



Parts 35, 90, and 490 – Confined Space in Construction and Permit-Required Confined Spaces in General Industry

**Student Materials
Level Two Compliance Course
Consultation Education and Training Division
Michigan Occupational Safety and Health Administration
Michigan Department of Labor and Economic Opportunity
www.michigan.gov/miosha
517-284-7720**



(Revised 07/24)



Parts 35, 90, and 490 – Confined Spaces in Construction and Permit-Required Confined Spaces in General Industry



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Overall Course Objectives

The attendee will be able to...

- ✓ Define and apply the definition of:
 - Confined space
 - Permit-required confined space (PRCS)
- ✓ Describe the requirements of MIOSHA Part 35 Confined Spaces in Construction and Part 90/490 Permit-Required Confined Spaces
- ✓ Identify and apply the three types of entry procedures:
 - Permit
 - Alternate
 - Reclassified as a non-PRCS prior to entry
- ✓ Apply the basic principles of air monitoring and ventilation

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Module 1

Identification of Confined Spaces

The attendee will be able to:

- Define and apply the definition of confined space
- Identify spaces that...
 - Are large enough and so configured that an employee can bodily enter and perform assigned work
 - Have limited or restricted means for entry or exit
 - Are not designed for continuous employee occupancy
- Determine if a space is a confined space

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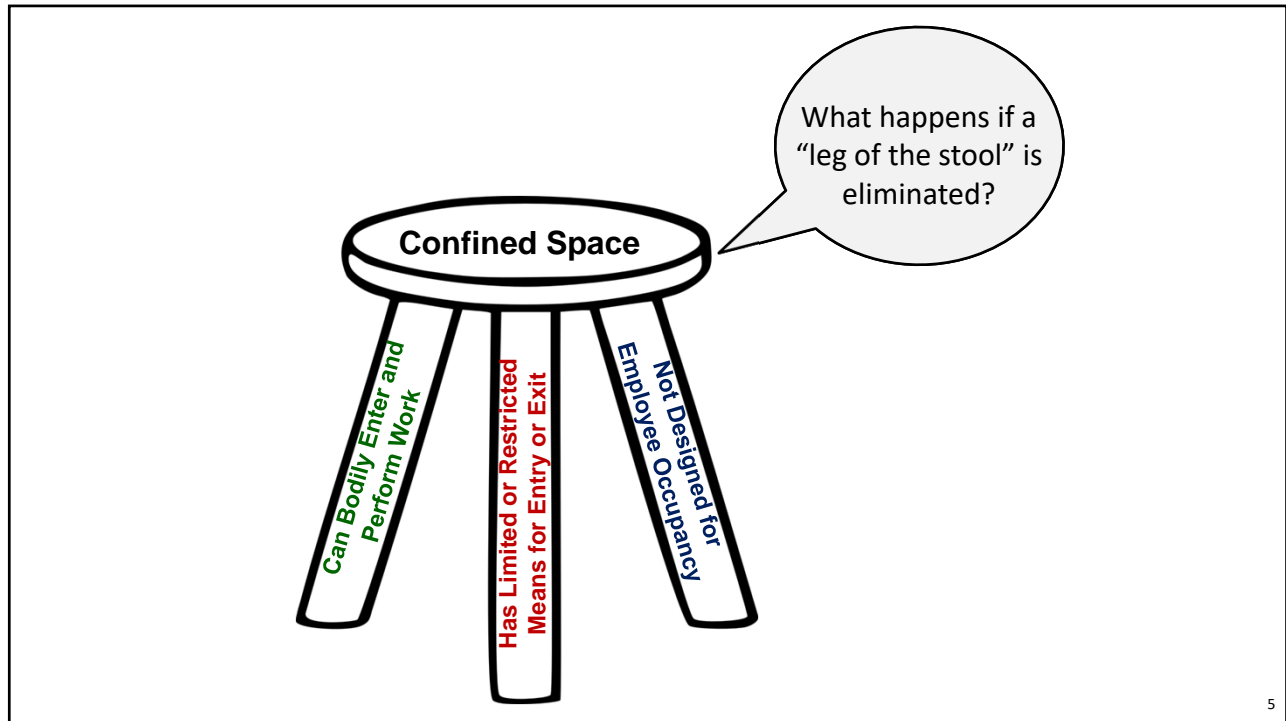
Definition: Confined Space

- Is large enough and so configured that an employee can bodily enter and perform assigned work; **and**
- Has limited or restricted means for entry or exit; **and**
- Is not designed for continuous employee occupancy.

