# Confined Spaces

## Standard

- Confined Spaces in Construction
  - Subpart AA
  - 29 CFR 1926.1200

## Exceptions

- Does not apply to : Excavations, Underground Construction (Subpart S), Diving

## Confined Space

- Confined space:
- Large enough that employee can enter & perform assigned work
- Has limited or restricted means for entry or exit.
- Is not designed for continuous employee occupancy

## Permit-Required Confined Space

- Has 1 or more of following characteristics:
  - Contains or has potential to contain hazardous atmosphere
  - Contains material that has potential for engulfing entrant
  - Internal configuration that could trap entrant
  - Any other recognized safety hazard

## Examples

## Characteristics

- Internal configuration
  - Open - no obstacles, barriers or obstructions within space (i.e. water tank)
  - Obstructed - permit space contains some type of obstruction that rescuer would need to maneuver around, such as baffle or mixing blade
    - Large equipment, such as ladder or scaffold brought into space for work purposes, would be considered obstruction if positioning or size of equipment would make rescue more difficult

## Characteristics

- Elevation
  - Elevated - permit space where entrance portal or opening is above grade ≥ 4 ft
    - Requires knowledge of high angle rescue procedures because of difficulty in packaging & transporting patient to ground from portal
  - Non-elevated - permit space with entrance portal located ≤ 4 ft above grade
    - Allows rescue team to transport injured employee normally

## Characteristics

- Portal size
  - Restricted - portal ≤ 24” in least dimension
    - Too small to allow rescuer with SCBA to easily enter
    - Too small to allow normal spinal immobilization of injured employee
  - Unrestricted - portal ≥ 24” in least dimension
    - Allows relatively free movement into & out of permit space

## Characteristics

- Space access
  - Horizontal - portal located on side of space
    - Use of retrieval lines could be difficult
  - Vertical - portal located on top of space; rescuers must climb down, or at bottom of permit space, rescuers must climb up to enter space
    - May require knowledge of rope techniques or special patient packaging to safely retrieve downed entrant

## 29 CFR 1926.1200
## Permit-Required Confined Spaces

- Scope & application
- Definitions
- General requirements (to include dev. of written plan)
- Permit-required confined spaces
- Permit process
- Entry permit
- Training
- Duties of authorized entrants
- Duties of attendants
- Duties of entry supervisors
- Rescue & emergency services
- Employee participation

## Appendices

- Appendix A - Permit-Required Confined Space Decision Flow Chart
- Appendix B - Procedures for Atmospheric Testing
- Appendix C - Examples of Permit-Required Confined Space Programs
- Appendix D - Confined Space Pre-Entry Check List
- Appendix E - Sewer System Entry
- Appendix F - Rescue Team or Rescue Service Evaluation Criteria

## Definitions

- Attendant
  - Individual stationed space who monitors authorized entrants & performs all attendant's duties assigned in employer's permit space program

## Duties of Attendants

- Knows & understands hazards of entry
- Aware of possible behavioral effects of hazard exposure in authorized entrants
- Continuously maintains count of authorized entrants
- Remains outside permit space during entry operations until relieved by another attendant

## Duties of Attendants

- Communicates with authorized entrants
- Monitors activities inside & outside space
- Summons rescue & emergency services
- Performs non-entry rescues as specified by employer's rescue procedure
- Performs no duties that might interfere with primary duty to monitor & protect authorized entrants

## Definitions

- Authorized entrant
  - Employee authorized by employer to enter permit space

## Duties of Authorized Entrants

- Familiar with & understand hazards of entry, including type, signs or symptoms & consequences of exposure
- Properly use equipment as required by paragraph (d)(4)
- Communicate with attendant as necessary & enable attendant to alert entrants of need to evacuate space as required by paragraph (i)(6)

## Duties of Authorized Entrants

- Alert attendant whenever:
  - Entrant recognizes any warning sign or symptom of exposure to dangerous situation
  - Entrant detects prohibited condition

# Duties of Authorized Entrants

- Exit from permit space when…
  - Directed by attendant or entry supervisor
  - Any warning sign or symptom of exposure to a dangerous situation is detected
  - A prohibited condition is detected
  - Evacuation alarm activated

# Definitions

- Engulfment
  - Person is captured by liquid or finely divided (flowable) solid substance that can be aspirated to cause death by filling or plugging respiratory system
  - Material exerts enough force on body to cause death by strangulation, constriction or crushing

# Definitions

- Entry
  - Action by which person passes through opening into permit-required confined space
  - Occurs as soon as *any* part of entrant's body breaks plane of opening into space

# Definitions

- Entry Supervisor
  - Person (employer, foreman or crew chief) responsible for determining if acceptable entry conditions are present at permit space where entry is planned, for authorizing entry & overseeing entry operations & for terminating entry
  - Note: entry supervisor *may* serve as attendant or authorized entrant, as long as that person is trained & equipped as required for each role filled
    - Duties of entry supervisor may be passed from one individual to another during entry operations

