enclosed space.

As part of a pre task risk assessment the need for and the type of ventilation should be considered. Also if contaminants are being extracted, consideration should be given to where they are extracted to, so as to minimise the possible impact on others working around the area.

Case Study - Ventilation in enclosed areas

Various types of mechanical ventilation can be found in the recreational and light commercial boating industry.



In built ventilation systems such as engine room extractors and bilge blowers can be used to increase air flow within enclosed spaces on boats. The use of external ventilation system can remove contaminants or provide clean air to a work environment. Inhouse designed fan boxes placed over a hatchway is also a way of increasing air flow through the hull of a boat and removing contaminants from the enclosed space. Any mechanical ventilation used should be suitable for the task ie. Ignition proof fans for use with flammable substances

The use of volatile or flammable chemicals in enclosed areas of boats has in the past led to catastrophic events. Cleaning agents, solvents and fuels used in the boating industry can be highly flammable and when vapours are generated within enclosed areas of boats, can lead to fires and explosions.

Case Study – Use of flammable chemicals

It has been widely documented in NSW, throughout Australia and the world that the use of flammable chemicals on boats can lead to serious injuries, loss of property and fatalities.



The above incident resulted from the use of a flammable substance (contact adhesive) by a lone worker within an enclosed area of a boat and then the

introduction of a ignition source (a vacuum). The incident resulted in the loss and damage of numerous boats, injury to the person undertaking the task and to those responding to the incident and potentially could have led to loss of life.

There is a need to understand and control the risk of using flammable chemicals aboard boats. A documented risk assessment should always be carried out before starting any task involving the use of flammable chemicals within the confines of a boat. What may seem to be a simple task in an open area can be highly dangerous in an enclosed area. During the assessment alternative chemicals should be look at to see if the flammable substance can be eliminated or substituted for a less flammable substance. There is a need to ensure adequate ventilation to remove vapours from the air to prevent exposure to hazardous substances and the development of an explosive atmosphere. Ignition sources such as smoking, elctrical equipment, lights, radios, extraction equipment etc. should be removed from the work area or only used if they have been rated for use in a flammable atmosphere. If flammable substances are to be used vapour detection systems should be used, such as flammable gas monitors, to ensure that a flammable atmosphere is not present. All persons undertaking the tasks need to be trained and competent in the use and handling of the chemicals and the control measures required to ensure the task can be carried out safely. Proper supervisory arrangements need to be inpace and emergency procedures documented and known.

When working with chemicals in enclosed areas of boats it is necessary to understand the nature of the chemical. Reading the label and SDS for a chemical before use and a risk assessment needs to be carried out before the task is started. Persons need to be trained in the safe use of the chemicals

Decreasing the risk of a fire or explosion can be achieved by:

- substituting the flammable chemical for a non flammable chemical,
- opening up the enclosed space to allow better ventilation,
- using mechanical ventilation to extract the flammable vapours,
- using gas detection equipment, whether fixed or portable, to detect flammable vapours,
- controlling ignition sources such as smoking and electrical power tools,
- ensuring lids on flammable chemical containers are closed,
- storing rags in sealed metal containers.

When assessing the risks of using flammable chemicals in an enclosed space ignition sources need to be controlled.

- Smoking should be banned from work areas.
- Mechanical extraction systems should be rated to work in flammable areas.
- Hot work such as welding, braising and grinding should not be carried out in the immediate vicinity
- Electrical equipment e.g. power tools, light sources, radios etc. should be tested and tagged and only used when the atmosphere is safe
- Engines should not be running

Internal combustion engines should not be used in enclosed spaces on boats. This would include portable petrol, diesel or gas powered generators, compressors, power tools etc. Using this type of equipment in an enclosed space can lead to the build up of toxic gases such as carbon monoxide and nitrogen dioxide. The use of internal combustion engines in enclosed spaces has caused fatalities. When using internal combustion engines around boats, such as on docks or on a deck of a boat, consideration should also be given to where the exhaust is directed. Toxic exhaust gases could be directed towards an enclosed space of a boat impacting on others working in the area.

The use of noisy equipment in enclosed spaces will cause hearing loss if not properly controlled. The effects of noisy equipment can increase when working in enclosed spaces. Owners, operators and managers of marine facilities need to understand the risks of using noisy equipment in the workplace by undertaking a risk assessment. The risks of noisy equipment can be reduced by:-

- Knowing the noise levels of equipment being used
- Buying quiet equipment
- Isolating the noisy work from the rest of the work area
- Scheduling noisy work for when others aren't around
- Signposting noisy areas
- Using hearing protection (hearing protection should only be used as a last resort)

Working in enclosed areas on boats can lead people having to work in cramped postures. This can lead to health problems. Refer to guidance on Manual Tasks – Working awkward postures for control options.

Further guidance

- Work Health and Safety Regulation
- Managing chemical hazards in the workplace: Advice for managers and supervisors, WorkCover NSW
- Labelling dangerous goods, WorkCover NSW
- Dangerous goods and hazardous substances chemicals in the workplace – WorkCover NSW
- Code of practice for the control of workplace hazardous substances – WorkCover NSW
- Code of practice for the storage and handling of dangerous goods – WorkCover NSW
- Code of Practice for Noise Management and Protection of Hearing at Work – WorkCover NSW

Note: This material provides a brief overview of some of the key issues and readers are directed to the further guidance material provided and to seek expert advice as required. Each business should utilise risk management principles, including consulting relevant workers, to ensure any control measures implemented are properly tailored to the site, workers and tasks.

To ensure you comply with your legal obligations you must refer to the appropriate legislation. Information on the latest laws can be checked by visiting the NSW legislation website (www.legislation.nsw.gov.au).

This publication does not represent a comprehensive statement of the law as it applies to particular problems or to individuals or as a substitute for legal advice. You should seek independent legal advice if you need assistance on the application of the law to your situation.