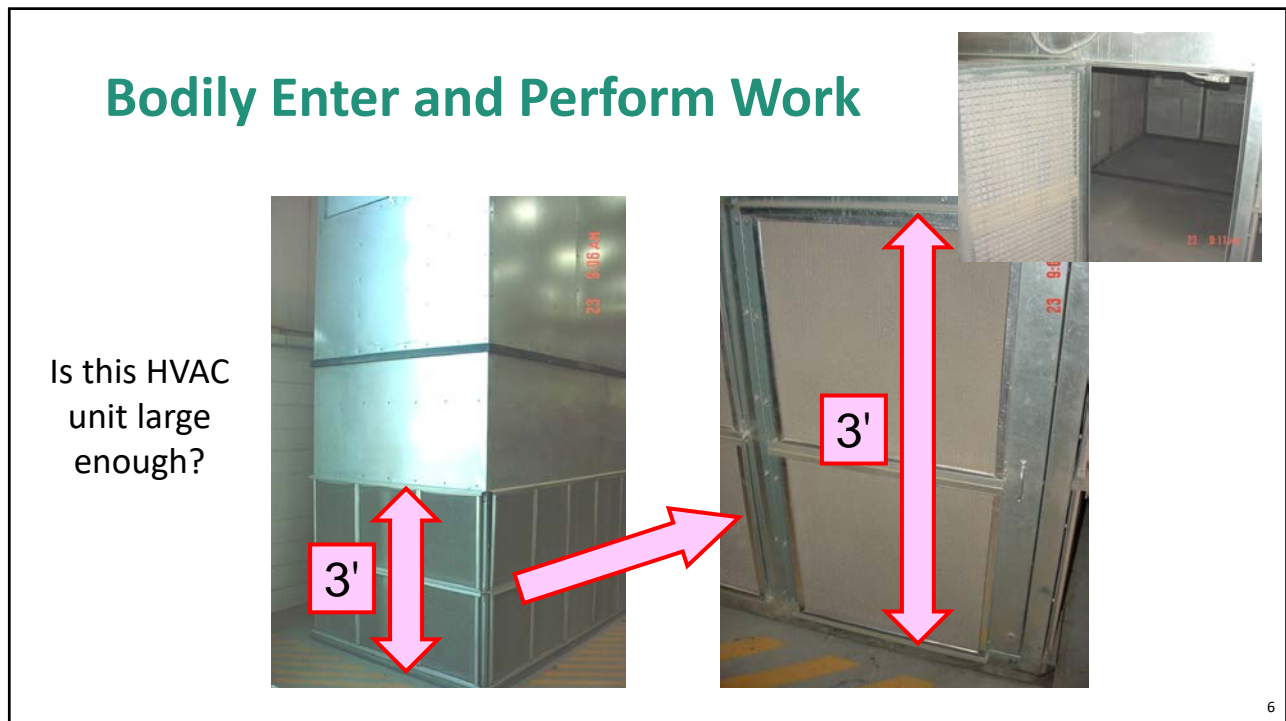
KEY TAKEAWAY: Remember, all three criteria must be present for a space to be a “confined space”.

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Bodily Enter and Perform Work



How about this tank of "really bad stuff"?

The only entry point is on top of the tank.

The diameter of the opening is **≈8 inches**.

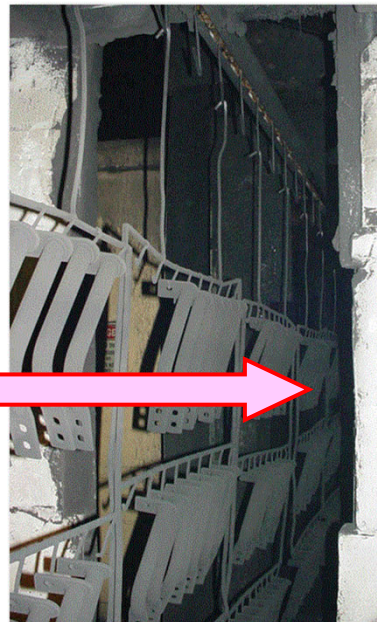
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Powder-Coat Curing Oven

Large enough to bodily enter?

If an employee can simply move parts aside (if necessary) and enter the space; it can be bodily entered.



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Limited or Restricted Means for Entry or Exit

The standard lists seven examples of spaces that may have limited or restricted means for entry or exit:

- Tanks
- Vessels
- Silos
- Storage bins
- Hoppers
- Vaults
- Pits



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Impediment to Entry or Exit

KEY QUESTION: Does the route or method of entry or exit create an impediment to **self-rescue**?

