

INCIDENT SHARING – DANGERS OF CONFINED SPACES IN CHEMICAL INDUSTRIES

Working in confined spaces pose significant dangers due to potential lack of oxygen, presence of dangerous gases, vapours or fumes or engulfment by materials. The risk of confined space work activity can be high especially when the entrances or exits of confined spaces might not allow for quick evacuation. In the chemical industries, examples of confined spaces typically include storage tanks, silo, large pipelines and vessels. To ensure safety, strict adherence to safety protocols and heightened worker awareness are important. Below are two case studies arising from work in confined space environment.

Case 1:

A worker was tasked to check for residue in an ISO tank to ensure its cleanliness before repair works. He was equipped with a helmet, respirator, safety goggles, rain boots and rubber gloves. The worker was working alone. Later, he was found unconscious at the bottom of the tank. A co-worker entered the ISO tank in an attempt to save him, but felt dizzy and exited the tank. After multiple attempts, the worker was pulled out of the tank, but he could not be revived.

Investigation revealed that the company had standard operating procedures for ISO tank inspections, but it was not adhered to. Gas testing were not conducted before entering the ISO tank because the gas meter was not functional. The internal of the ISO tank was not sufficiently ventilated with fresh air before the work commenced. Furthermore, as nitrogen was previously used to expel the residue from the tank, it resulted in an oxygen-deficient environment. The worker was also not equipped with a harness attached to lifeline and no safety attendant was present to keep watch during work.



Figure 1: Close-up of the manhole opening at the top of the ISO tank.

Case 2:

Three workers were inspecting an ISO tank after its valve was repaired. As one of the workers was descending the tank's interior ladder, he passed out and fell to the tank bottom. Another worker heard the 'thud' from inside the tank and tried to help after noticing his colleague lying on the bottom. He entered the tank, but also lost consciousness shortly after. Upon hearing some shouting, the third worker called for help through his walkie-talkie and tried to enter the tank. He too lost consciousness. Other workers immediately responded to the emergency by ventilating the tank. Fortunately, all three workers were rescued, recovered from injuries and returned to work.

Investigation revealed that the ISO tank was not ventilated before the first worker entered the confined space. There was also no gas testing conducted, despite being part of the established safe work procedures. No tank entry permit-to-work was issued. There was also no proper rescue system established.

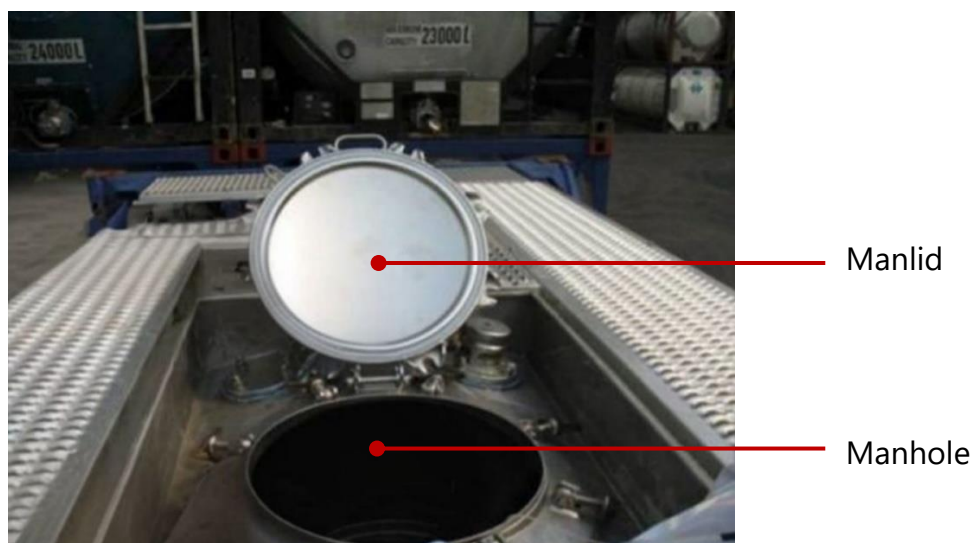


Figure 2: Close-up of the manhole opening at the top of the ISO tank.

Lessons learnt

To prevent such accidents, workers are reminded to:

- Look out for a confined space entry permit, and ensure that the hazards of the confined space work activity have been communicated to you before commencing work;
- Follow safe work procedures and do not open any manhole of a confined space unless you are authorised to do so;
- Make sure that the confined space has been properly ventilated, gas testing has been conducted, and verified safe to enter by an authorised confined space safety assessor;
- Enter the confined space only if you are trained and competent to do so. Workers entering confined spaces should have completed the WSQ Perform Work in Confined Space Operation Course;
- Make use of all Personal Protective Equipment (PPE) provided by the employer and ensure that gas detectors are functional;
- Ensure that there is a confined space attendant outside before entering the confined space.
- Carry out rescue work only if you are trained. Never attempt rescue without proper PPE.

For more information, you can refer to the WSH Council's [Confined Space Safety Guidebook for Supervisors and Workers](#) , [6 Basic WSH Rules for Confined Space Entry](#) and [WSH Insights on Safe Entry Into Confined Spaces](#).

This write-up is part of a series of incident sharing for workers brought to you by the Workplace Safety and Health Council and the Ministry of Manpower.