

What You Should Know about Safety in the Oil & Gas Industry



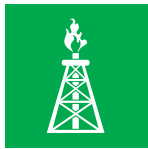
Hazardous Environments

For more than 100 years, the safety experts at MSA have been protecting people at work against the dangers of toxic and combustible gases, explosions and fires, trips and falls, loud noises, flying debris, dust, and more. If you're responsible for plant and/or process safety in the oil and gas industry, we're here to help you prevent accidents.

This summary introduces the basics of maintaining a safe work environment in the oil and gas industry. It is a quick-start tool, which is intended to point you in the right direction and not an all-inclusive safety manual. Our teams are ready to help you take the next steps with more detailed information when you're ready to talk about your company's needs.

WE KNOW WHAT'S AT STAKE.

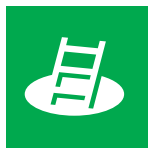
What You Should Know about **Safety in the Oil & Gas Industry**



Oil & Gas Safety

Hazardous fluids and gases are present in petrochemical operations, which include large indoor and/or outdoor areas with complex arrays of equipment that pose a danger to workers. In this industry, many accidents have occurred with tragic results. (OSHA) standard 29 CFR 1910, along with additional standards, directives and documents, is the primary industrial standard to protect oil and gas workers.

OSHA has approved another 28 state safety standards that regulate the oil and gas industry. In addition, there are multiple consensus safety standards provided by professional organizations, such as the American National Standards Institute (ANSI), the American Society of Safety Engineers (ASSE), the National Fire Protection Association (NFPA), the American Petroleum Institute (API) and other international organizations around the globe.



Confined Space Compliance

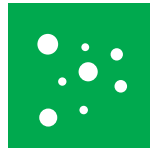
Confined spaces are one of the most potentially hazardous areas in the oil and gas industry. They require special maintenance consideration, planning, equipment and training in order to be compliant with multiple regulations set by the U.S. Occupational Safety & Health Administration (OSHA) 29 CFR 1910.146, the American National Standards Institute (ANSI) ASSE Z117.1, Canada's CSA Z1006 standard and others around the globe.

A confined space can be defined as an area that:

- Is large enough for an employee to bodily enter and perform work.
- Has limited or restricted means of entry or exit.
- Is not designed for continuous human occupancy

Confined spaces are also present in a wide range of other industries that include: chemical, construction, electric power, food and beverage, water and wastewater treatment, and many more. Some examples of the many types of confined spaces include:

- Boilers
- Degreasers
- Manholes
- Mixers
- Pits
- Sewers
- Silos
- Tanks
- Tunnels
- Vats
- Vaults



Toxic and Combustible Gases; Oxygen Deficiency

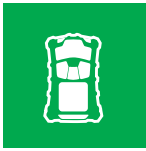
Toxic gases and combinations of toxic and/or combustible gases that require worker protection include: hydrogen sulfide (H₂S), carbon monoxide (CO), sulfur dioxide (SO₂), nitrogen dioxide (NO₂), ammonia (NH₃), chlorine (Cl₂), chlorine dioxide (ClO₂) and hydrogen cyanide (HCN). In addition, the potential of oxygen deficiency (when oxygen levels in confined spaces drop below 19.5% of the total atmosphere) must always be a concern.

H₂S gas is one of the most common (and potentially deadly) toxic gas hazards in the oil/gas industry. It is colorless, flammable and has a "rotten egg" smell. Workers can encounter H₂S gas during production, refining and pipeline operations. It is heavier than air and can collect in low-lying and enclosed, poorly ventilated areas, where it can irritate the eyes, nose, throat and cause respiratory difficulty.

Higher concentrations of H₂S gas can quickly overcome workers, resulting in shock, convulsions, the inability to breathe, coma and death. Workers are warned not to depend alone on their sense of that rotten egg smell to detect this toxic gas because it interferes with one's sense of smell, giving the impression that there is minimal danger when the opposite can be true. If workers smell this gas or if a portable or fixed gas detection alarm occurs, they must evacuate the area.

Combustible gases are both potentially explosive and flammable threats that can be encountered in confined spaces or anywhere in a plant. Petrochemicals, methane and other specific gas vapors can become combustible or flammable when air (oxygen) and heat are present in specific quantities. The lowest percentage at which this happens is known as 100% of the LEL (Lower Explosive Limit); the highest percentage is the UEL (Upper Explosive Limit).