The path by which the entrant must travel out of a space to reach an area of safety must not present a physical barrier which would impede self-rescue.

Examples of impediments:

- Porthole, portable ladder, vertical fixed ladder, hatchway, etc.
- Internal configuration which makes movement in the space difficult, such as: pipes, ductwork, conveyors, holes in the floor, etc.
- Distance (travel time)

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Limited or Restricted Means for Entry or Exit

Does this method of entry or exit fit the criterion?



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Limited or Restricted Means for Entry or Exit

Is contortion of the body necessary to enter or exit the space?

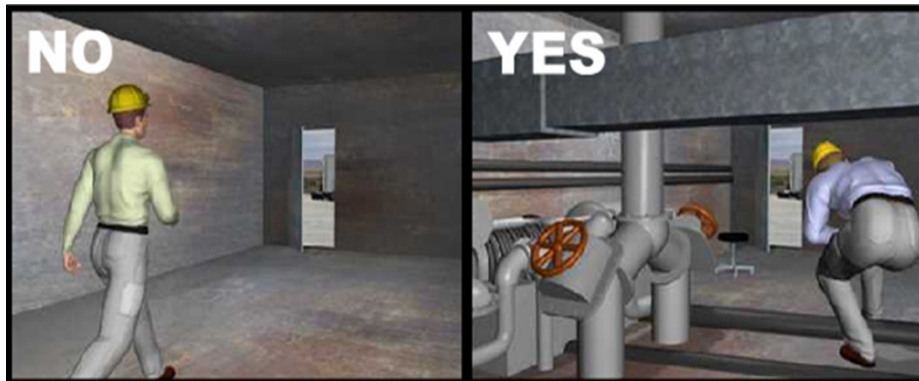


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Limited or Restricted Means for Entry or Exit

Does entry or exit require a posture that might slow self-rescue (escape) or make rescue more difficult?



Such obstructions may include: pipes, ductwork, walls, holes in the floor, flanges, etc.

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Limited or Restricted Means for Entry or Exit

Is the use of your hands necessary to enter or exit the space?



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Powder Curing Oven

Does this doorway provide an impediment to entry or exit?



Can the door be opened from the inside
by simply pushing outwards?

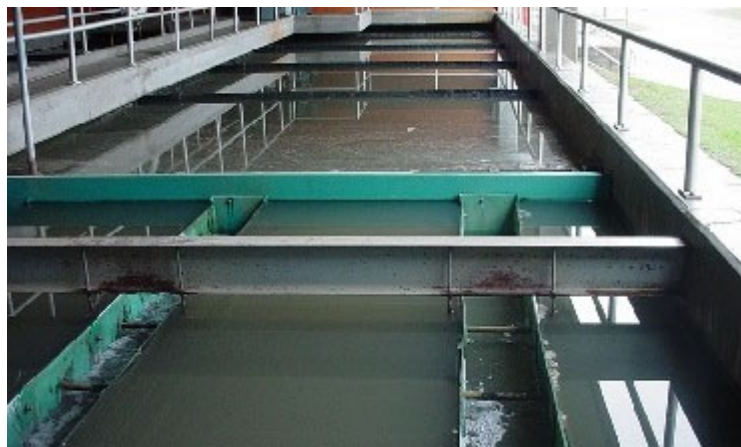
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Not Designed for Continuous Employee Occupancy

Two terms to understand
in this criterion:

- Continuous
- Employee Occupancy



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Not Designed for Continuous Employee Occupancy

- Continuous does not mean the space has to be continuously occupied
- The key to understanding “continuous” is...
 - Whether or not the space could be occupied continuously **under normal operating conditions** (not once the space has been made ready for entry)

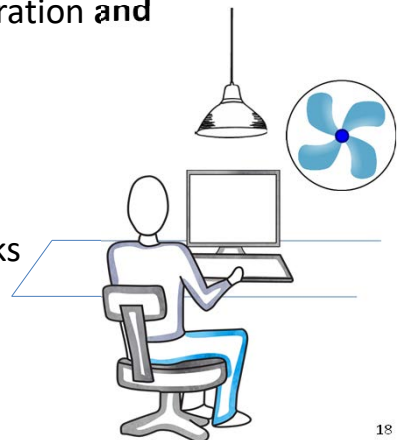
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Not Designed for Continuous Employee Occupancy

Employee occupancy addresses the concept that when the space was **originally designed** (or subsequently redesigned) the following provisions (at a minimum) were taken into consideration **and** maintained:

- Ventilation
- Lighting
- Sufficient room to accomplish anticipated tasks



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Fountain Pump Room

Is the room designed for continuous employee occupancy?



