

Permit-Required Confined Space

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- Each year 1.6 million workers work in what is defined by OSHA as Confined Spaces. In general industry (1910), as a result of the operations, the American work force suffers an average 63 fatalities, 5930 lost workdays injuries, and 6950 non-lost workday injuries annually. Serious injury or death can result due to engulfment, electrocution, asphyxiation, or the accidental activation of machinery. It is estimated that 80% of these fatalities are due to hazardous atmospheric conditions.

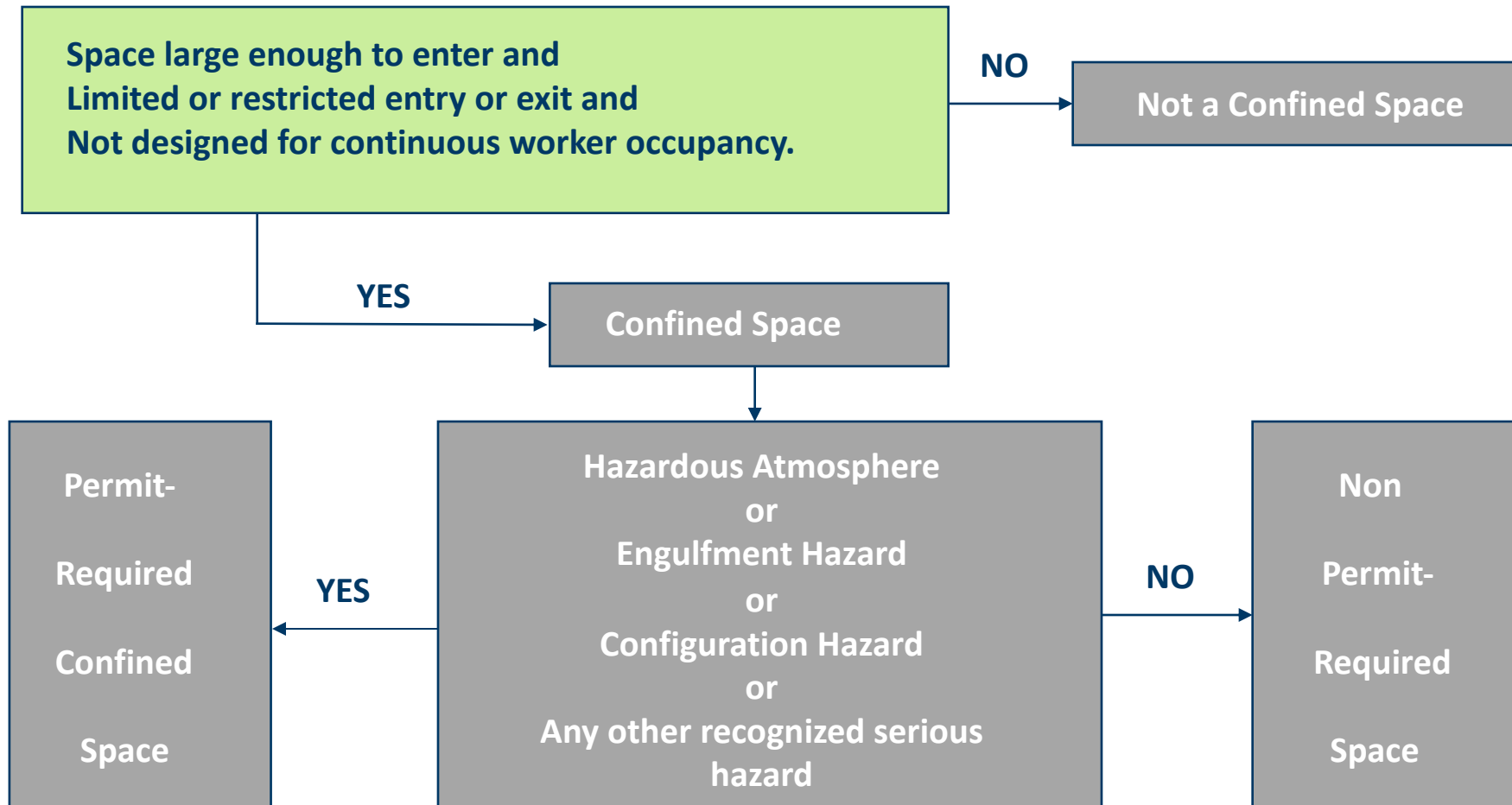


Permit-Required Confined Space

- Identify Confined Spaces
 - Large enough to enter with whole body; and
 - Limited or restricted means for entry or exit; and
 - Not designed for continuous worker occupancy.



Categorizing Work Space



Categorizing Work Space

- If a space is determined to be a Non-Permit-Required Confined Space then 29 CFR 1910.146 does not apply.
- The space should still be labeled as a confined space.



Categorizing Work Space

- If the space is determined to be a Permit-Required Confined Space then 29 CFR 1910.146 applies in General Industry.

Examples of Permit Required Confined Spaces:

- Manholes going into sewers
- Grain Silos
- Tanks
- Crawl Spaces

General Requirements 1910.146(c)

- If permit-required confined spaces exist in the workplace, the employer must inform exposed employees:

- Signs



...or other effective means

General Requirements 1910.146(c)

- If the employer decides that employees will not enter a permit space, then measures to prevent employee access must be taken.
 - Signs
 - Permanently closing the space
 - Barricades
 - Training



General Requirements 1910.146(c)

- If employees are to enter permit spaces, the employer must develop a written permit space program to properly manage the entry.
- The program shall be made available to employees or their representatives.
- The written program will outline the necessary procedures for safe entry into a permit space.



Written PRCs Program 1910.146(d)

- Develop and implement a system for the preparation, issuance, use, and cancellation of entry permits
- Develop and implement procedures for summoning rescue and emergency services.
