

**Introduction:**

This is intended to provide a brief overview of Confined Spaces and the OSHA requirements of entry into confined spaces. It does not take the place of a thorough understanding of the OSHA confined space standard. Nor does it take the place of a thorough understanding of the use and operation of all equipment used for confined space entry such as gas monitors, blowers and tripod rescue systems.

**Examples of Confined Spaces:**

Confined spaces can include any existing tank, tower, sewer, sewer station, manhole, sump, vault, vat, grease pit, tunnel, or other similar confined space.

**Hazards:**

Due to the nature of a confined space's shape, size, lack of ventilation, proximity to toxic gases, and other contributing substances, confined spaces present many hazards to employees. Potential confined space hazards include **hazardous atmospheres**, and **general safety hazards**.

**Hazardous atmospheres** expose employees to the risk of death, incapacitation, injury, or acute illness. Hazardous atmospheres include:

- A flammable gas, vapor, or mist in excess of ten percent (10%) of its lower flammable limit (LFL)
- An airborne combustible dust at a concentration that obscures vision at a distance of five feet or less
- An atmospheric oxygen concentration below 19.5 percent or above 23.5 percent
- An atmospheric concentration of any substance for which a permissible exposure limit is published in Subpart Z of 29 CFR Part 1910 and could result in employee exposure in excess of its permissible limit(s)
- Any atmospheric condition recognized as immediately dangerous to life or health (IDLH)

**General safety hazards** include but are not limited to:

- Physical hazards
- Structural hazards
- Electrical hazards
- Mechanical hazards
- Biological hazards
- Radiation hazards

**Evaluating Confined Spaces:**

Once confined spaces have been identified, then those confined spaces must be evaluated to determine the hazards that may be present. Hazardous atmospheres and general safety hazards must be evaluated for all the confined spaces.

**A Hazardous atmosphere hazard** evaluation must be conducted through atmospheric testing with a confined space gas monitor such as our [GasAlert Quattro](#) or [GasAlert Max XT II](#).

**General safety hazards** should be assessed by visual observation. This observation should include a visual assessment of:

- Any engulfment potential;
- The internal configuration of the confined space is such that the entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section;
- Other recognized serious safety or health hazards

Additionally, assessment should be based on knowing the existing conditions and normal use/function of the confined space, along with the actual and potential hazards posed by materials and substances in the confined space

### **Permit-Required vs. Non Permit-Required Confined Space:**

***A confined space is a "permit-required confined space" if any of the above listed hazards are present.***

If none of these hazards are present, then the space or area is not designated as a permit-required confined space.

If a change in use or configuration of a non-permit-required confined space increases hazards to an entrant, then the space must be reevaluated for possible reclassification to a permit-required confined space.

A permit-required confined space may be reclassified to a non-permit-required confined space if:

- The permit-required confined space poses no atmospheric hazards and all non-atmospheric hazards are eliminated without entry
- Entry is necessary to eliminate hazards and such entry is performed
- In accordance with the confined space entry program, testing and inspection during entry indicate that hazards have been eliminated
- The basis for determining that all hazards are eliminated is documented and certified

Reclassification is effective only as long as the hazard(s) remain eliminated.

### **Permit-Required Confined Space Requirements:**

Permit-required confined spaces should be marked with a sign (example shown in **Figure 2**) advising personnel and the general public as to the dangers involved. Where practical, all permit-required confined spaces will be locked or blocked to prevent entry.



**Figure 2**

A qualified entry supervisor must authorize entry, prepare and sign written permits, order corrective measures if necessary, and cancel permits when work is completed. The entry permit is completed and posted in a conspicuous location near the entrance. Permits must be available to all permit space entrants at the time of entry and should extend only for the duration of the task.

Once all permit-required confined spaces have been identified, no employee may enter that space until several requirements are met. These requirements include:

- Establishing a permit system
- Conducting pre-entry atmospheric testing
- Isolating energy sources (lockout/tagout)
- Ventilating and cleaning the confined space in necessary
- Posting permit-required confined spaces with the appropriate warning signs
- Having appropriate PPE
- Having appropriate tools in place
- Having attendants in place
- Having rescue equipment and/or teams in place
- Having provisions for contractor compliance with these requirements

**Pre-entry atmospheric testing** for the confined space shall be performed prior to employee entrance

If welding is to be performed in the confined space (permit-required or non permit-required), a hot work permit must also be obtained.

A Confined Space Entry Permit must be completed prior to a permit-required confined space entrance.

**Energy sources** will be completely isolated by physical disconnection, double blocking, bleeding, or by lockout/tagout procedures.

**Ventilation and cleaning** shall be performed to empty, flush, or purge spaces using outside air, where feasible.

- This can be done easily using our [9533-15](#) blower system.

When a hazardous atmosphere is detected, ventilation will continue until:

- The job is completed
- The space has no harmful concentration of toxic gases or vapors and acceptable oxygen concentrations

#### **PPE:**

The **appropriate PPE** shall be worn based on the hazard(s) and include:

- Eye and face protection
- Head protection
- Foot and leg protection
- Body protection
- Hearing protection
- Respiratory protection
- Hand and arm protection
- Harness, safety belts, and lifelines

**Attendant and Rescue:**

The attendant shall be stationed immediately outside of the permit-required confined spaces and shall:

- Be trained in rescue protocols
- Not enter the permit-required confined space
- Be within sight or call of the entrant
- Have means to summon assistance
- Have safety and rescue equipment on hand such as our [51-CSE/system](#)

The attendant shall be physically capable of assisting any employee inside the confined space in the event of an emergency. This individual will be responsible for alerting others that a rescue is in progress and for taking appropriate measures to ensure the safety of all co-workers in the area.