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Powder Coating Oven (Temp = 350 °F)

Is this space designed for continuous employee occupancy?



While the presence of hazards (e.g., toxic atmospheres, excessive temperatures and/or pressures, etc.) in a space is more pertinent to the definition of a permit space, note that such hazards may also prevent continuous employee occupancy of a space.

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Walk-in Freezer

Is this space designed for continuous employee occupancy?



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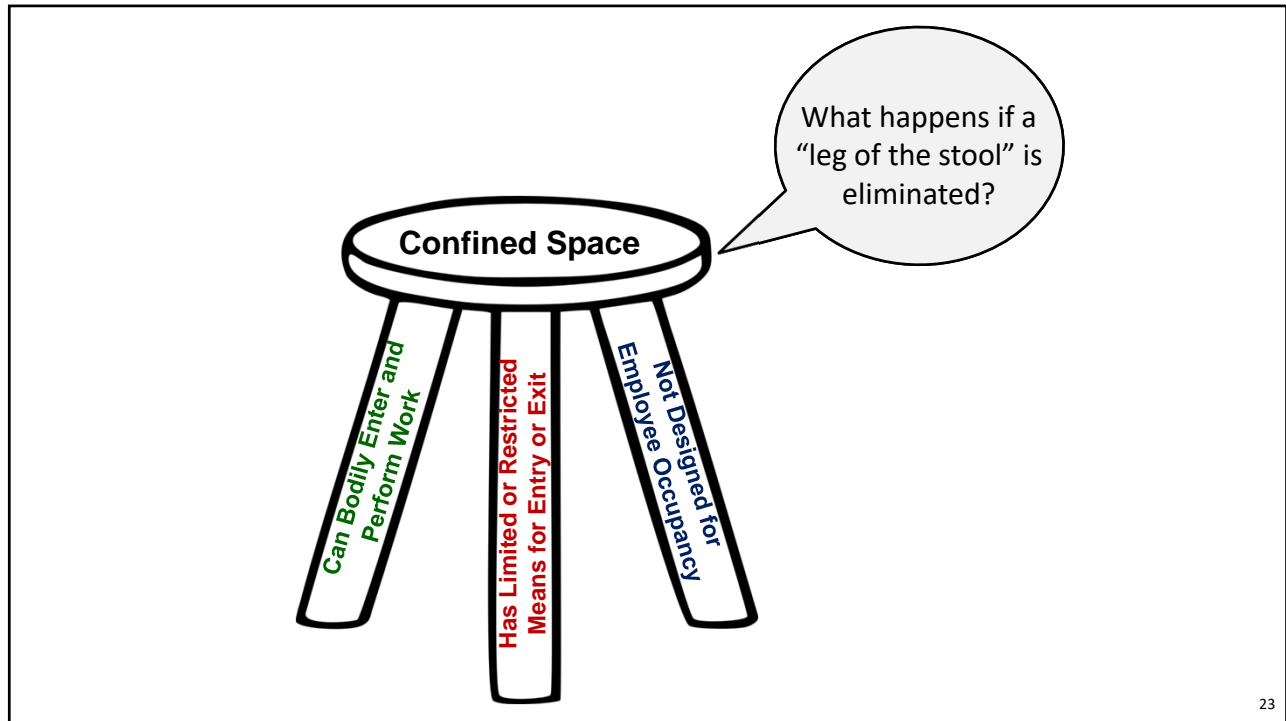
Dry Well

Is this space designed for continuous employee occupancy?



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Confined Space Identification Group Exercise

- Examine the space provided and determine if it is a confined space.
- Give justification why the space is or is not a confined space.

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Module 2

Identification of Permit Required Spaces

The attendee will be able to:

- Define and apply the definition of a permit required confined space (also known as a PRCS).
- Identify or recognize:
 - A hazardous atmosphere,
 - An engulfment hazard,
 - An internal configuration that could trap or asphyxiate an entrant, and
 - Other serious safety or health hazards
- Determine if a space is a permit space (PRCS)

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Remember...

- A space cannot be a permit space unless it:
 - Meets the definition of a confined space, **and**
 - Possesses an acute serious hazard
- Additionally, the evaluation of the confined space for hazards must be done when the space is in operation

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Definition: Permit-Required Confined Space (PRCS) or Permit Space

Any confined space that possesses, or has the potential to possess, one or more of the following hazards:

- A hazardous atmosphere;
- An engulfment hazard;
- An internal configuration that could trap or asphyxiate the entrant by inwardly converging walls or a floor sloping downwards and tapering to a smaller cross-section;
- Any other recognized serious safety or health hazards.