# Duties of Entry Supervisor

- Knows & understands hazards of entry, including type, signs or symptoms & consequences of exposure
- Verifies, by checking permit, all tests specified by permit have been conducted & all procedures & equipment specified are in place before endorsing permit & allowing entry to begin
- Terminates entry & cancels permit as required by paragraph (e)(5)

## Duties of Entry Supervisor

- Verifies that rescue services are available & means for summoning are operable
- Removes unauthorized individuals who enter or attempt to enter permit space during entry operations
- Determines that entry operations remain consistent with terms of entry permit & acceptable entry conditions are maintained

## Definitions

- Hazardous atmosphere
  - Atmosphere that may expose employees to risk of death, incapacitation, impairment of ability to self-rescue, injury or acute illness from 1 or more following causes:
    - Flammable gas, vapor or mist in excess of 10% of Lower Flammable Limit (LFL)
  - Airborne combustible dust at concentration that meets or exceeds LFL
    - Note: concentration may be approximated as condition in which dust obscures vision at distance of 5 ft or less

# Definitions

- Hazardous atmosphere
  - Atmospheric oxygen concentration <19.5% or >23.5%
  - Atmospheric concentration of any substance which could result in employee exposure in excess of dose or PEL
    - Note: atmospheric concentration of any substance not capable of causing death, incapacitation, impairment of ability to self-rescue, injury or acute illness due to health effects is not covered

# Definitions

- Hazardous atmosphere
  - Any other atmospheric condition that is IDLH
    - Note: for air contaminants which OSHA has no dose or PEL, other sources of information, such as SDSs that comply with 29 CFR 1910.1200, published information & internal documents can provide guidance in establishing acceptable atmospheric conditions

## Definitions

- Immediately Dangerous to Life and Health (IDLH)
  - Condition that poses immediate or delayed threat to life or cause irreversible adverse health effects or interfere with individual's ability to escape unaided from permit space

## Definitions

- Isolation
  - Process by which permit space is removed from service & completely protected against release of energy & material into space by such means as: blanking or blinding; misaligning or removing sections of lines, pipes or ducts; double block & bleed system; lockout or tagout of all sources of energy; or blocking or disconnecting all mechanical linkages

## Definitions

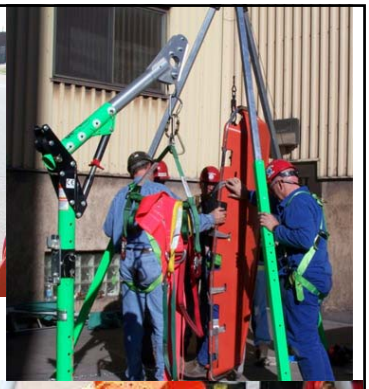
- Line breaking
  - Intentional opening of pipe, line or duct that is or has been carrying flammable, corrosive or toxic material, inert gas or any fluid at volume, pressure or temperature capable of causing injury

# Definitions

- Rescue service
  - Personnel designated to rescue employees from permit spaces
- Note: rescue personnel may be industry emergency personnel, outside rescue service or combination of teams

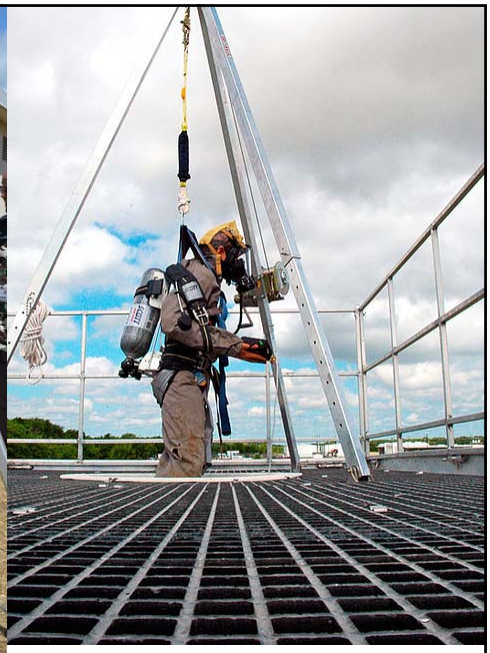

# Rescue & Emergency Services

- Rescue & emergency services
  - Employer who designates rescue & emergency services, must:
    - Evaluate rescuer's ability to respond to rescue summons in timely manner, considering hazards identified
    - Select a rescue team that can respond in an appropriate time frame, is equipped & trained to do rescues, agrees to notify employer if they are unavailable



## Definitions

- Retrieval system
  - Equipment (including retrieval line, chest or full-body harness, & lifting device or anchor) used for non-entry rescue of persons from permit spaces

# Definitions


- Testing
  - Process by which hazards that may confront entrants are identified & evaluated
  - Testing includes specifying tests to be performed in permit space
    - Note: testing enables employers to devise & implement adequate control measures for protection of authorized entrants & determine if acceptable entry conditions are present immediately prior to & during entry

# Testing Protocol

- Before employee enters space, internal atmosphere shall be tested, with calibrated direct-reading instrument, for following conditions in order given
  - Oxygen content
  - Flammable gases & vapors
  - Potential toxic air contaminants

Test in that order!

