






Confined Spaces in Residential Construction


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Program Description

Confined spaces present a unique hazard in the workplace. Environmental conditions can change unexpectedly, and the consequences can be dire and immediate. Residential construction sites routinely have small crews and inadequate resources to rescue an affected worker. In this session, learn how to identify and protect workers from the hazards presented by working in confined spaces.



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Learning Objectives

- Understand the definition of a confined space and how it applies to residential construction.
- Examine the OSHA requirements of Confined Spaces in Construction Standard (1926 Subpart AA).
- Recognize confined spaces in residential construction.
- Discuss how to prevent injuries and implement a proactive confined space program.



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Let's get started shall we...

- **Scenario:** One of your workers is down in a crawlspace and suddenly becomes unresponsive. Unfortunately, you can't reach to pull them out. What do you do?
- In your opinion, What is the most important preventive step an employer can take to protect their workers from being harmed in a confined space?



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What is a Confined Space?

- Limited means for entry or exit;
- Large enough size for employee entry; and
- Not designed for continuous human occupancy.

(All three required for space to be designated as a "confined space")



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Confined Space Examples

- Ventilation Duct
- Exhaust Duct
- Manhole
- Sewer
- Tunnel
- Storage tank
- Silo
- Pit



- Oven
- Furnace
- Tub
- Vault
- Vessel
- Tank car
- Bin
- Vat



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Crawlspace



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What is a Permit-Required Confined Space?

Meets the requirements of a "Confined Space," **PLUS** has one or more of the following:

- Hazardous atmosphere (existing or potential)
- Contains a material having a potential to engulf
- Configuration hazards (trapped or asphyxiated by inwardly converging walls, or downward sloping floor that tapers to a smaller section)
- Contains any other recognized serious safety or health hazard.

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Limited Openings for Entry/Exit

- Openings as small as 18 inches in diameter
- Difficult to enter with SCBA or other rescue equipment
- Difficult to remove downed worker in folded-up or bent over position.
- Exit from large openings may be difficult due to the presence of ladders, hoists, etc.


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Unfavorable Natural Ventilation


- Lack of air movement in and out of the space can create an atmosphere much different than the outside atmosphere.
- Deadly gases can be trapped inside.
- Organic materials can decompose.
- May not be enough oxygen due to presence of other gases or chemical reactions such as rusting.

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Characteristics Include


- **Not Designed for Continuous Worker Occupancy:**
 - Most confined spaces are not designed to enter and work in on a regular basis.
 - Designed to store a product.
 - Enclose materials or processes.
 - Transport products or substances.
 - Occasional worker entry for inspection, repair, cleanup, maintenance, etc.

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Hazards


- **Physical Hazard** – an existing or potential hazard that can cause death or serious physical damage.
- **Limited or restricted means for entry or exit** – a condition that has a potential to impede an employee’s movement into or out of a confined space (e.g. trip hazards, slippery floors, poor illumination, etc.)

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Dangerous Combinations

- Presence of all three confined space characteristics can complicate the situation.
- Working in and around the space.
- Rescue operations during emergencies.
- Worsened conditions due to work activities:
 - Welding and cutting, use of bonding agents
 - Cleaning and solvents, use of other chemicals
 - Use of gas-powered equipment



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Flowchart

Criteria for Confined Space:

- * Space large enough to enter &
- * Limited or Restricted entry or exit &
- * Not designed for continuous worker occupancy

Flow:


- NO → Not a confined Space
- YES → Confined Space

Permit-Required Confined Space Criteria:

- Hazardous Atmosphere
- Or
- Engulfment Hazard
- Or
- Configuration Hazard
- Or
- Any other recognized serious hazard

Flow:

- YES → Permit-Required Confined Space
- NO → Non-Permit Required Space



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Responsible Personnel

- Competent Person must predict and identify hazards in surroundings or in the space.
- Qualified Persons will resolve problems found.






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Responsible Personnel


- The **Controlling Contractor** is the employer responsible for construction at the worksite.
- An **Entry Employer** is any employer who decides whether an employee it directs will enter a permit space.
- The **Host Employer** is the employer who owns or manages the property where the construction work is taking place.

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Hazard Control


- Control is the action taken to reduce the level of any hazard inside a confined space using engineering methods (ventilation), and then using these methods to maintain the reduced hazard level.
- Control also refers to the engineering methods used for this purpose. *PPE is not a control.*
- Control ensures persons do not enter IDLH atmospheres.

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Hazard Control

- **Isolate or isolation:** the process by which a permit space is removed from service and completely protected against the release of energy and material into the space.
 - Line Breaking
 - Lockout
 - Tagout
 - Monitoring

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Hazard Control

- **Protection against serious physical damage:**
 - Ventilation
 - PPE
 - Lighting
 - Barriers

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Hazards of Confined Spaces

- Oxygen-deficient
- Oxygen-enriched
- Flammable Atmospheres
- Toxic Atmospheres
- Temperature Extremes
- Engulfment Hazards
- Noise, Slick/Wet Surfaces
- Fall Objects

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Hydrogen Sulfide

- **Decomposition of materials: human waste.**
- **Rotten egg odor at low concentrations.**
- **Possibly no warning at high concentrations**

PPM	Effect	Time
10	Permissible Exposure Level	8 hours
50-100	Mild Irritation-eyes, throat	1 hour
200-300	Significant Irritation	1 hour
500-700	Unconsciousness, Death	0.5-1 hour
>1000	Unconsciousness, Death	Minutes

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Carbon Monoxide

- Odorless, Colorless Gas
- Combustion By-product
- Quickly collapse at high concentrations

PPM	Effect	Time
50	Permissible Exposure Level	8 hours
200	Slight headache, discomfort	3 hours
600	Headache, discomfort	1 hour
1000-2000	Confusion, nausea, headache	2 hours
1000-2000	Tendency to stagger	1.5 hours
1000-2000	Slight heart palpitation	30 minutes
2000-2500	Unconsciousness	30 minutes

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Purge Time

- Purge times can be estimated by the following equation:
- $T = 7.5V/C$
- T = Purge times in minutes
- V = the volume of the space in ft³
- C = effective blower capacity in CFM

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Authorized Entrants

- Know the hazards they are facing.
- Be able to recognize signs and symptoms of exposure.
- Understand the consequences of exposure.
- Communicate with attendants as necessary.
- Alerts attendants to warning signs or existence of a hazardous condition.
- Exit when ordered or alerted.

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Importance


- OSHA stated: of the 122 confined space accidents each year led to 173 fatalities. 60% of the fatalities occurred during rescue attempts.



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Rescues




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Attendants

- Be aware of behavioral effects of potential exposure.
- Maintain count and identity of entrants.
- Remain outside the space until relieved.
- Communicate with entrants.
- Monitor activities inside and outside the space and order exit if required.




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Attendants shall:

- Summon rescuers if necessary
- Prevent unauthorized entry
- Perform non-entry rescue


• Important: Attendants may NOT perform other duties that interfere with their primary duty to monitor and protect!

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On-site teams shall:


- Be properly equipped
- Receive the same training as entrants
- Receive additional training in the use of PPE, rescue equipment, first aid and CPR
- Practice simulated rescues once each year

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Off-site Teams

- Be aware of confined space hazards.
- Practice similar rescues in similar spaces.


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Entry Requirements

- Name and phone numbers of rescue and emergency services
- Communication procedures
- Special equipment and procedures
 - Alarms
 - Rescue equipment
 - PPE

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Summary

• So what is the most important way to protect your workers?



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Questions?

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