



Confined Spaces 190

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Objectives

- Define confined space.
- Describe characteristics of open-top confined spaces.
- Describe characteristics of limited-access confined spaces.
- Identify causes of confined space hazards.
- Identify types of general confined space hazards.
- Identify types of physical confined space hazards.
- Identify types of atmospheric confined space hazards.
- Describe rules for entering confined spaces.
- Describe the purpose of a confined-space entry permit.
- Describe requirements of a permit-required confined space entry program.
- Describe training requirements for permit-required confined space entry.
- Identify the duties of the authorized entrant.
- Identify the duties of the authorized attendant.
- Identify the duties of the entry supervisor.
- Describe the training requirements for a confined space entry rescue team.
- Describe proper work practices for permit-required confined space entry.
- Describe equipment requirements for confined spaces.



Figure 1. Confined spaces that contain hazards require permits for entry. (Courtesy of NMC.)



Figure 2. Sewers and drains are considered confined spaces.

Entering Confined Spaces

One of the most hazardous locations in any workplace is a **confined space**. Confined spaces are areas with limited means of entry or exit that are large enough for an employee to enter and perform work. Confined spaces can be part of the building's physical structure, such as a drainage pipe or crawlspace, or they may be a component of a product being fabricated, such as a storage tank, construction vehicle, or ship.

In general, confined spaces are not intended for continuous occupancy, but they are places that employees must enter to perform tasks such as cleaning, welding, and inspections. Once inside, workers can face hazards such as entrapment, low levels of air, explosions, or poisoning from chemicals in the atmosphere. Because of the dangers associated with confined spaces, the **Occupational Safety and Health Administration (OSHA)** created a set of requirements for entering and working inside these areas.

This class will cover different types of confined spaces and the hazards they present, the roles and responsibilities of employers and employees, and proper work practices and safety precautions for confined spaces.



Figure 1. Building large equipment, such as this ship, can expose workers to many confined space hazards.



Figure 2. An elevator shaft is usually considered a confined space because it is a pit with only one means of entry.

Types of Confined Spaces

There are generally two categories of confined spaces. A confined space may be an **open-top confined space** or a **limited-access confined space**.

As the name suggests, open-top confined spaces have an entry on the top, with or without a cover. For example, pits and some **storage tanks** are considered open-top confined spaces. These spaces generally have a depth that restricts the normal movement of air. When certain substances are present, the quality or even the amount of air that is present in the tank may be affected, posing a breathing hazard to anyone entering. Even the interior of a water tank can be hazardous because of the possible buildup of certain gases.

Limited-access confined spaces are those that are enclosed and have a very small opening for entry and exit. For example, **sewers** and **silos** are considered limited-access confined spaces. Because movement is so restricted in confined spaces, employees can become stuck, or they can be injured by the tools they take into the space with them. Also, the small openings can restrict the flow of air into the space. Even a space that contains air can be deadly if a worker spends too much time in the space and the worker's breathing causes **carbon dioxide** to build up.

Both types of confined spaces also can contain mechanical equipment, such as a pump or mixing device, which could cause additional hazards. For example, someone could accidentally start the equipment while an employee is inside the space, causing injury or death.



Figure 1. A rail car storage tank is considered an open-top confined space.



Figure 2. A sewer is considered a limited-access confined space.

Causes of Confined Space Hazards

Hazards specific to confined spaces generally have three causes: the material stored or used in the confined space, the activity carried out in the space, and the external environment.

The material stored or used in a confined space might be an obvious hazard, such as a **caustic chemical**, or an unrecognized hazard, such as a carbon filter in a water tank. While some substances have an odor that would warn you of their presence, many do not. For example, most employees would not suspect that the carbon filters in a water tank are capable of absorbing available oxygen, thus creating a breathing hazard.

The activity carried out in a confined space also can create a number of problems. For example, if a tank is used for **fermenting** organic materials, **decomposition** can create a number of hazardous vapors. Also, when work, such as welding, is performed inside a confined space, workers can be affected by fumes, heat, explosions, and other hazards.

The external environment also can create hazards. For example, sewer systems can be affected by floods or tides, and a worker entering an empty pipe may be engulfed by water rushing into the pipe. Similarly, a storage tank that is entered at dawn may turn deadly when the rising sun raises the interior temperature.