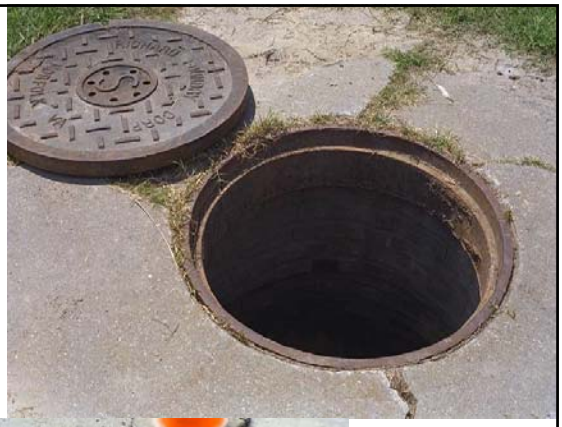
1. Oxygen (Range = 19.5 to 23.5%)
2. Combustible gases and vapors Measured by Lower Explosive Limit (LEL)
3. Toxic gases and vapors: Permissible Exposure Limit (PEL)

# Other Hazards


- Unstable or dangerous work surfaces
- Falling objects
- Insects or animals
- Biological

PRCS Signage


**CONFINED SPACE**
**— KEEP OUT —**
**UNLESS AUTHORIZED**




DANGER
CONFINED SPACE
ENTRY PERMIT
REQUIRED
CALL YOUR
SUPERVISOR


## PRCS Written Plan Outline

- Introduction - company policy
- Definitions
- Identification of confined spaces
- Notification & warning
- Hazard identification
- Equipment for entry & rescue
- Evaluation of confined spaces
- Permits
- Authorized entrants
- Authorized attendants

## PRCS Written Plan Outline

- Entry supervisors
- Entry procedures
- Communications procedures
- Rescue procedures
- Closure procedures
- Coordination of work with contractors
- Program review & update (required annually)
- Training requirements & documentation

## Entry Permits

- Permit space to be entered
- Purpose of entry
- Date & authorized duration of permit
- Authorized entrants
- Authorized attendants
- Name & signature of entry supervisor
- Hazards of permit space to be entered
- Isolation of hazard control measures
- Acceptable entry conditions
- Results of initial & periodic atmospheric monitoring
- Rescue & emergency services
- Communications procedures
- Equipment required for entry & rescue operations
- Other necessary information & other required permits

# Sample Confined Space Entry Permits

## CONFINED SPACE ENTRY PERMIT Sample 1

| | | |
|---|---|---|
| Date: | | |
| Site location or description: | | |
| Purpose of entry:<br>_____<br>_____ | | |
| Supervisor(s) in charge of crews: | Type of crew (welding, plumbing, etc) | Phone #: |
| | | |
| | | |
| Permit duration: | | |
| Communication procedures (including equipment):<br>_____<br>_____ | | |
| Rescue procedures (also see emergency contact phone numbers at end of form):<br>_____<br>_____ | | |

| **REQUIREMENTS COMPLETED (Put N/A if item doesn't apply)** | **DATE** | **TIME** | **REQUIREMENTS COMPLETED (Put N/A if item doesn't apply)** | **DATE** | **TIME** |
|---|---|---|---|---|---|
| Lockout/De-energize/Try-out | | | Supplied Air Respirator (N/A if alternate entry) | | |
| Line(s) Broken-Capped-Blank | | | Respirator(s) (Air Purifying) | | |
| Purge-Flush and Vent | | | Protective Clothing | | |
| Ventilation | | | Full Body Harness w/ "D" ring | | |
| Secure Area (Post and Flag) | | | Emergency Escape Retrieval Equip | | |
| Lighting (Explosive Proof) | | | Lifelines | | |
| Hotwork Permit | | | Standby safety personnel (N/A if alternate entry) | | |
| Fire Extinguishers | | | Resuscitator—Inhalator (N/A if alternate entry) | | |

**Add other specific information, if needed, or attach additional instructions or requirements. See the following examples in bold print.**

| | | | |
|---|---|---|---|
| **Line(s) to be bled/blanked:** | | | |
| **Ventilation equipment:** | | | |
| **PPE clothing:** | | | |
| **Respirator(s):** | | | |
| **Fire extinguisher(s):** | | | |
| **Emergency retrieval equipment:** | | | |