***No employee is to enter a confined space if another employee goes down!*** The attendant shall always seek assistance. Appropriate communications shall be established, such as radios or walkie-talkies, if the employee gets out of sight or hearing range.

**Atmospheric Testing Procedures:**

An instrument, such as the [GasAlert Quattro](#) or [GasAlert Max XT II](#), is used to test for the following:

- **Oxygen** level (19.5 percent minimum/maximum 22 percent)
- Potential **Combustible** gases (not to exceed 10% of its Lower Flammable Limit (LFL))
- Toxic materials known or expected to be present; typically **Hydrogen Sulfide** and **Carbon Monoxide**.
- Instruments without pumps can be lowered down into the space via a rope.
- The space is to be tested before entry is made.
- The space is to be continuously monitored during entry.
- The instrument should be regularly calibrated and field checked prior to each use.

**Personnel Responsibilities:**

**A confined space team performs four functions:**

- The entrant does the work
- The attendant (observer) who remains outside while the work is being done
- The entry supervisor who authorizes permits
- The rescue team who performs rescue

**The entrant:**

- Does the assigned task
- Reviews the permit before entry
- Wears appropriate personal protective clothing, as required
- Uses appropriate PPE, as required
- Uses and attends to area and personal monitoring equipment
- Pays attention to own physical reactions that could signal an unsafe condition
- Maintains contact with the attendant and responds to evacuation orders
- If the entrant senses any reaction to the environment, he or she should signal the attendant for help, if necessary, and leave the confined space immediately

**The attendant:**

- Reviews the permit before entry
- Keeps track of who is in the space at all times
- Keeps unauthorized people out of the area
- Maintains continuous communication, visual or voice, with the entrant during the entry
- Makes sure the ventilation equipment, if used, is working
- Monitors the atmospheric testing equipment
- Attends to the lifeline, if worn by the entrant
- Attends to the air line, if used, to prevent tangles and kinks
- Remains alert for early symptoms of danger within the space
- Watches for hazards outside and inside the space
- Maintains clear access to and from the space
- Notifies the entrant and orders evacuation if conditions warrant or if the permit limits expire
- Is prepared to call for emergency help, if needed
- Remains at the entry point unless relieved by another trained attendant

**The Entry Supervisor (person authorizing permits):**

- Plans each entry. Planning means to:
  - Describe the work to be done
  - Identify the workers involved
  - Evaluate the hazards of the space
  - Perform (or arrange for) atmospheric testing and monitoring
  - Develop rescue plans
- Ensures that the permit is complete, dated, and signed
- Determines the need for certain equipment
- Ensures atmospheric testing is conducted by qualified person and is acceptable
- Ensures that all necessary procedures, and equipment for safe entry are in effect
- Determines, at “appropriate” intervals, that operations remain acceptable
- Cancels the permit and terminates the work if the conditions are not acceptable
- Trains (or provides training for) all workers on the Confined Space Entry Team
- Keeps records on training, safety drills, test results, equipment inspections, and equipment maintenance.
- Cancels the permit and secures the space when the work is done
- Determines if a written rescue plan is necessary for a particular confined space entry
- Verifies that emergency help is available and that the method of summoning help is operable

**Definitions:*****Attendant***

Person who remains outside the permitted space while the work is being done.

***Entrant***

A employee who is authorized by the employer to enter a permitted space.

***Entry Permit***

A written document that is provided by the employer to allow and control entry into a permit required space.

***Entry Supervisor***

The person responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required.

***Hot Work Permits***

A permit allowing employees to perform work involving welding, cutting, or any task that would deplete oxygen, create toxic fumes and vapors, or create the potential for fire or explosion.

#### *Lower Flammable Limit (LFL)*

The minimum concentration of a combustible/flammable gas or vapor in air which will ignite if an ignition source is present.

#### *Non-permit confined space*

A confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.

#### *Oxygen Deficiency*

An atmosphere containing oxygen at a concentration of less than 19.5% by volume as measured by an oxygen measuring device.

#### *Oxygen Maximum*

An atmosphere containing oxygen at a concentration of more than 23.5% by volume as measured by an oxygen measuring device.

#### *Permit-required confined space (permit space)*

A confined space that has one or more of the following characteristics:

- (1)** Contains or has a potential to contain a hazardous atmosphere;
- (2)** Contains a material that has the potential for engulfing an entrant;
- (3)** Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or
- (4)** Contains any other recognized serious safety or health hazard.

#### *Permit System*

The employer's written procedure for preparing and issuing permits for entry and for returning the permit space to service following termination of entry.

#### *Qualified Person*

A person who has been trained and authorized by the employer to perform atmospheric testing.

#### *Upper Explosive Limit (UEL)*

The maximum concentration of a combustible/flammable gas or vapor in air before its saturation point which will ignite if an ignition source is present.

**[Our Complete Confined Space Kit](#) will help you meet most of the above requirements; It features:**

- Miller Rescue Tripod
- A GasAlert Quattro Gas Monitor with Calibration Certificate
- A Miller Harness
- An Allegro Blower System with 15' Duct