Again, all of these hazards may be increased by the addition of moving parts or mechanical equipment inside. Employees entering these spaces must be aware of all possible sources of injury or death.

<h1>CHLORINE</h1>	
HEALTH HAZARD H - DEADLY 2 - EXTREMELY HAZARDOUS 3 - HAZARDOUS 4 - SLIGHTLY HAZARDOUS 5 - NORMAL MATERIAL	FIRE HAZARD FLASH POINT 4 - BELOW 100 °F (38 °C) 3 - BELOW 100 °F (38 °C) 2 - BELOW 100 °F (38 °C) 1 - ABOVE 100 °F (38 °C) 0 - WILL NOT BURN
	INSTABILITY 1 - MAY DETONATE 2 - ENDS AND HEAT 3 - MAY DETONATE 2 - VIOLENT CHEMICAL CHANGE 1 - UNSTABLE IF HEATED 0 - STABLE
SPECIFIC HAZARD ACID - ACID ALK - ALKALI COR - CORROSIVE OXY - OXIDIZER WF - USE NO WATER RA - RADIATION HAZARD	
PROTECTIVE EQUIPMENT REQUIRED	
EMERGENCY PROCEDURES	
TARGET ORGANS: LUNGS, THROAT, EYES, SKIN FIRST AID: Flush immediately with water for at least 15 minutes. GET MEDICAL ATTENTION. SKIN: Remove contaminated clothing. Leave unaffected area with water for at least 15 minutes. INHALATION: Do not remove anything if conscious and breathing. If unconscious, stop breathing, get medical attention. RESPIRATOR: RESISTOR TO FUMES AND GAS. EITHER AN ARTIFICIAL RESPIRATOR OR SCBA.	
DOT CLASS: 2.3 POISON GAS-INHALATION HAZARD - HAZARD ZONE III DOT ID NO.: UN 1911 CAS NO.: 7782-50-5	
MEDICAL EMERGENCY NUMBERS	
FIRE: 4500 MEDICAL: 450 SPILL: 4908	

Figure 1. The presence of chemicals can be a very serious confined space hazard. (Courtesy of NMC.)



Figure 2. Welding inside a confined space can expose workers to fumes, heat, explosions, and other hazards.

Types of Confined Space Hazards: General

There are three types of confined space hazards: **general hazards**, **physical hazards**, and **atmospheric hazards**. General hazards are further broken down into **mechanical hazards**, **communication hazards**, and **entry and exit hazards**.

Mechanical hazards are those that occur when electrical or mechanical equipment is accidentally activated. To protect against these types of hazards, electrical and mechanical devices must be put under **lockout** or **tagout** to alert others that the device should remain off. Alternatively, or in addition to lockout/tagout, devices must be **isolated**. Isolation may be accomplished by physically or manually blocking components so that they cannot accidentally start up or by disconnecting pipes or feed lines to prevent the flow of substances. In general, shutting off power switches and valves is not sufficient.

Communication hazards occur when the person inside the confined space is unable to communicate with those on the outside and vice versa. When workers cannot speak to or signal each other, accidents can occur. In dark areas, a type of lighting that is safe for the environment must be used so that the worker is visible to those on the outside. When visual contact is impossible, another means of communication must be used, such as a radio or alarm system.

Entry and exit hazards occur when insufficient preparations are made to ensure that the employee on the inside can exit quickly. All possible means of entry and exit must be examined, and an emergency plan for removing injured or incapacitated workers must be in place.



Figure 1. Electrical and mechanical devices should be put under lockout/tagout to prevent accidental startup of equipment. (Courtesy of NMC.)



Figure 2. Confined spaces require special lighting, such as this explosion-proof utility light.

Types of Confined Space Hazards: Physical

Physical hazards are non-chemical hazards that affect the body. Physical hazards include temperature, **noise**, and **vibration**.

Temperature hazards occur in conditions of extreme heat or extreme cold. Because it is difficult to control the environment within confined spaces, you must take special precautions when your body is exposed to excess temperatures. When your body is overheated, you are prone to **heat exhaustion** or **heat stroke**. When your body is chilled, you are at risk for **hypothermia** and **frostbite**. Both extremes also can impair your physical and mental abilities.