# CONFINED SPACE ENTRY PERMIT
## Sample 1 (continued)

| AIR MONITORING | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Substance Monitored** | | **Permissible Levels** | | **Monitoring Results** | | | | | | |
| Time monitored (put time)<br>Percent Oxygen | | Record the time<br>19.5% to 23.5% | | | | | | | | |
| LEL/LFL | | Under 10% | | | | | | | | |
| Toxic 1: | | _____ PEL | ____STEL | | | | | | | |
| Toxic 2: | | _____ PEL | ____STEL | | | | | | | |
| Toxic 3: | | _____ PEL | ____STEL | | | | | | | |
| Toxic 4: | | _____ PEL | ____STEL | | | | | | | |
| | | | | | | | | | | |

**REMARKS:**

_____

_____

| Air Tester Name | ID# | Instrument(s) Used<br>(For example: oxygen meter, combustible gas indicator, etc.) | Model # or Type | Serial# or Unit |
|---|---|---|---|---|
| | | | | |
| | | | | |

**ATTENDANTS AND ENTRANTS**

| Attendant(s)<br>(Required for all confined space work except alternate entry) | ID# | Confined Space Entrant(s) | ID# |
|---|---|---|---|
| | | | |
| | | | |

**REMARKS**:

_____

_____

**SUPERVISOR AUTHORIZATION - ALL CONDITIONS SATISFIED**

Department or phone number: _____

**EMERGENCY CONTACT PHONE NUMBERS:**

AMBULANCE: _____ FIRE: _____ SAFETY: _____ RESCUE TEAM: _____ OTHER: _____

**CONFINED SPACE ENTRY PERMIT**
**Sample 2**

Date and time issued:

Job site/space I.D.:

Equipment to be worked on:

Standby personnel:

Date and time expires:

Job supervisor:

Work to be performed:

1. Atmospheric Checks: Time: _____

Oxygen _____%

Explosives _____%L.F.M.

Toxic _____ PPM

2. Tester's signature: _____

3. Source isolation (No Entry):

| | N/A | Yes | No |
|---|---|---|---|
| Pumps or lines blinded, disconnected, or blocked: | ❑ | ❑ | ❑ |

4. Ventilation modification:

| | N/A | Yes | No |
|---|---|---|---|
| Mechanical: | ❑ | ❑ | ❑ |
| Natural Ventilation only: | ❑ | ❑ | ❑ |

5. Atmospheric check after isolation and ventilation:

Oxygen: _____% >19.5%

Explosive: _____% L.F.M. <10%

Toxic: _____PPM <10PPM $H_2S$

Time: _____

Tester's signature: _____

6. Communication procedures:

_____

_____

## CONFINED SPACE ENTRY PERMIT
## Sample 2 (continued)

7. Rescue procedures:

_____

_____

| 8. Entry standby and backup persons successfully completed required training? | Yes ❑ | No ❑ |
|---|---|---|
| Is it current? | ❑ | ❑ |

| 9. Equipment: | N/A | Yes | No |
|---|---|---|---|
| Direct reading gas monitor-tested: | ❑ | ❑ | ❑ |
| Safety harnesses and lifelines for entry and standby persons: | ❑ | ❑ | ❑ |
| Hoisting equipment: | ❑ | ❑ | ❑ |
| Powered communications: | ❑ | ❑ | ❑ |
| SCBA's for entry and standby persons: | ❑ | ❑ | ❑ |
| Protective clothing: | ❑ | ❑ | ❑ |
| All electric equipment listed: Class I, Division I, Group D and non-sparking tools | ❑ | ❑ | ❑ |

10. Periodic atmospheric tests:

| | | | | | |
|---|---|---|---|---|---|
| Oxygen | _____% | Time _____ | Oxygen | _____% | Time _____ |
| Oxygen | _____% | Time _____ | Oxygen | _____% | Time _____ |
| Explosive | _____% | Time _____ | Explosive | _____% | Time _____ |
| Explosive | _____% | Time _____ | Explosive | _____% | Time _____ |
| Toxic | _____% | Time _____ | Toxic | _____% | Time _____ |
| Toxic | _____% | Time _____ | Toxic | _____% | Time _____ |

We have review the work authorized by this permit and the information contained here. Written instruction and safety procedures have been received and are understood. Entry cannot be approved if any squares are marked in the "No" column. This permit not valid unless all appropriate items are completed.