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Physical Hazards – Defined in Part 35 Confined Spaces in Construction

An existing or potential hazard that can cause death or serious physical damage.

Examples:

- Explosives
- Energy
 - Mechanical
 - Electrical
 - Hydraulic
 - Pneumatic
- Radiation
- Temperature Extremes
- Engulfment
- Noise
- Inwardly converging surfaces
- Chemicals that can cause death or serious physical damage through skin or eye contact

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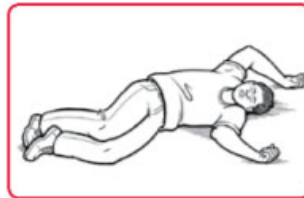
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Serious Physical Damage – Defined in Part 35 Confined Spaces in Construction

Permanent or temporary impairment or illness:

Examples:

- Loss of consciousness
- Disorientation
- Reduction in mental efficiency



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Hazard

In determining if a confined space is a permit space, the hazard must be:

Serious and Acute with short on-set of symptoms that impede ability to self-rescue

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Hazardous Atmosphere



- The first question to ask to determine whether a confined space is a permit space is: *Does the space contain or have a potential to contain a hazardous atmosphere?*
- Potential exposure means that it is likely that an exposure could occur during the entry.

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Definition: Hazardous Atmosphere

A hazardous atmosphere is an atmosphere that may expose employees to the risk of:

- Death, **or**
- Incapacitation, **or**
- Impairment of the ability to self-rescue, **or**
- Injury, **or**
- Acute illness.

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Types of Hazardous Atmospheres

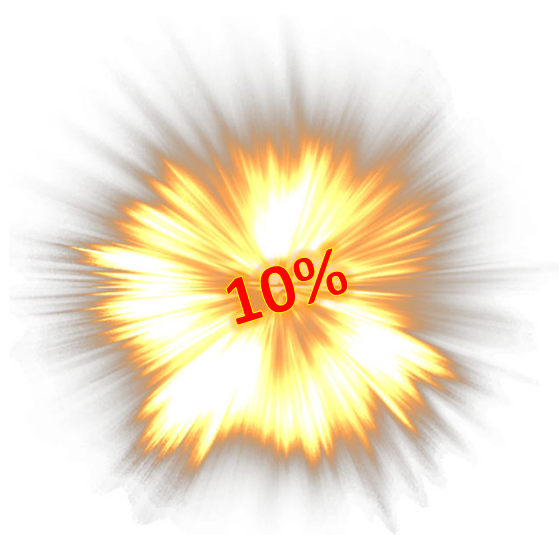
Atmospheres which are capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or both acute and serious illness by exposure to any one or more of the following:

- Flammable gas, vapor, or mist > 10% of Lower Flammable Limit(LFL)
- Airborne combustible dust \geq to its LFL
- Oxygen < 19.5% **or** > 23.5%
- Any acutely toxic substance > Permissible Exposure Limit (PEL)
- Any atmospheric condition Immediately Dangerous to Life and Health (IDLH)

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Flammable Gas, Vapor, or Mist



Flammable gas, vapor, or mist in excess of ten percent of its lower flammable limit (LFL) causes a hazardous atmosphere

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Flammable Limits

- The percent by volume range of a gas, vapor, or mist in air that will burn or explode if a flame or other ignition source is present
- This flammable range is represented by:
 - Lower Flammable Limit (LFL), and
 - Upper Flammable Limit (UFL)
- Note:
 - LFL is often used interchangeably with LEL (Lower Explosive Limit)
 - UFL is often used interchangeably with UEL (Upper Explosive Limit)

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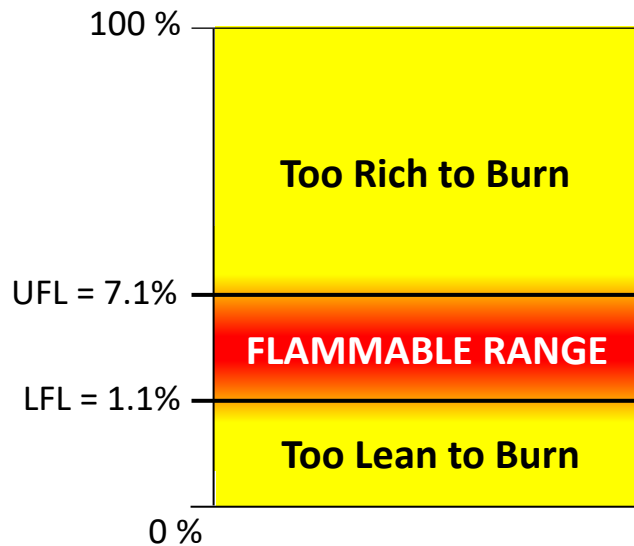
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LFL and UFL Example: Toluene

1% of a substance equals
10,000 PPM of that
substance!