- Develop and implement procedures for concluding an entry.
- Develop and implement procedures to coordinate entries when contractors are working with employees.

Written PRCs Program 1910.146(d)

Develop and implement the means, procedures, and practices necessary for safe entry.

Specifying acceptable entry conditions

Isolating the space

Purging, inerting, flushing or ventilating the space as necessary to eliminate hazards

Providing barriers as necessary to protect entrants/pedestrians

Verifying that conditions are acceptable for entry



PHOTO: GENERAL EQUIPMENT

Written PRCs Program 1910.146(d)

- Provide, maintain, and ensure use of necessary equipment:
 - Testing and monitoring equipment
 - Ventilating equipment as needed
 - Communications equipment
 - PPE
 - Lighting equipment sufficient to work safely and exit the space quickly in an emergency
 - Barriers and shields as necessary

Written PRCs Program 1910.146(d)

- Provide, maintain and ensure use of necessary equipment (cont.):
 - Equipment, such as ladders, needed for safe ingress and egress
 - Rescue and emergency equipment as needed
 - Any other equipment needed for safe entry

Written PRCs Program 1910.146(d)

Test/evaluate conditions in the permit space before entry, to identify all hazards and conduct continuous or periodic monitoring as needed, during entry.



- Perform, in the following sequence, appropriate testing for atmospheric hazards:
 - (1) oxygen
 - (2) combustible gases/vapors
 - (3) toxic gases/vapors



Permit System 1910.146(e)

- A permit, verifying that pre-entry preparations have been completed and that the space is safe to enter, must be posted at entrances or otherwise made available to entrants before they enter a permit space.
- The permit must be completed and signed by the entry supervisor prior to entry.

Permit System 1910.146(e)

- An entry supervisor must terminate entry and cancel permits when an assignment has been completed or when new conditions exist.
- New conditions must be noted on the canceled permit and used in revising the permit space program.
- The canceled permit must be kept for at least one year so it can be evaluated, as part of the annual program review.