Noise hazards are a special problem within confined spaces. Noise is generally intensified in these enclosures, and sound can echo. Workers in confined spaces must protect themselves from hearing damage or hearing loss. Even when noise is not loud enough to cause damage, it may be loud enough to cause hazards in the form of communication problems.

Vibration can cause numbness, irritation, and harm to the whole body, individual organs, or specific body parts. For example, when workers use tools such as grinders, excessive vibration can affect hands and fingers. Because the employee is generally enclosed by the space that is receiving the vibration, the effects on the body are intensified.



Figure 1. High temperatures within a confined space can put workers at risk for heat exhaustion.



Figure 2. The tools you use within a confined space can cause physical hazards, such as the noise and vibration that can be caused by this hand-held grinding tool.

Types of Confined Space Hazards: Atmospheric

Atmospheric hazards are hazards in the **environment** of the confined space. Generally, atmospheric hazards are categorized as **flammable hazards, toxic hazards, irritant hazards, and asphyxiating hazards.**

Flammable atmospheres may arise from a number of causes, including excess oxygen, lingering flammable vapors, and concentrated **combustible dusts**. Often the smallest spark from a tool can ignite the atmosphere within a tank, causing burns, explosions, and death. Also, many substances will spontaneously ignite when exposed to air or water.

Toxic atmospheres contain substances in the form of gases, vapors, and dusts. These substances may be inhaled, may be absorbed through the skin or eyes, or may enter the body through a cut in the skin. Toxic substances can cause illness, disease, and death.

Irritants are found in many forms, including liquids or gases. **Primary irritants** cause no **systemic effects**, meaning they harm only the parts that they touch, such as the skin, without harming the entire body. **Secondary irritants** can harm the parts they touch, as well as the entire body. For example, a chemical can cause skin problems and be absorbed into the body and cause diseases like cancer or infertility.

Asphyxiating atmospheres are those that lack oxygen and/or contain excessive levels of harmful, breathable substances. While chemical gases may be the most obvious source of an asphyxiating atmosphere, this type of environment occurs naturally in sewers, wells, and storage bins. For example, even the formation of rust or the decay of organic materials can deplete oxygen levels in an atmosphere.



Figure 1. Atmospheric hazards within confined spaces can cause injury and illness.



Figure 2. Corrosive chemicals are primary irritants, harming the skin on contact. (Courtesy of NMC.)

Rules for Entering Confined Spaces

Because of the many hazards associated with confined spaces, OSHA has strict rules about how work in these spaces is carried out. OSHA's Standards for General Industry 1910.146 sets forth the rules for **permit-required confined spaces**. In general, a written, signed permit is required for entry to any space that meets the general definition of a **confined space** and also has one or more of the following characteristics:

- It contains or has the potential to contain a hazardous atmosphere.
- It contains a material that has the potential to **engulf** an entrant.
- It has an internal configuration that might cause an entrant to be trapped or asphyxiated by inwardly converging walls or a floor that slopes downward and tapers to a smaller cross section.
- It contains any other recognized serious safety or health hazards.

In general, the standard states that employers must determine whether or not the confined spaces on the worksite or that are part of the manufacturing process require a permit. Employers also are required to train and **certify** any employee who may be required to enter a permit-required space. Finally, employers must post warning signs on permit-required confined spaces to keep non-certified employees from entering.



Figure 1. A confined space that contains an engulfment hazard, such as the grain in a silo, requires a permit for entry.



Figure 2. These industrial silos contain powdered materials for making concrete blocks.

Permit Requirements

The purpose of an entry permit is to document the fact that all necessary pre-entry preparations have been carried out and the space is safe to enter. It is the employer's responsibility to fill out the permit and assure that the space is ready for entry. Prior to entry, the permit must be posted at the entrance to the space or otherwise made available to employees who must enter the space.