1.1% = 11,000 PPM
7.1% = 71,000 PPM

Toluene Vapor Concentration
(% by volume)



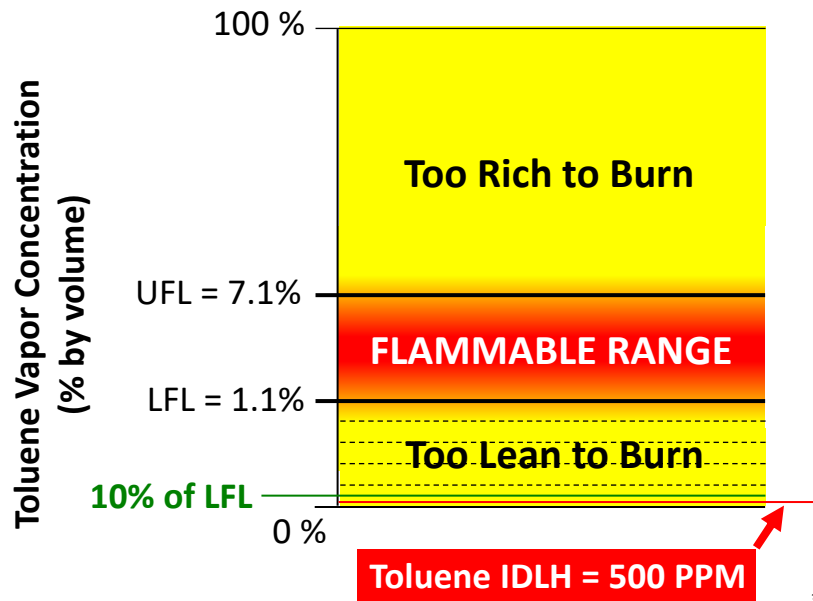
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10% of LFL vs. IDLH: Toluene

10% of the toluene LFL

- Equals 0.11%
- Equals 1,100 PPM



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LFL for Airborne Combustible Dust

- A cloud of combustible dust at or above its LFL is dense
- This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet or less

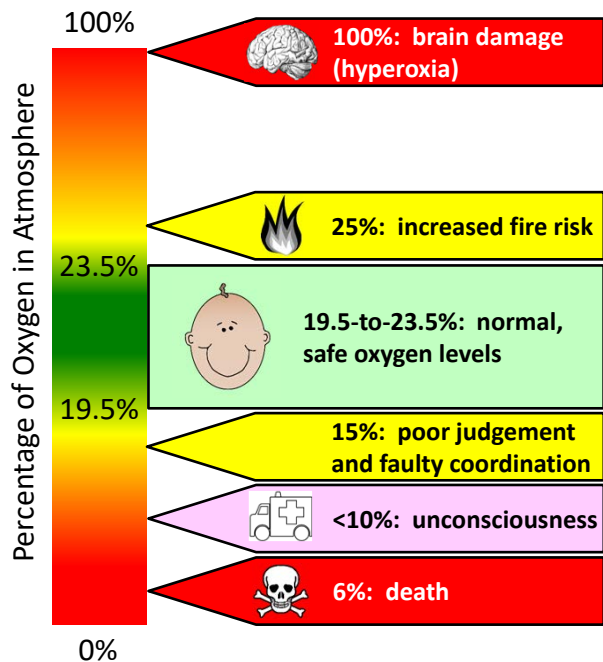


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Percentage of Oxygen in Atmosphere

- Normal oxygen content equals **20.9%**
- Content can be depleted or enriched for various reasons with serious impact on the body and/or increase in fire risk



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Acute Acting Air Contaminants

This may include chemicals causing:

- Central nervous system depression,
- Severe eye irritation,
- Headache, nausea, or vomiting, and/or
- Delayed severe effects within 12-to-72 hours after exposure



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Non-Acute Hazards - Asbestos

- Asbestos does not have acute effects, therefore, a confined space cannot be a permit-space due to the toxic effects of asbestos.
- While asbestos and other substances with chronic effects may pose a toxic hazard to employees, such chronic effects are not a consideration where a permit spaces are concerned.