Entry Permits 1910.146(f)

- Name of the permit space.
- Purpose of the entry.
- The hazards of the space being entered.
- Safeguards to eliminate or control hazards.
- Testing results.
- The names of the authorized entrants, attendants, & entry supervisor.

Entry Permits 1910.146(f)

CONFINED SPACE ENTRY PERMIT

FRONT

PERMIT VALID FOR 8 HOURS ONLY. ALL PERMIT COPIES MUST REMAIN AT THE SITE UNTIL JOB IS COMPLETED.

Date:	Site location/description:
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Purpose of entry:

Supervisor(s) in charge of crews	Type of Crew	Telephone#
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Communication procedures:

Rescue procedures (telephone number on back):

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

Communication procedures:

Rescue procedures (telephone number on back):

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
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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

BACK

Gas tester name & check #:	Instructions used	Model and/or type:	Serial and/or unit #:

SAFETY STANDBY IS REQUIRED FOR ALL CONFINED SPACE WORK

Safety Standby Person(s)	Check#	Confined Space Entrant	Check#

SUPERVISOR AUTHORIZATION - ALL CONDITIONS SATISFIED:

Department or phone number: _____

EMERGENCY CONTACT PHONE NUMBERS:

Ambulance: _____

Fire: _____

Safety: _____

Gas coordinator: _____

Individual Responsibilities 1910.146(h) thru (j)

- Establish responsibilities to safely manage the entry:
 - Entry Supervisors
 - Attendants
 - Entrants



Entry Supervisor

- Know the hazards of the space, including information on the mode, signs or symptoms, and consequences of exposure.
- Verify that the permit is fully completed, that necessary monitoring, procedures, and equipment are in place before allowing entry.

Entry Supervisor is accountable for managing safe entry and work within a PRCS

Entry Supervisor

- Sign the permit when acceptable entry conditions have been established.
- Terminate entry and cancel permit(s) when entry operations are completed or new conditions exist.
- Take appropriate measures to remove unauthorized entrants.
- Verify availability of emergency rescue service

Attendant

- Provide at least one outside attendant for each authorized entry...
 - Monitor activities in the space
 - Notify of changes in conditions...
 - Notify emergency rescue personnel
 - Keep unauthorized out/away...
 - Notify supervisor of unauthorized entry
 - Perform no other activities that would interfere with primary duties...





Attendant

- Know the hazards of the space, including information on the mode, signs or symptoms, consequences of exposure, as well as any behavioral effects.
- Maintain communication and keep an accurate account of entrant's activities, within the permit space.
- Remain outside the permit space during entry operations, unless relieved by another authorized attendant.

- **Order evacuation of the permit space when:**
 - a prohibited condition exists
 - when a worker shows signs of physiological effects of hazardous exposure
 - when an emergency outside the permit space exists
 - when an attendant cannot effectively and safely perform required duties.

- Summon rescue and other services during an emergency.
- Perform non-entry rescues when specified by the employer's rescue procedure.
- If an attendant is also authorized to perform entry for emergency rescue, they must not enter until they have been relieved by another authorized attendant and are equipped with any necessary PPE and rescue equipment.

- An attendant must be assigned for each permit-space entered.
 - Attendants can watch more than one space with certain restrictions.
 - If attendant will watch more than one space, include in the permit how that person is expected to respond to emergencies in one or more spaces.

- Know the hazards of the space, including information on the signs, symptoms, and consequences of exposure.
- Properly use appropriate equipment .
- Maintain communication with attendant to enable attendant to monitor entrant's activities and alert them to evacuate, if necessary.



- Alert the attendant when a prohibited condition exists or when warning signs or symptoms of exposure exist.
- Exit from the permit space ASAP when recognized warning signs or symptoms of exposure exist, when a prohibited condition exists, or an evacuation alarm or order to evacuate is given.



