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[1]. 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

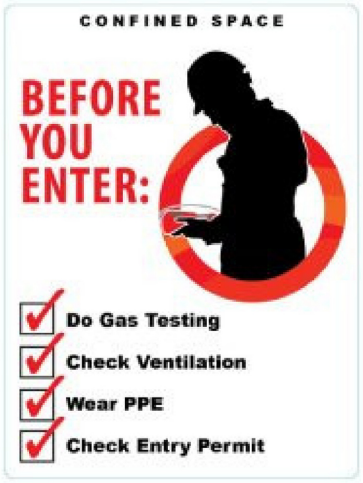
Use a remotely operated drone for confined space inspection

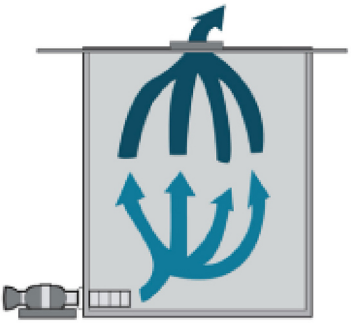
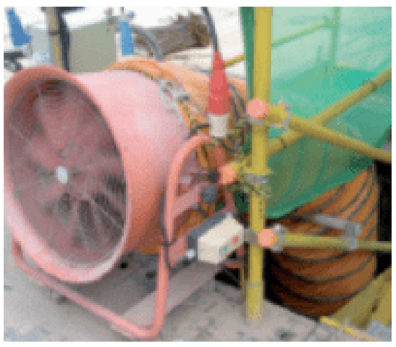
Deploy a robot for tank cleaning
(Photo source: Recipient of the WSH Awards 2016)

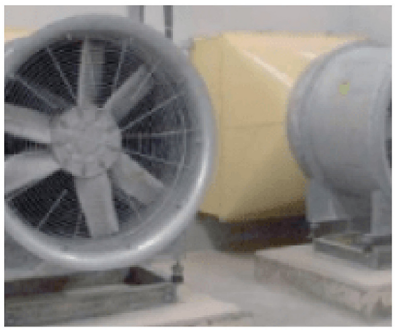
Identify and label confined spaces

Warning signs are clearly displayed

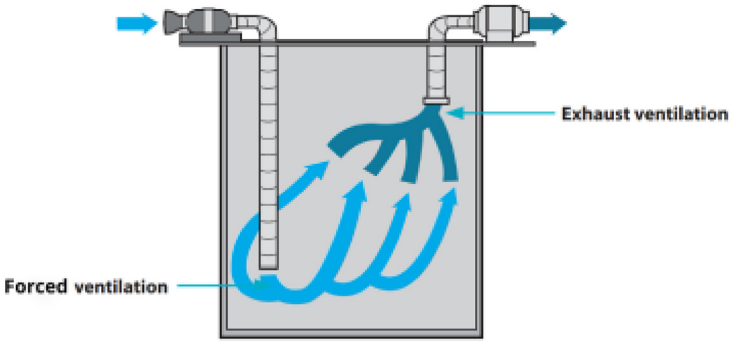
Warning sign is placed at every confined space entry point

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	 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



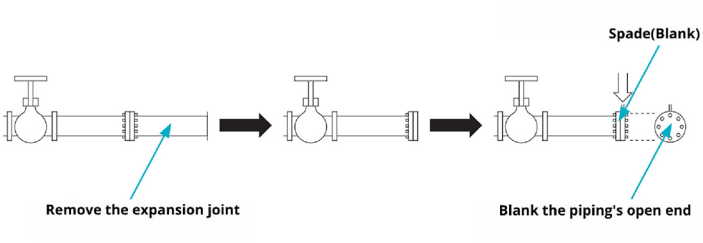
Exhaust (pull) ventilation for air extraction and enhanced air movement



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

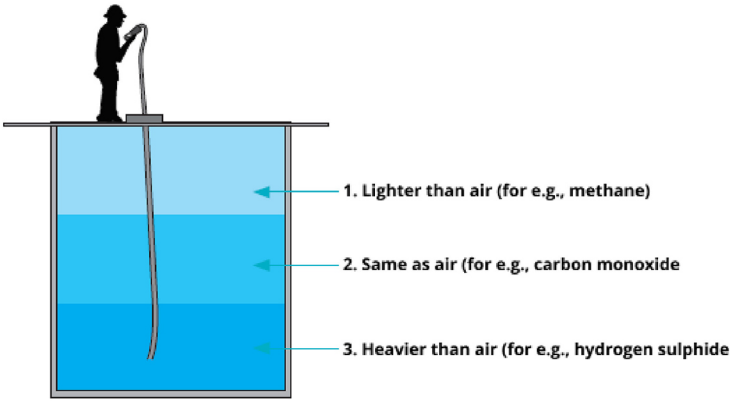
Connected valve has been locked and electrical switches disconnected to prevent accidental activation

Atmospheric gas testing

Gas tests are conducted by a competent person before entry.

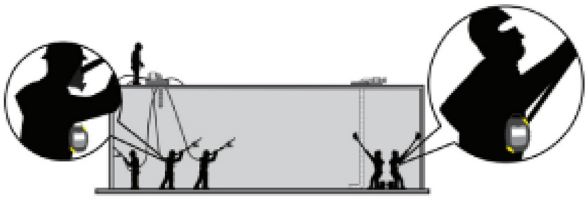
Entry is allowed only if the atmosphere within is confirmed to be safe.

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

[1]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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Tripartite Alliance for Workplace Safety and Health

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