Entry permits must contain the following information:

- Any test results, such as levels of breathable air, and the tester's initials or signature.
- Name and signature of the supervisor authorizing entry.
- Name of permit space to be entered, names of **authorized entrants**, and names of others involved in the entry.
- Purpose of the entry and known hazards of the space.
- Measures taken to isolate the space and control hazards, such as lockout/tagout or **ventilation** procedures.
- Date and authorized duration of entry.
- Acceptable entry conditions.
- Communication procedures and equipment
- Additional permits needed, such as for **hot work**, before entering the space.
- Special equipment and procedures, including **personal protective equipment (PPE)**.

In general, the duration of the permit must not exceed the time required to complete the assigned task or job identified on the permit. Also, the **entry supervisor** must terminate the permit as soon as the operations covered by the permit are completed or when a condition arises that is not covered by the permit. For example, if the purpose of the entry is to inspect the space, and the inspection uncovers the need for a repair, the employer must issue a second permit for repair work.



Figure 1. It is the employer's responsibility to fill out the permit and assure that the space is ready for entry.

Permit-Required Confined Space Entry Program

OSHA puts the burden of providing a safe working environment on the employer. Because of the many hazards associated with confined spaces, OSHA requires employers whose employees must enter permit-required confined spaces to develop a written **permit-required confined space program**.

Among other conditions, OSHA requires the employer's program to:

- Identify and evaluate a permit space before allowing employee entry.
- Test conditions in the permit space before entry operations and monitor the space during entry.
- Perform, in the following sequence, appropriate testing for atmospheric hazards: oxygen, combustible gases or vapors, and toxic gases or vapors.
- Implement necessary measures to prevent unauthorized entry.
- Establish and implement the means, procedures, and practices to eliminate or control hazards, such as by flushing or ventilation of the permit space.
- Identify employee job duties.
- Provide, maintain, and require, at no cost to the employee, the use of PPE and any other equipment necessary for safe entry, such as proper lighting.
- Ensure that at least one attendant is stationed outside the permit space for the duration of entry operations.
- Coordinate entry operations when employees of more than one employer are to be working in the permit space.
- Implement appropriate procedures for summoning rescue and emergency services.

If the only hazard or potential hazard in a confined space is a hazardous atmosphere that can be made safe by forced air ventilation alone, the employer may be exempt from some of these requirements. However, the employer must still perform atmospheric testing.



Figure 1. Written programs must include procedures for appropriate testing of atmospheric hazards, such as the gases that might be present in this manhole.



Figure 2. The written program should include procedures for handling specific confined space hazards.

Employee Training

Employees must be trained and certified by an OSHA-approved program to work in permit-required confined spaces. OSHA's training requirements are not very specific regarding content. The standard states that "the training shall establish employee proficiency in the duties required by this section and shall introduce new or revised procedures, as necessary, for compliance with this section." In addition to the requirements of the standard, areas that training should cover include:

- Atmospheric testing methods for the confined space.
- Cleaning and **purging** methods, including steaming and rinsing.
- Mechanical ventilation methods appropriate for the space, such as the use of exhaust fans.
- Isolation and lockout methods for the confined space.
- Proper use of PPE, including respiratory equipment and other safety devices.
- Systems for signaling and communication.
- Rescue procedures.
- First aid methods.

In addition to these general guidelines, training should focus on the specific types of confined spaces and hazards employees will encounter at their worksite. When training is complete, employers must ensure that employees have acquired the understanding, knowledge, and skills for the safe performance of their duties. Employers must keep detailed records and certifications for all trained employees.

In fact, because of the dangers associated with confined spaces, employers often prohibit all employees from entering confined spaces. Instead, employers will hire outside companies that specialize in confined space entry.



Figure 1. Exhaust fans with hoses are often used to purge and ventilate hazardous atmospheres.



Figure 2. You must wear personal protective equipment that is appropriate for the hazards present in a confined space, such as this hard hat.

Authorized Entrant

Permit-required confined space entry requires a team of employees filling clearly defined roles. Each role has specific duties that help ensure everyone involved in the process remains safe. These roles are the **authorized entrant**, **authorized attendant**, **entry supervisor**, and **rescue team**.