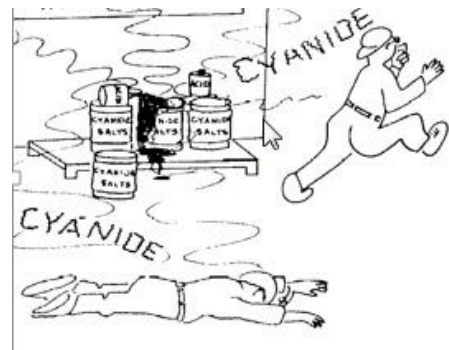


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Immediately Dangerous to Life or Health - IDLH

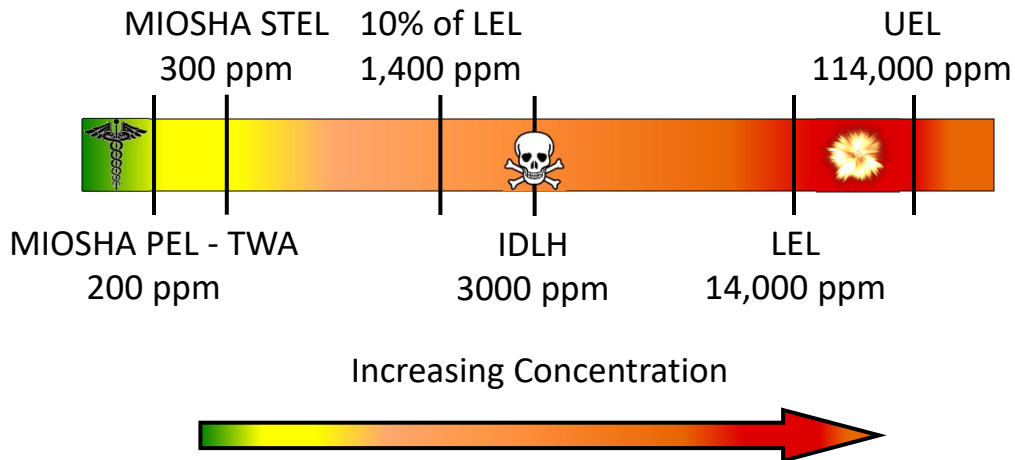
- Any condition that poses an immediate or delayed threat to life or that would cause irreversible adverse health effects or that would interfere with an individual's ability to escape unaided from a permit space.
- A note in the standard addresses IDLH materials whose effects are delayed.
- Built-in safety margin which allows a maximum period of 30 minutes to escape without the use of respiratory protection.



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MEK Exposure Line



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U.S. Chemical Safety Board Case

Confined Space
Accident Investigation (2007):

Group Discussion:

- Was this a confined space?
- Was this a permit-required confined space?
- What were the hazardous conditions?
- Describe some measures that should have been taken to eliminate or reduce the hazard.

Video available online at:

www.csb.gov/videos/no-escape-dangers-of-confined-spaces/

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Transient Effects of Chemical Exposures



- Some materials may produce immediate transient effects that, even if severe, may pass without medical attention, but are followed by sudden and possibly fatal collapse 12-72 hours after the exposure:
 - Hydrogen fluoride gas:** almost immediate narrowing and swelling of the throat; upper airway obstruction; lung injury may evolve rapidly or may be delayed in onset for 12-to-36 hours.
 - Cadmium fume:** severe weakness, difficulty breathing (dyspnea), coughing and tightness of the chest, pulmonary edema, acute pneumonitis may occur 10-to-24 hours after significant exposure.
- Such materials in hazardous quantities are considered to be IDLH atmospheres.

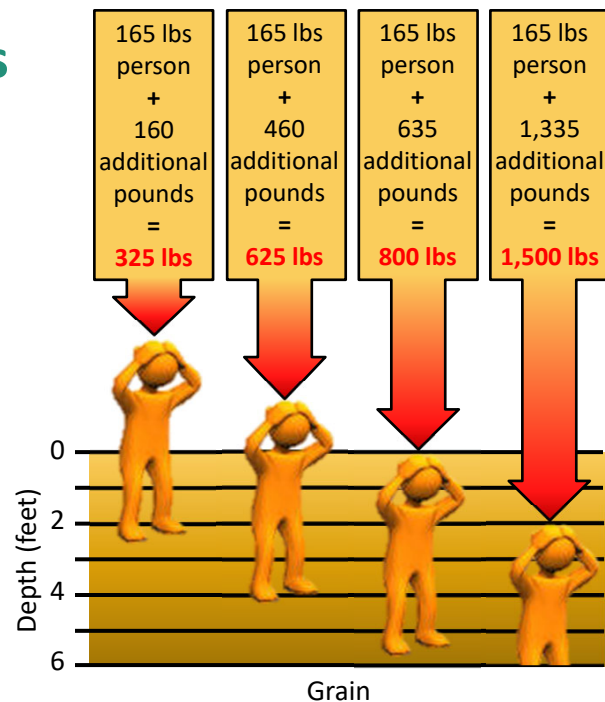
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Permit Space Hazards