Gas leaks in the oil and gas industry are highly dangerous because they are often variable in nature depending on the location and situation. They can vary in density, for example, depending on ambient temperature, nearby air flow including wind, and other factors. Despite the number of fixed gas and flame detectors in a system, a leak or flame can still go undetected if it doesn't reach a gas sensor or can't be seen by a flame sensor.



Portable and Fixed Gas Detectors

Oil and gas industry plants where toxic and combustible gases as well as oxygen deficiency are a potential threat to worker safety typically rely on two basic types of gas detection. MSA's single gas and multi-gas portable detectors are worn by workers when entering areas where production or maintenance activities are routinely performed, including confined spaces. Their proper set-up, use and maintenance requires routine worker training so that everyone understands what to do.

In oil and gas industry plants, potentially hazardous conditions exist 24-x-7 when the accidental release of toxic or combustible gases and the presence of flames are a potential danger. For this reason, MSA's advanced fixed gas and flame detectors are installed to protect the entire plant including: process areas, storage tanks, pipelines, loading/unloading docks and perimeters. They provide continuous monitoring of hazards with safety system alarms.



Breathing Apparatus

The hazardous conditions of some oil and gas industry processes, maintenance activities and confined spaces require workers to wear self-contained breathing apparatus (SCBAs) because there is an immediate danger to life or health (IDLH). They provide the highest level of respiratory protection and are designed to protect workers within oxygen-deficient atmospheres and/or in IDLH atmospheres often found in confined space areas.

SCBAs are equipped with user-worn air cylinders that provide a dependable, yet limited air supply without hoses or tethers to impede movement. An SCBA's primary components include an air cylinder, low-pressure warning device, regulator, face piece, and carrier and harness assembly. MSA manufactures several different types of industrial SCBAs designed for different applications, which also support municipal fire/rescue units around the world.



Fall Protection

Workers in the oil and gas industry must frequently scale to high locations where fall hazards exist in order to perform required maintenance, including the interiors of large tanks that are considered confined spaces. Falls from higher locations are the single biggest cause of worker deaths and one of the major causes of serious workplace injury.

MSA's Latchways overhead systems combine innovative Constant Force® technology with a robust mobile anchorage that offers outstanding levels of safety, convenience and versatility within virtually any industrial environment. Workers attached to the overhead system enjoy both unfettered mobility and continuous, hands-free security while working at heights.



Protecting Head, Face, Eyes, Ears

Head protection should be worn by all workers entering confined spaces and during many other types of routine maintenance activity. MSA offers two different helmets designed to meet ANSI/ISEA and CSA standards: Type I helmets protect the wearer from top impact, while Type II helmets protect the wearer from top and lateral impact. The necessary level of protection should be determined by employers based upon hazards within a specific work area.

MSA provides eye protection in the form of protective spectacles or goggles to help shield worker eyes from flying debris and other hazards. Faceshields also are available for protection against splashes and debris. MSA's hearing protection products offer auditory protection from loud noises during maintenance activities. By their nature, confined spaces tend to reverberate and amplify sounds, creating potentially serious auditory hazards for workers.



Emergency Preparedness

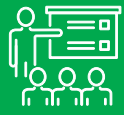
Worker training for confined space and other maintenance activities in the oil and gas industry must include emergency preparedness. It is extremely important to know what to do when an emergency happens. If workers are overcome, attendants must order all workers from the confined space. They must summon help and coordinate all necessary rescue efforts



Next Steps

There is much more to learn about safety in the oil and gas industry. MSA is here to help you with the expertise, equipment and training to prevent accidents. We know every industry is unique, which means that we can help you best by getting to know you better.

Visit MSAsafety.com or contact our award winner customer service team at 1-800-MSA-2222.



Training Resources

Individuals authorizing confined space entry and other maintenance activities in the oil and gas industry must have complete knowledge of the space's contents and hazards. All confined space workers must fully understand their duties prior to entry or if changes occur in assigned duties or confined space applications. Their training also must be certified.

MSA's Training Services include confined space educational courses. Attendees can participate in the most active, hands-on, solution based training available utilizing MSA portable instruments, SCBAs and Supplied Air Respirators, tripods, and rescue systems. These hands-on training courses are available at your facility or one of our regional training centers.

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