

19  
September  
2024

# WSH INSIGHTS

## Safe Entry into Confined Spaces

Confined spaces can be dangerous work environments, posing risks of oxygen deficiency, toxic atmospheres, fires or explosions. Between 2021 and 2023, three workplace fatalities resulted from work in confined spaces<sup>1</sup>. In the first half of 2024, two workers died due to excessive exposure to hydrogen sulphide after entering a service tunnel to carry out tank-cleaning work.

To assist the industry, the WSH Council has compiled the following good practices for confined space work. Companies are reminded to implement these practices to protect their workers from confined space hazards.

### Avoid confined space entry where possible

Consider alternative methods to carry out the work, and eliminate the need for workers to enter a confined space

Camera, lighting and sensors optimised for confined space inspection



Collision resistant (designed to auto-recover in midair)

No line of sight required from the drone pilot

A drone cage may be added for greater impact resilience

Use a remotely operated drone for confined space inspection



Deploy a robot for tank cleaning

(Photo source: Recipient of the WSH Awards 2016)

### Identify and label confined spaces

Warning signs are clearly displayed



Warning sign is placed at every confined space entry point

## Basic entry requirements

Workers are trained on confined space hazards and risk controls are in place



Confined space hazards are addressed during daily toolbox briefings and before entry. Workers understand the entry requirements

Competent persons are deployed for confined space work



Confined space assessors, attendants and workers have valid training certificates

Permit-to-work system implemented for confined space entry

A "PERMIT TO ENTER INTO CONFINED SPACES" form. It includes fields for "DATE", "CONFINED SPACE", "ISSUED BY", and "PERMITTED TO ENTER". Below these are sections for "APPLICABLE REQUIREMENTS" and "PERMIT CONDITIONS". The "PERMIT CONDITIONS" section is divided into three columns: "Pre-Entry Requirements", "Personal Protective Equipment (PPE)", and "Permit Holder's/ Confined Space Attendant's".

| Pre-Entry Requirements   | Personal Protective Equipment (PPE)  | Permit Holder's/ Confined Space Attendant's   |
|--|--|---|
| <ul style="list-style-type: none"> <li>Gas testing</li> <li>Gas monitoring</li> <li>Gas analysis and recording</li> <li>Gas concentration below the LEL</li> <li>Gas analysis and recording</li> <li>Gas analysis and recording</li> <li>Gas analysis and recording</li> <li>Gas analysis and recording</li> </ul> | <ul style="list-style-type: none"> <li>Hard hat</li> <li>Eye protection</li> <li>Hand protection</li> <li>Safety harness/ fall arrest</li> <li>Respiratory protection</li> <li>Other PPE</li> <li>Other identification number</li> </ul> | <ul style="list-style-type: none"> <li>Name</li> <li>Job Title</li> <li>Department</li> <li>Company</li> <li>Contact No.</li> </ul> |

At the bottom, there are fields for "DATE", "ISSUED BY", "PERMITTED TO ENTER", and "DATE".

Permits are used to check risk controls are in place. Valid permits are displayed at the entrance of the confined space

## Eliminate confined space hazards

Sources of toxic or flammable vapours have been removed as much as possible



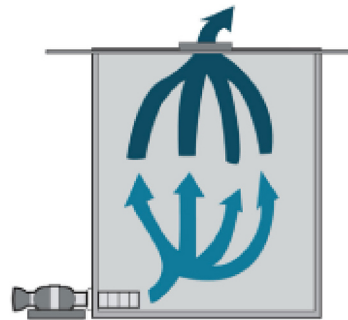
Decomposing sludge is removed using a pump



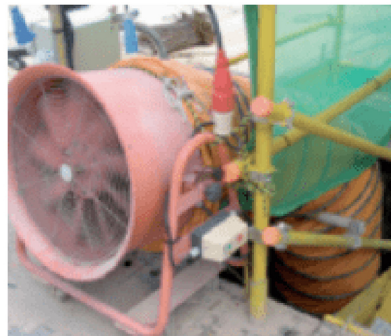
Tank is filled with water and drained to remove residual chemicals before entry