An **authorized entrant** is an employee who actually has permission to enter the workspace. OSHA is very specific about the skills and duties required of authorized entrants, including requirements that entrants should:

- Know the hazards they may face during entry, including information on the mode of entry for the hazard and the signs, symptoms, and effects of exposure.
- Properly use appropriate PPE, including eye and ear protection.
- Maintain communication with attendants.
- Alert the attendant when a prohibited condition exists or when warning signs or symptoms of exposure exist.
- Exit from the permit space as soon as possible when ordered, when the warning signs or symptoms of exposure exist, when a **prohibited condition** exists, or when an alarm is activated.

More than one authorized entrant is allowed to enter a confined space at a time. However, there must be adequate space for all entrants. Also, the amount of time it takes to exit the space in the event of an emergency must be taken into account when determining the number of occupants.



Figure 1. The authorized entrant is the person trained to enter the confined space.

Lesson: 13/18

Authorized Attendant

The **authorized attendant** is essentially a guard who helps keep the authorized entrant safe. However, this person should be completely trained in the hazards that the entrant may encounter within the space.

The duties outlined by OSHA for the authorized attendant include requirements that this person must:

- Remain outside the permit space during entry operations unless relieved by another authorized attendant.
- Perform no-entry rescues when specified by the employer’s rescue procedure.
- Know existing and potential hazards, including the signs and symptoms of exposure and their behavioral effects.
- Maintain communication with and keep an accurate account of those employees entering the permit-required space.
- Order evacuation of the permit space when a prohibited condition exists or when a worker shows signs of exposure.
- Summon rescue and other service during an emergency.
- Ensure that unauthorized persons stay away from the permit space.
- Inform the authorized entrant and the entry supervisor in the event that unauthorized persons have entered the space.
- Perform no other duties that interfere with the task of attending the space.

The authorized attendant is the authorized entrant’s primary safety device. The importance of this person’s duties cannot be overstated.

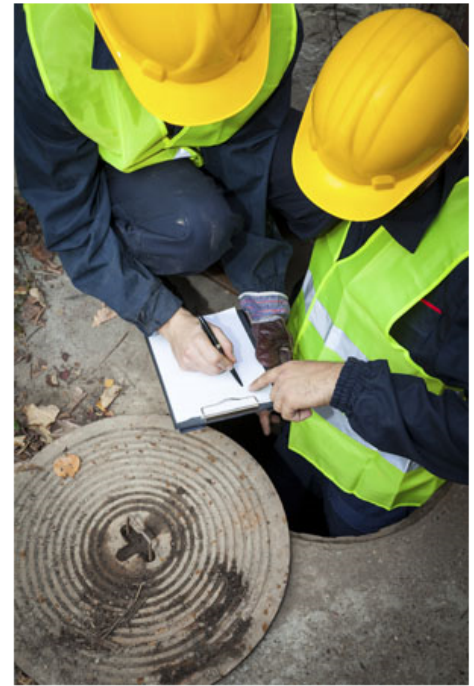


Figure 1. The authorized attendant helps ensure the safety of the authorized entrant.

Entry Supervisor

The **entry supervisor** is the person most responsible for verifying that the space is as safe as possible to enter. In addition to knowing the hazards that may be faced during entry and the signs and symptoms of exposure, the supervisor's duties include:

- Verifying that specified entry conditions, such as permits, tests, procedures, and equipment, are in place.
- Terminating entry and canceling permits when entry operations are completed or if a new condition exists.
- Taking appropriate measures to remove unauthorized entrants.
- Ensuring that entry operations remain consistent with the entry permit and that acceptable entry conditions are maintained.
- Verifying that rescue services are available and that the means of summoning them, such as telephones or radios, are in working order.

The role of the entry supervisor is often filled by the employer, foreman, or crew chief. An entry supervisor may also serve as an attendant or as an authorized entrant, as long as they are properly trained and equipped for these other roles. Also, the role of entry supervisor may be passed from one individual to another during the course of a single entry situation.



Figure 1. The entry supervisor must make sure that all preparations, such as calibrating atmospheric testing equipment, are performed prior to anyone entering the space.

Lesson: 15/18

Rescue Team

Approximately half of all deaths involving confined spaces occur when employees or municipal safety personnel enter a confined space in order to rescue someone, and the rescuers become trapped or incapacitated themselves. Therefore, rescuers must be trained and knowledgeable in all aspects of confined space hazards. It is up to the employer to assure that a **rescue team** is ready and available to safely aid a trapped or incapacitated employee.