Multi-employer work site 1910.146(c)(8)

- If a contractor has been hired to do work in a space, the host employer must coordinate with the contractor, to apprise the hazards and necessary precautions & procedures for entry.
- The contractor must follow a permit space program meeting the requirements of this standard
 - use their own permit-program, or
 - use the host-employer's permit program

Alternate Procedures 1910.146(c)(5)

- If employers can demonstrate with monitoring and inspection data, that the only hazard is an actual or potential hazardous atmosphere, which can be made safe for entry by the use of continuous forced air ventilation alone, then they may be exempt from requirements, such as permits and attendants.

Alternate Procedures 1910.146(c)(5)

- The employer must verify the space is safe for entry and that specified pre-entry measures have been taken.
- This shall be done through a **written certification** that contains the date, the location of the space, and the signature of the person providing the certification.
 - The certification shall be made before the entry and made available to all entrants (or their reps).

Alternate Procedures 1910.146(c)(5)

- Employees must not enter a space until forced air ventilation, using a clean air source, has controlled the hazard.

**An acute/IDLH hazard
cannot readily develop
if ventilation is disrupted.**



PHOTO: GENERAL EQUIPMENT

Alternate Procedures 1910.146(c)(5)

- The ventilation must be directed so that it provides maximum ventilation in the area where the work will be done.

Dilution Ventilation:

$$t = -V/Q \ln C2/C1$$

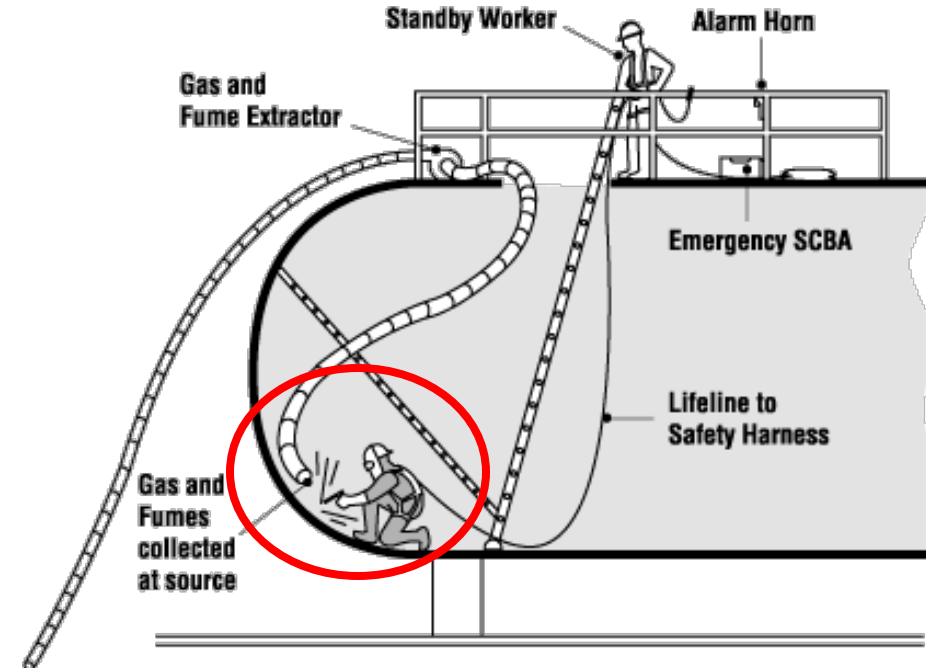
t = time required to reduce concentration from C1 to C2

V= volume of space in cubic feet

Q = ventilation flow rate in cfm (cubic feet per minute)

C2 = final concentration desired (in ppm)

C1 = initial concentration (in ppm)



Alternate Procedures 1910.146(c)(5)

- When verifying the hazardous atmosphere is controlled, the internal atmosphere of the space must be tested:
 - First for oxygen content,
 - Second for flammable gases/vapors, and
 - Third for potential toxic air contaminants, before any employee enters.
- Entrants, or their representatives, shall be allowed to observe the testing.