## Mechanical ventilation

Safe atmosphere is created and maintained via a continuous ventilation system



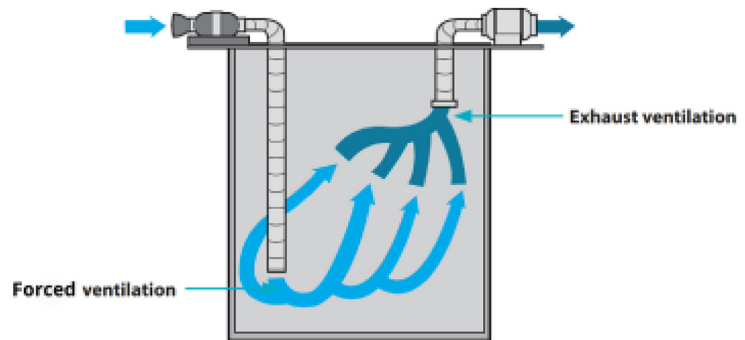
Confined space atmosphere is purged before entry



Forced (push) ventilation to introduce fresh air for breathing



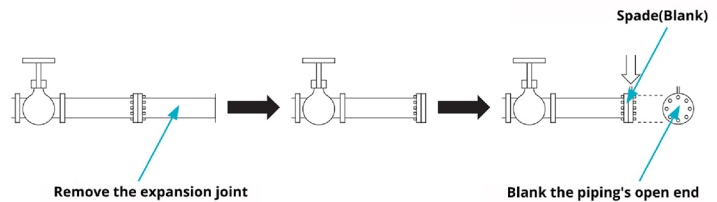
Exhaust (pull) ventilation for air extraction and enhanced air movement



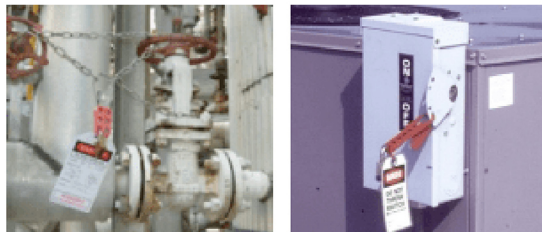
Push-pull ventilation system is deployed for more effective air exchange

### Hazardous energy lockout

Hazardous energy sources are isolated, locked and tagged before entry is allowed.



Pipe carrying hazardous chemicals positively isolated



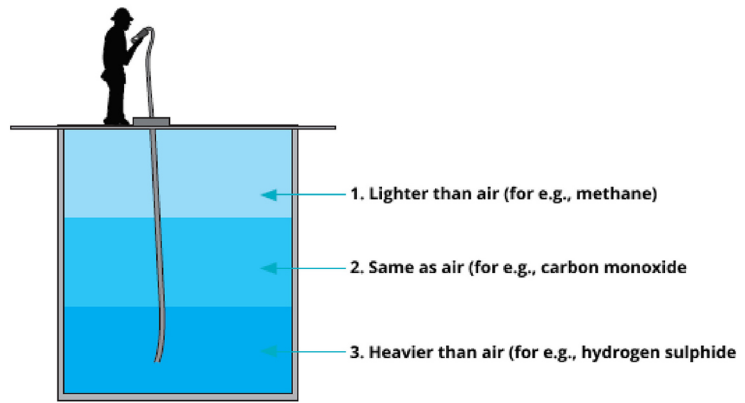
Connected valve has been locked and electrical switches disconnected to prevent accidental activation

### Atmospheric gas testing

Gas tests are conducted by a competent person before entry.

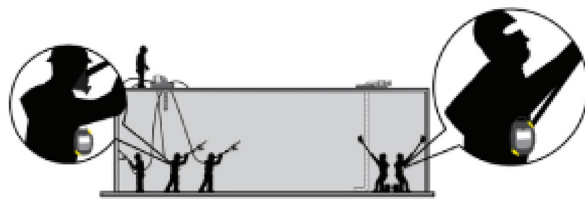
Entry is allowed only if the atmosphere within is confirmed to be safe.

Periodic gas testing is carried out to check the atmosphere remains safe.