When employees are designated to provide permit space rescue and emergency services, the employer must train each employee in proper rescue methods and provide appropriate PPE. Rescue team members must also be trained in basic first aid procedures, including **cardiopulmonary resuscitation**.

Members of the rescue team also must practice permit space rescues at least once every 12 months. Using dummies or actual persons, team members simulate actual rescue operations from confined spaces to practice the skills necessary for an actual rescue.



Figure 1. Members of the rescue team must know the location of emergency equipment and be trained to use it.

Proper Work Practices

A number of work practices are necessary to ensure that a permit-entry confined space is safe. You must follow these guidelines to reduce and eliminate hazards that can cause serious injury and death.

The practices necessary for securing a permit-entry confined space are as follows:

- **Atmospheric testing** must be performed by qualified personnel with specialized testing equipment. Because some gases are lighter or heavier than air, the atmosphere must be tested at various levels. You should never trust your senses to determine the safety of the atmosphere.
- **Purging** clears the existing atmosphere by displacing it with water, vapor, or forced air. **Ventilation** with an exhaust fan maintains the atmosphere. Purging or ventilation with pure oxygen, however, is a serious fire and explosion hazard and is prohibited.
- **Decontaminating** by various cleaning methods removes hazardous substances.
- **Isolating** removes from service any type of mechanical, electrical, or powered device that is part of the confined space. Isolation can include lockout/tagout of power sources, **blanking** and **bleeding** feed lines, disconnecting belt and chain drives, and securing moving parts with chains or blocks.
- **Record keeping** includes securing proper permits and recording the details of any problems or accidents that occur.

Once spaces are cleared of hazards, they should be checked and monitored repeatedly for problems. For example, a poor atmosphere could be caused by a very small amount of chemical residue or an ongoing chemical reaction. Clearing the space once is not enough.



Figure 1. Oxygen use in confined spaces is a fire and explosion hazard, so it should never be used to purge the atmosphere.



Figure 2. Isolating valves to keep substances from entering the confined space is among the preparations necessary for entry.

Equipment for Confined Spaces

Equipment used in confined spaces includes the PPE that authorized entrants and rescuers must wear, as well as any tools that are used inside the space. Because of the hazards that exist in confined spaces, equipment must be specialized.

For example, typical ear, eye, and head protection is often appropriate in confined spaces. However, caustic chemicals or fire and explosion hazards may require you to wear special protective suits, gloves, and facemasks. To facilitate rescue, entrants must often wear a **harness** with a **hoist** that allows workers to be pulled to safety.

When atmospheres cannot be purged or when safe environments cannot be maintained, authorized entrants must wear breathing equipment. An **air-purifying respirator** is used when air exists in the atmosphere but is too contaminated to breathe without filtering. An **air-supplying respirator** is used when there is not enough air to safely filter and breathe. This device may have an air tank that the entrant wears or a supply line leading to an external tank.

Work tools used inside the space must not create additional hazards. For example, tools used in explosive atmospheres must not create sparks or flames. Also, wet atmospheres require electrical tools that use low **voltage** or are plugged into power sources that have circuits equipped with **ground fault interrupters**.

Employers are responsible for providing necessary equipment, but it is your responsibility to use it. To successfully perform work in confined spaces, you must strictly follow the requirements for entry, including using the proper equipment. Disregarding the rules because you will be in the space for "just a minute" can be fatal.



Figure 1. Air-purifying respirators filter air that contains oxygen but is too contaminated to breathe.



Figure 2. Air-supplying respirators are used in confined spaces that lack oxygen.

Summary

A confined space is an area with limited means of entry or exit that is large enough for an employee to enter and perform work. A confined space may be an open-top confined space or a limited-access confined space. OSHA has specific requirements for entering and working in these areas.

Hazards specific to confined spaces generally have three causes: the material stored or used in the confined space, the activity carried out in the space, and the external environment. Similarly, there are three types of confined space hazards: general hazards, physical hazards, and atmospheric hazards. General hazards are further broken down into mechanical hazards, communication hazards, and entry and exit hazards. Physical hazards are non-chemical hazards that affect the body, including temperature, noise, and vibration. Atmospheric hazards are found in the environment of the confined space and include flammable hazards, toxic hazards, irritant hazards, and asphyxiating hazards.