Permit prepared by: _____
Entry Supervisor

Approved by: _____
Unit Supervisor

Review by: _____
Operations Manager

**This permit is to be kept at the job site. Return this job site copy to the unit supervisor following job completion.**

| Entrants Name | Sign in | Sign out | Sign in | Sign out |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |

# CONFINED SPACE ENTRY PERMIT

## Sample 3

| PERMIT VALID FOR 8 HOURS ONLY. ALL PERMIT COPIES MUST REMAIN AT THE SITE UNTIL JOB IS COMPLETED. | | |
|---|---|---|
| Date: | Site location /description: | |
| Purpose of entry: | | |
| Supervisor (s) in charge of crews | Type of Crew | Telephone # |

Communication procedures:

_____

_____

Rescue procedures (telephone number at bottom):

_____

_____

**BOLD INDICATES MINIMUM REQUIREMENTS TO COMPLETE AND REVIEW PRIOR TO ENTRY**
**Note: For Items that do not apply, enter N/A in the blank.**

| REQUIREMENTS COMPLETED | DATE | TIME | REQUIREMENTS COMPLETED | DATE | TIME |
|---|---|---|---|---|---|
| **Lockout/De-energize/Tagout** | | | **Full Body Harness w/"D" Ring** | | |
| **Line(s) Broken-Capped-Blank** | | | **Emergency Escape Retrieval Equipment** | | |
| **Purge-Flush and Vent** | | | **Lifelines** | | |
| **Ventilation** | | | Fire Extinguishers | | |
| **Secure Area (Post and Flag)** | | | Lighting (Explosive proof) | | |
| **Breathing Apparatus** | | | Protective Clothing | | |
| **Resuscitator - Inhalator** | | | Respirator(s) (Air Purifying) | | |
| **Standby Safety Personnel** | | | Burning and Welding Permit | | |

**Continuous Monitoring**: ❑ Yes ❑ No

**Periodic Monitoring Frequency**: _____

| Test(s) | Permissible entry level |
|---|---|
| Percent of oxygen | 19.5% TO 23.5% |
| Lower flammable limit | Under 10% |
| Carbon monoxide | +35 PPM |
| Aromatic Hydrocarbon | +1 PPM *5 PPM |
| Hydrogen Cyanide | (Skin) *4 PPM |
| Hydrogen Sulfide | +10 PPM *15 PPM |
| Sulfur Dioxide | +2 PPM *5 PPM |
| Ammonia | * 35 PPM |

***** Short-term exposure limit: Employees can work in the area up to 15 minutes.

**+** 8 hour Time Weighted Average: Employees can work in the area 8 hours (longer with appropriate respiratory protection).

**REMARKS:** _____

_____

## CONFINED SPACE ENTRY PERMIT
## Sample 3 (continued)

GAS TESTER NAME & CHECK #: _____

INSTRUCTIONS USED: _____

MODEL &/OR TYPE: _____

SERIAL &/OR UNIT #: _____

**SAFETY STANDBY IS REQUIRED FOR ALL CONFINED SPACE WORK**

| SAFETY STANDBY PERSON(S) | CHECK# |
|---|---|
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |

| CONFINED SPACE ENTRANT(S) | CHECK # |
|---|---|
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |

**SUPERVISOR AUTHORIZATION - ALL CONDITIONS SATISFIED:**

Department or phone number: _____

**EMERGENCY CONTACT PHONE NUMBERS:**

Ambulance: _____

Fire: _____

Safety: _____

Gas coordinator: _____

OSHA® FactSheet

# Confined Spaces in Construction: Pits

**Confined spaces can present conditions that are immediately dangerous to workers if not properly identified, evaluated, tested, and controlled. This fact sheet highlights many of the confined space hazards associated with pits and how employers can protect their workers in these environments.**

OSHA has developed a new construction standard for Confined Spaces (29 CFR 1926 Subpart AA)— any space that meets the following three criteria:

- Is large enough for a worker to enter it;
- Has limited means of entry or exit; and
- Is not designed for continuous occupancy.

A space may also be a **permit-required confined space** if it has a hazardous atmosphere, the potential for engulfment or suffocation, a layout that might trap a worker through converging walls or a sloped floor, or any other serious safety or health hazard.

## Fatal Incidents

Confined space hazards in pits have led to worker deaths. Several tragic incidents included:

- Two workers suffocated while attempting to close gate valves in a valve pit.
- A worker lost consciousness, fell, and was killed while climbing down a ladder into an unventilated underground valve vault to turn on water valves.
- While replacing a steam-operated vertical pump, an equipment repair technician died from burns and suffocation after falling into an industrial waste pit.

## Training

The new Confined Spaces standard requires employers to ensure that their workers know about the existence, location, and dangers posed by each permit-required confined space, and that they may not enter such spaces without authorization.

Employers must train workers involved in permit-required confined space operations so that they can perform their duties safely and understand the hazards in permit spaces and the methods used to isolate, control or protect workers from these hazards. Workers not authorized to perform entry rescues must be trained on the dangers of attempting such rescues.

## Safe Entry Requirements

The new Confined Spaces standard includes several requirements for safe entry.