Atmosphere is tested at different locations and at three or more elevations

Portable gas detectors are used to continuously monitor workers' breathing zone



At least one worker in every working group is equipped with a portable gas detector

### Atmospheric gas testing

Workers are equipped with respiratory protection for work in oxygen-deficient or toxic atmosphere



Breathing air is provided to each worker via a Self-Contained Breathing Apparatus (SCBA)

### Plan for emergencies

Emergency response plan is established with rescue personnel stationed onsite

Rescue drills conducted at least once every 6 months



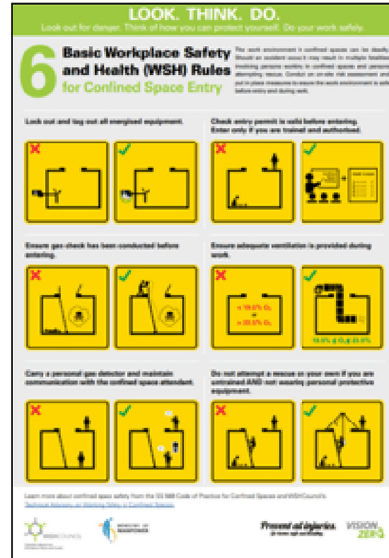
Emergency and rescue equipment are in place before entry

**CAUTION:** Rescue operations must only be carried out by trained rescuers wearing suitable respiratory protection.

Many confined space casualties were rescuers who, in their eagerness to save co-workers, failed to don SCBAs before entering confined spaces that lacked oxygen or contained toxic atmospheres.

### Sharing and communication

Share WSH resources on confined space work



Example of a poster showing WSH rules for confined space entry

<sup>1</sup>Source: National WSH Statistics Report 2021 to 2023

### For more information:

#### WSH Legislation

- WSH (Confined Spaces) Regulations 2009
- WSH (Risk Management) Regulations
- WSH (General Provisions) Regulations
- WSH (Shipbuilding and Ship-Repairing) Regulations 2008
- WSH (Construction) Regulations 2007

#### Singapore Standard

SS 568: 2011 Code of Practice for Confined Spaces

#### Workplace Safety and Health Council

- [Technical Advisory on Working Safely in Confined Spaces](#)
- [Confined Space Safety Guidebook for Supervisors and Workers](#)

WSH posters:

- [6 Basic WSH Rules for Confined Space Entry Before You Enter \(Confined Space\)](#)
- [Do Not Enter \(Confined Space\)](#)
- [Call For Rescue \(Confined Space\)](#)
- [Confined Space - Know Where You Are Heading](#)
- [Flammable Hazardous Substances - Be Alert At Work](#)

WSH Advisory/Alerts:

- [WSH Advisory: Workplace Fatal Injuries Due to Environmental Factors in 2H2023](#)
- [WSH Alert: Two Workers Passed Out and Died in Dredger's Ballast Tank](#)

[WSH Alert: Worker Found With Upper Body in Pipe](#)  
[WSH Alert: Worker Died in Pump Room](#)

Animated videos:

[Safety in Confined Spaces - Case Study and Lessons Learnt \(Full video\)](#)

[Introduction: Confined Space Safety](#)

[Case Study 1: Oxygen Deficiency in Barge Tank](#)

[Case Study 2: Flash Fire in Pontoon Tank](#)

[Case Study 3: Toxic Gas Poisoning in Manhole](#)

[Case Study 4: Workers Overcome by Toxic Gas During Reactor Washing](#)

[Case Study 5: Solvent Vapour Poisoning in ISO Tank](#)

[Conclusion: Safe Working in Confined Space](#)

Sector-specific information:

[Guide to WSH Obligations for Shipmasters and Contractors for Anchorage Works](#)

[Case Studies for Marine Industry](#)

[Confined Space Safety by ExxonMobil Singapore Manufacturing Complex](#)

[Case Studies for Chemical Industry](#)

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Workplace Safety and Health

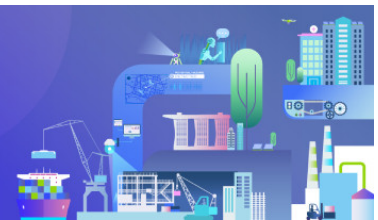
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Visit the WSH Council's [website](#) now for updates on WSH-related  
matters, information and events.



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11 September 2024 | Sands Expo and Convention Centre

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