A written, signed permit is required for entry to any confined space with an additional hazardous characteristic. An entry permit documents that all necessary pre-entry preparations have been carried out and the space is safe to enter. The employer must determine if a confined space requires a permit, must fill out the permit, and must assure that the space is ready for entry.

Employers must develop a written permit-required confined space program and train and certify employees required to enter a permit-required space. Training should include information about specific types of confined spaces and hazards employees will encounter at their worksite. Permit-required confined space entry requires a team of employees filling clearly defined roles. These are the authorized entrant, attendant, entry supervisor, and rescue personnel.

For a permit-required confined space to be safe, employers must ensure that certain work practices are followed, including atmospheric testing, purging, decontaminating, isolating, and record keeping. Employees must protect themselves by wearing proper PPE and by using specialized equipment that does not cause additional hazards, such as fires.



Figure 1. Proper work practices are vital for keeping employees safe in confined spaces. (Courtesy of NMC.)



Figure 2. Employees must be properly trained, equipped, and certified to enter a confined space. (Courtesy of NMC.)

Class Vocabulary

Air-Purifying Respirator	A form of PPE that consists of a face mask containing filters that remove contaminants from the atmosphere and make the air breathable.
Air-Supplying Respirator	A form of PPE that consists of a face mask that is attached by a line to a wearable or external tank of air.
Asphyxiating Hazard	A type of atmospheric hazard that interferes with the ability to breathe. Gases and dusts may cause asphyxiation if inhaled.
Atmospheric Hazard	A confined space hazard that is present in the environment. Atmospheric hazards are categorized as flammable, toxic, irritant, and asphyxiating.
Atmospheric Testing	Measurement of the content of the environment using electronic equipment.
Authorized Attendant	Someone trained in permit-required confined space entry and surface rescue who remains outside of the confined space and monitors the safety of the authorized entrant.
Authorized Entrant	A person who has been trained to enter and perform work within a confined space.
Blanking	A method of blocking feed lines to prevent the flow of materials or substances.
Bleeding	A method of draining feed lines to prevent the flow of materials or substances.
Carbon Dioxide	A colorless, odorless gas that is produced by burning or decaying materials and by respiration.
Cardiopulmonary Resuscitation	A technique, commonly known as CPR, designed to temporarily circulate oxygenated blood through the body of a person whose heart has stopped.
Caustic Chemical	A substance that can burn or destroy living tissue.
Certify	To offer proof of accomplishment. Employees are given a certificate or other proof when they have completed confined space training.
Combustible Dust	A type of atmospheric hazard that consists of fine grains of material that are capable of exploding or catching fire.
Communication Hazard	A type of general confined space hazard that exists when persons inside the space are unable to speak to or signal those on the outside and vice versa.
Confined Space	An area with limited means of entry or exit that is large enough for an employee to enter and perform work.
Decomposition	The breakdown or decay of organic materials, such as plants or animals.
Decontaminating	Using various cleaning methods, including rinsing or steaming the interior of a confined space, to remove hazardous substances.
Engulf	To be submerged by a substance such as water, grain, or earth, as it completely flows over and covers a person.
Entry And Exit Hazard	A type of general confined space hazard that exists when insufficient preparations have been made to assure that employees can exit a space quickly.
Entry Supervisor	The person most responsible for verifying that the confined space is as safe as possible to enter. The role of the entry supervisor is usually filled by the employer, foreman, or crew chief.
Environment	The factors that make up the surroundings in a given place. A confined-space environment includes air content and quality.