Alternate Procedures 1910.146(c)(5)

- The atmosphere in the space must be periodically tested and if a hazardous atmosphere is detected, all entrants must leave the space immediately, and the space re-evaluated.



Reclassification of Permit-required Confined Spaces 1910.146(c)(7)

- Re-classification from permit to non-permit required shall be documented, through a **written certification** that contains the date, the location of the space, and the signature of the person making the determination.
 - The certification shall be made available to each employee entering the space or their rep.
- If hazards arise during an entry, the space shall be evacuated and re-evaluated to determine if the space should be reclassified as a permit-required space.

Reclassification of Non-permit Confined Spaces 1910.146(c)(6)

- When there are changes in the use or configuration of a non-permit confined space that might increase the hazards to entrants, the employer shall re-evaluate it.
- If necessary, the space shall be re-classified as a permit-required confined space.

Training & Education

1910.146(g)

- Employer must provide training for all workers who are required to enter a permit space.
- Employees must demonstrate an understanding of the procedures and skills necessary for safe entry and performance of their duties, within a permit space.

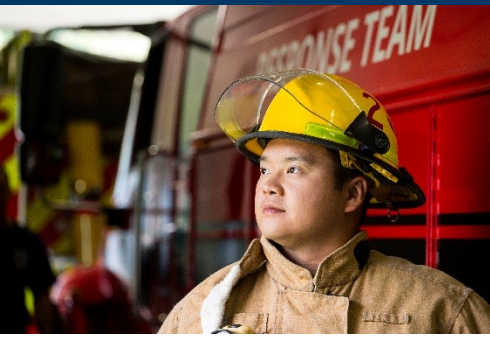
- Additional/refresher training is required if:
 - job duties change
 - there is a change in the permit program or work in the permit space presents a new hazard
 - employee's job performance shows deficiencies

Emergencies 1910.146(k)

- If an outside rescue service will be used, the employer shall evaluate the prospective rescuers ability to:
 1. respond to a rescue in a timely manner
-and-
 2. effectively perform rescue procedures for the permit spaces present.



Emergencies 1910.146(k)



- If an outside rescue service will be used, inform them of the hazards they may encounter in and around the permit-space.
- Provide the rescue service with access to all permit-spaces where rescue may be necessary so that they can develop and practice appropriate rescue plans.

Emergencies 1910.146(k)

- Authorized entrants of a permit space must use a retrieval system, unless it would increase the overall risk of entry or would not contribute to the rescue of the entrant.
 - chest or full body harness
 - Wristlets may be used if the employer can demonstrate that a harness is infeasible or creates a greater hazard.
 - the retrieval line(s) shall be attached to a mechanical device or fixed point outside of the space.



A mechanical device must be used for spaces deeper than 5 feet.

Emergencies 1910.146(k)



If an injured entrant was exposed to a substance/agent for which a Material Safety Data Sheet (MSDS) or other similar written information must be kept at the work-site, that MSDS or other information must be made available to the medical facility treating the exposed entrant.

Permit-required confined space program Program Evaluation 1910.146(d)

- **Employers** have an on-going responsibility to:
 - re-evaluate permit spaces and update the permit program, based on changes to the permit space
 - review the permit-space program within one year of each entry, and revise program as necessary

Permit-required confined space program Program Evaluation 1910.146(d)

- The permit-space program review:
 - will include a review of cancelled permits
 - allow employee participation
 - Note: if no entry is performed within a 12-month period then no program review is necessary

- What is the first question that should be asked before planning entry into a permit-required confined space?

Is entry necessary?



Internet Resources

- <https://www.cdc.gov/niosh/topics/confinedspace/default.html>
- <https://www.osha.gov/confined-spaces>
- <https://www.dli.mn.gov/about-department/our-areas-service/minnesota-osha-workplace-safety-consultation>



Thank You!

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