**Preparation:** Before workers can enter a confined space, employers must provide pre-entry planning. This includes:

- Having a competent person evaluate the work site for the presence of confined spaces, including permit-required confined spaces.
- Once the space is classified as a permit-required confined space, identifying the means of entry and exit, proper ventilation methods, and elimination or control of all potential hazards in the space.
- Ensuring that the air in a confined space is tested, before workers enter, for oxygen levels, flammable and toxic substances, and stratified atmospheres.
- If a permit is required for the space, removing or controlling hazards in the space and determining rescue procedures and necessary equipment.
- If the air in a space is not safe for workers, ventilating or using whatever controls or protections are necessary so that employees can safely work in the space.

**Ongoing practices:** After pre-entry planning, employers must ensure that the space is monitored for hazards, especially atmospheric hazards. Effective communication is important because there can be multiple contractors operating on a site, each with its own workers

needing to enter the confined space. Attendants outside confined spaces must make sure that unauthorized workers do not enter them. Rescue attempts by untrained personnel can lead to multiple deaths.

## Confined Spaces in Pits

Even though a pit is typically open on top and over 4 feet deep, it can still be a confined space or permit-required confined space. Additionally, pits can be completely underground or below grade, such as a utility vault within a sewer system or a pit within a pit in a wastewater treatment plant.

Pits are found in many environments. Examples include sump pits, valve pits or vaults (e.g., wastewater treatment plants, municipal water systems), electrical pits/vaults, steam pits/vaults, vehicle service/garage pits, elevator pits, dock leveler pits, industrial chemical waste pits, and many more. Many of these spaces qualify as permit-required confined spaces.

Employers must take all necessary steps to keep workers safe in confined spaces, including following the OSHA Construction Confined Spaces standard. This standard applies to both new construction in a pit and alterations and/or upgrades. Among the pit-related tasks covered by the standard are:

- Opening or closing valves during renovation work.
- Installing or upgrading pump equipment, cables, or junction boxes.

Construction work can create confined spaces, even if there are none at the start of a project. Changes to the entry/exit, the ease of exit, and air flow could produce a confined space or cause one to become permit-required.

**Personal protective equipment:** Employers should assess the worksite to determine what personal protective equipment (PPE) is needed to protect workers. Employers should provide workers with the required PPE and proper training on its use and about any related hazards before the work starts.

## How to Contact OSHA

For questions or to get information or advice, to find out how to contact OSHA's free on-site consultation program, order publications, report a fatality or severe injury, or to file a confidential complaint, visit www.osha.gov or call 1-800-321-OSHA (6742).

## Additional Information

OSHA's Confined Spaces in Construction Standard (29 CFR 1926 Subpart AA)

Confined Spaces: OSHA Construction Industry Topics by Standard

OSHA Fact Sheet: Procedures for Atmospheric Testing in Confined Spaces

Confined Spaces: NIOSH Workplace Safety and Health Topics Page

State Plan Guidance: States with OSHA-approved state plans may have additional requirements for confined space safety.

Help for Small and Medium-Sized Employers: OSHA's On-site Consultation Program offers free and confidential advice to businesses nationwide.



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OSHA® FactSheet

# Confined Spaces in Construction: Sewer Systems

**Confined spaces can present conditions that are immediately dangerous to workers if such conditions are not properly identified, evaluated, tested, and controlled. This fact sheet highlights many of the confined space hazards associated with sewer systems and how employers can protect workers in these environments.**

OSHA has developed a new construction standard for Confined Spaces (29 CFR 1926 Subpart AA)—any space that meets the following three criteria:

- Is large enough for a worker to enter it;
- Has limited means of entry or exit; and
- Is not designed for continuous occupancy.

A space may also be a **permit-required** confined space if it has a hazardous atmosphere, the potential for engulfment or suffocation, a layout that might trap a worker through converging walls or a sloped floor, or any other serious safety or health hazard.

## Fatal Incidents

Confined space hazards in sewer systems have led to worker deaths. Several tragic incidents in sewers have included:

- A worker who lost consciousness and died when he climbed into a sewer vault to retrieve a tool. His co-worker also died when he attempted a rescue.
- While repairing a natural gas leak, a worker entered a drainage pipe to retrieve survey equipment. The natural gas ignited, killing the worker.

## Training

The new Confined Spaces standard requires employers to ensure that their workers know about the existence, location, and dangers posed by each permit-required confined space, and that they may not enter such spaces without authorization.

Employers must train workers involved in permit-required confined space operations so that they can perform their duties safely and understand the hazards in permit spaces and the methods used to isolate, control or protect workers. Workers not authorized to perform entry rescues must be trained on the dangers of attempting such rescues.

## Safe Entry Requirements

The new Confined Spaces standard includes several requirements for safe entry.