Fermenting	The interaction of yeast and sugar that produces alcohol and carbon dioxide. The process of winemaking involves fermentation.
Flammable Hazard	A type of atmospheric hazard that occurs when substances that are likely to catch fire are present. Both oxygen and dust are flammable hazards.
Frostbite	Damage to human tissue caused by exposure to extreme cold.
General Hazard	One of three types of confined space hazards. General hazards may be mechanical, communication, or entry and exit hazards.
Ground Fault Interrupter	An electrical safety device that disconnects power by breaking a circuit when surges of electricity are detected. GFI circuits are usually used around sources of water.
Harness	A form of PPE that consists of a series of straps connected around the legs, waist, and shoulders that is attached to a hoist and used to pull entrants out of confined spaces.
Heat Exhaustion	An illness brought on by exposure to high temperatures that is characterized by faintness, dizziness, and heavy sweating.
Heat Stroke	A life-threatening illness brought on by exposure to high temperatures. Heat stroke occurs when the body is unable to cool itself down.
Hoist	A device attached by a line to a harness used to pull entrants out of confined spaces.
Hot Work	Tasks such as welding, brazing, or cutting that produce heat.
Hypothermia	A rapid physical and mental collapse that occurs when the body is exposed to cold temperatures and is unable to warm itself.
Irritant Hazard	A type of atmospheric hazard that causes inflammation or irritation to the eyes, skin, or respiratory system. Chemical gases are a type of irritant.
Isolated	A machine component or feed line that has been physically or manually blocked or disconnected so that it cannot accidentally start up or allow the flow of substances.
Isolating	Physically or manually blocking or disconnecting a machine component or feed line so that it cannot accidentally start up or allow the flow of substances.
Limited-Access Confined Space	A confined space that has a very small opening for entry and exit. Sewers and silos are examples of limited-access confined spaces.
Lockout	A method of protecting employees from accidental machine startup through proper locking or blocking of machines that are undergoing maintenance.
Mechanical Hazard	A type of general confined space hazard that exists when electrical or mechanical equipment may be accidentally activated.
Noise	Any unwanted sound. Noise is a hearing hazard.
Occupational Safety And Health Administration	A government agency under the U.S. Dept. of Labor that helps employers reduce injuries, illnesses, and deaths in the workplace.
Open-Top Confined Space	A confined space, with or without a cover, that is open at the top. Open-top confined spaces usually have a depth that restricts the normal movement of air.
Permit-Required Confined Space	A confined space that contains at least one additional hazard, such as a hazardous atmosphere, that requires supervisor permission for entry. Permit spaces may be entered only by certified employees.
Permit-Required Confined Space Program	A written set of policies and procedures for entering permit-required spaces. OSHA requires every employer whose employees enter permit-required spaces to develop a written plan.
Personal Protective Equipment	Any example of various safety equipment that workers wear or use to prevent injury in the workplace. Safety glasses are common PPE.
Physical Hazard	A type of non-chemical confined space hazard that affects the body. The three types of physical hazards are temperature, noise, and vibration.
Primary Irritant	A type of atmospheric hazard that harms only the parts of the body that it touches and does not cause further injury or disease.

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Prohibited Condition	Any existing hazardous condition within a permit-required confined space. The prohibited condition may not have been listed on the entry permit, may be listed on the entry permit as having been removed, or may have been unknown at the time of entry.
Purging	The process of clearing the environment within a confined space. Purging may be accomplished by forcing air, water, or another substance into the space to push the hazardous substance out.
Record Keeping	Recording the details of the planned permit-entry process, as well as the results of entries and acquisition of necessary paperwork.
Rescue Team	Individuals trained in permit-required confined space entry and rescue.
Secondary Irritant	A type of atmospheric hazard that harms the parts of the body that it touches and also causes further injury or disease.
Sewer	A pipe that carries waste water, such as sewage or runoff from rain.
Silo	A tall, cylindrical structure often used for storing grain.
Storage Tank	A large container made of plastic or metal used to hold liquid or powdered substances.
Systemic Effect	A hazard that affects the whole body. Systemic hazards may cause symptoms in one or two areas, such as the skin or lungs, but the whole body is affected.
Tagout	A method of protecting employees from accidental machine startup through labeling. Warning tags are placed on the switches or sources of power of machines that are undergoing maintenance
Toxic Hazard	A type of atmospheric hazard that can be poisonous or harmful. Gases and dusts may be toxic if inhaled.
Ventilation	To allow or cause the movement of fresh air into a confined space.
Vibration	The fast, back-and-forth movement of an object. Vibration is a physical hazard.
Voltage	A measure of electrical pressure. Human contact with high-voltage electricity is usually fatal.