**Preparation:** Before workers can enter a confined space, employers must provide pre-entry planning. This includes:

- Having a competent person evaluate the work site for the presence of confined spaces, including permit-required confined spaces.
- Once the space is classified as a permit-required confined space, identifying the means of entry and exit, proper ventilation methods, and elimination or control of all potential hazards in the space.
- Ensuring that the air in a confined space is tested, before workers enter, for oxygen levels, flammable and toxic substances, and stratified atmospheres.
- If a permit is required for the space, removing or controlling hazards in the space and determining rescue procedures and necessary equipment.
- If the air in a space is not safe for workers, ventilating or using whatever controls or protections are necessary so that employees can safely work in the space.

**Ongoing practices:** After pre-entry planning, employers must ensure that the space is monitored for hazards, especially atmospheric hazards. Effective communication is important because there can be multiple contractors operating on a site, each with its own workers needing to enter the confined space. Attendants outside confined spaces must make sure that unauthorized workers do not enter them. Rescue attempts by untrained personnel can lead to multiple deaths.

## Confined Spaces in Sewer Systems

Types of sewer systems include sanitary (domestic sewage), storm (runoff), and combined (domestic sewage and runoff). Sewer systems are extensive

and include many different components that are considered confined spaces, including pipelines, manholes, wet wells, dry well vaults, and lift/pump stations. Therefore, employers conducting work in sewer systems will likely have workers who will encounter confined spaces.

Sewer systems also consist of wastewater treatment plants, where confined spaces include digestion and sedimentation tanks, floating covers over tanks, sodium hypochlorite tanks, and wastewater holding tanks, among others. Many of these components may also qualify as permit-required confined spaces.

Employers must take all necessary steps to keep workers safe in confined spaces, including following the OSHA Construction Confined Spaces standard. This standard applies to both new construction within an existing sewer and alterations and/or upgrades. For example:

- Installing or upgrading a manhole.
- Altering or upgrading sewer lines.
- Making nonstructural upgrades to joints, pipes, or manholes.
- Demolition work.
- Installing new or upgraded pump equipment, cables, wires, or junction boxes.

Construction work can create confined spaces, even if there are none at the start of a project. Changes to the entry/exit, the ease of exit, and air flow could produce a confined space or cause one to become confined or permit-required.

## Hazards Associated with Sewer Systems

Sewer systems can present a host of confined space hazards, including:

- Atmospheric hazards (low oxygen, toxic or flammable gases).
- Chemicals in piping and from roadway runoff (may harm lungs, skin, or eyes).
- Engulfment and drowning.
- Electrocution (e.g., using electrical equipment in wet working conditions).
- Slips, trips, and falls.
- Falling objects.
- High noise levels, low visibility, limits to communication, and long distances to exits.

**Personal protective equipment:** Employers should assess the work site to determine what personal protective equipment (PPE) is needed to protect workers. Employers should provide workers with the required PPE and proper training on its use and about any related hazards before the work starts.

## How to Contact OSHA

For questions or to get information or advice, to find out how to contact OSHA's free on-site consultation program, order publications, report a fatality or severe injury, or to file a confidential complaint, visit www.osha.gov or call 1-800-321-OSHA (6742).

## Additional Information

OSHA's Confined Spaces in Construction standard (29 CFR 1926 Subpart AA)

Confined Spaces: OSHA Construction Industry Topics by Standard

OSHA Fact Sheet: Procedures for Atmospheric Testing in Confined Spaces

Confined Spaces: NIOSH Workplace Safety and Health Topics Page

State Plan Guidance: States with OSHA-approved state plans may have additional requirements for confined space safety.

Help for Small and Medium-Sized Employers: OSHA's On-site Consultation Program offers free and confidential advice to businesses nationwide.



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OSHA® FactSheet

# Is 911 your Confined Space Rescue Plan?

**Permit-required confined spaces can present conditions that are immediately dangerous to workers' lives or health if not properly identified, evaluated, tested and controlled.**

OSHA has developed a standard for Confined Spaces in Construction (29 CFR 1926 Subpart AA) for any space that meets all of the following criteria:

- Is large enough for a worker to enter;
- Has limited means of entry or exit; and
- Is not designed for continuous occupancy.

One provision of the standard requires employers to develop and implement procedures for summoning rescue or emergency services in permit-required confined spaces. An employer who relies on local emergency services for assistance is required to meet the requirements of §1926.1211 — *Rescue and emergency services*.

OSHA recognizes that not all rescue services or emergency responders are trained and equipped to conduct confined space rescues. When employers identify an off-site rescue service, it is critical that the rescuers can protect their employees. The emergency services should be familiar with the exact site location, types of permit-required confined spaces and the necessary rescue equipment.

## For Employers

Calling emergency responders to provide rescue services can be a suitable way of providing for rescues in a permit-required confined space. Pre-planning will ensure that the emergency service is capable, available and prepared.

Prior to the start of the rescue work operation, employers must evaluate prospective emergency responders and select one that has:

- Adequate equipment for rescues, such as: atmospheric monitors, fall protection, extraction equipment, and self-contained breathing apparatus (SCBA) for the particular permit-required confined spaces.

Photo: Oregon OSHA

*Emergency service workers perform a practice rescue inside a manhole.*

- The ability to respond and conduct a rescue in a timely manner based on the site conditions and is capable of conducting a rescue if faced with potential hazards specific to the space. Such hazards may include:
  - Atmospheric hazards (e.g., flammable vapors, low oxygen)
  - Electrocution (e.g., unprotected, energized wires)
  - Flooding or engulfment potential
  - Poor lighting
  - Fall hazards
  - Chemical hazards
- Agreed to notify the employer in the event that the rescue team becomes unavailable.

Employers must also:

- Inform the emergency responders of potential hazards when they are called to perform a rescue at the worksite; and

- Provide emergency responders with access to all permit-required confined spaces. Such access may include:
  - Information on access routes, gates or landmarks
  - A project site plan if necessary
  - GPS coordinates if in a remote location

Additionally, employers should ensure that:

- The most efficient means to contact emergency responders is available;
- Any changes to the project site conditions are communicated to the rescue service; and
- Emergency responders are willing to visit the site and conduct a joint training exercise with the employer.

## For Emergency Service Providers

Permit-required confined space emergencies can threaten workers' safety and health. Talking with the employer about the hazards they might encounter will assist in preparing for the situation. The following are some questions responders should be able to answer when an employer requests their services:

- Are you able to respond and conduct a rescue in a timely manner based on the site conditions?
- Do you have the appropriate equipment for response and rescue, such as: atmospheric monitors, fall protection, extraction equipment, and self-contained breathing apparatus (SCBA) for the particular permit-required confined spaces?
- Are you prepared for the hazards the employer has identified?
  - Atmospheric hazards (e.g., flammable vapors, low oxygen)
  - Electrocution (e.g., unprotected, energized wires)
  - Flooding or engulfment potential
  - Poor lighting
  - Fall hazards
  - Chemical hazards
- Are you trained for the hazards identified by the employer?
  - Hazard Communication training (HAZCOM)
  - Respiratory Protection training
  - Hazardous Material training
  - HAZWOPER training
  - Hazard recognition
  - Can you cope with other hazards the company may have identified on the site?
  - Do you need to develop a new procedure for these hazards/conditions?
- Has the employer provided you with the **exact** location of the work site?
  - Information on access routes, gates or landmarks
  - A project site plan if necessary
  - GPS coordinates if in a remote location
- Can you visit the site and hold a practice rescue?
- Does the company know the best way to contact you?
- How would the company communicate any changes to site conditions throughout the project?
- Could other emergencies or group training preclude you from responding and how will that be communicated?

OSHA encourages all emergency service providers to work closely with employers who request their services for permit-required confined space rescues. Pre-rescue planning, communication, and effective coordination of rescue activities are critical in the event that a life-threatening incident should occur.

Private sector commercial emergency service providers are covered by Federal OSHA and must comply with the provisions of §1926.1211. Similarly, state and local government emergency service providers in a state with an OSHA approved state plan must comply with these requirements. See www.osha.gov/dcsp/osp for information on state-plan requirements.

For more information on confined spaces in construction, visit OSHA's website at: www.osha.gov/confinedspaces.

## Workers' Rights

Workers have the right to:

- Working conditions that do not pose a risk of serious harm.
- Receive information and training (in a language and vocabulary the worker understands) about workplace hazards, methods to prevent them, and the OSHA standards that apply to their workplace.
- Review records of work-related injuries and illnesses.
- File a complaint asking OSHA to inspect their workplace if they believe there is a serious hazard or that their employer is not following OSHA's rules. OSHA will keep all identities confidential.
- Exercise their rights under the law without retaliation, including reporting an injury or raising health and safety concerns with their employer or OSHA. If a worker has been retaliated against for using their rights, they must file a complaint with OSHA as soon as possible, but no later than 30 days.

For more information, see OSHA's Workers page.

## How to Contact OSHA

For questions or to get information or advice, to report an emergency, fatality, inpatient hospitalization, amputation, or loss of an eye, or to file a confidential complaint, contact your nearest OSHA office, visit www.osha.gov or call OSHA at 1-800-321-OSHA (6742), TTY 1-877-889-5627.

**This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory-impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.**

**For assistance, contact us. We can help. It's confidential.**

OSHA® Occupational Safety and Health Administration

**www.osha.gov (800) 321-OSHA (6742)**

U.S. Department of Labor

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