Engulfment

- Does the space contain a material that has the potential for engulfing the entrant?
- Engulfment: surrounding and effective capture of a person by a liquid or flowable solid substance that can cause death by:
 - Asphyxiation by breathing in the substance, OR
 - Exerting enough force on the chest to make breathing difficult or impossible



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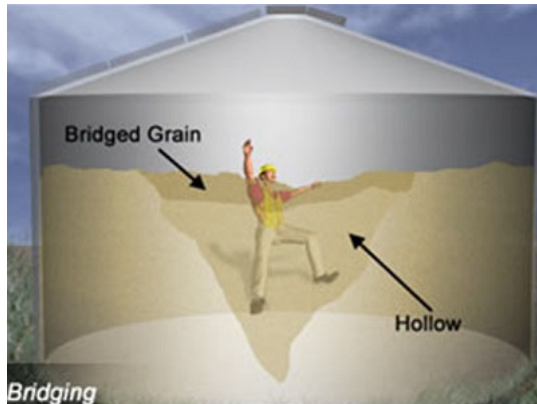
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Engulfment

Flowable Solid Substances

Substances that may present an engulfment hazard include:

- Grain,
- Sand,
- Sawdust,
- Gravel,
- Plastic pellets,
- Etc.



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Permit Space Hazards

Internal Configuration

Does the space have an internal configuration such that an entrant could be trapped or asphyxiated by:

- Inwardly converging walls, or
- A floor which slopes downward and tapers to smaller cross-section.



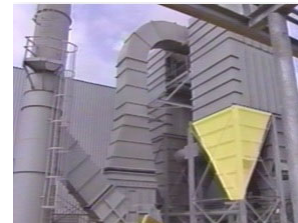
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Permit Space Hazards

Inwardly Converging Walls

- Possible to become stuck and die due to pressure on the chest
- Examples include:
 - Hoppers for air pollution dust collectors (e.g., baghouses, cyclones, electrostatic precipitators, etc.)
 - Bottom-mounted unloading chutes for railcars and trucks, and
 - Bins (e.g., grain, coal, sand, etc.)



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Permit Space Hazards

Other Serious Recognized Hazards

Examples include:

- Exposed, live electrical circuits
- Unguarded mechanical hazards
- Slippery surfaces
- Noise
- Vibration
- Heat
- Poor visibility
- Critters
- Radiation

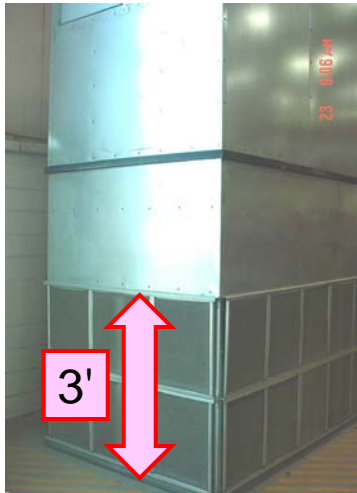


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Other Serious Recognized Hazards

Remember the HVAC unit from Module 1 of this class?



Door Into Unit



Unguarded Mechanical



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Confined Spaces Misclassified as PRCs

Other Serious Recognized Hazards

- Spaces that require air-purifying respirators are often misclassified as permit spaces.
- A confined space is not a permit space if the respirator is used only for:
 - Nuisance air contaminants, or
 - Non-acute hazards (i.e., asbestos).



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Other Serious Recognized Hazards

Serious Hazards



- Only serious hazards make a confined space a permit space.
- Hazards not capable of causing death or serious physical harm would not make a confined space a permit space.
- Example: the mere presence of water in a confined space that may solely pose a slipping hazard would not trigger application of the PRCS standard, however...

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Other Serious Recognized Hazards

Water in a Confined Space

- ...water, in combination with other hazards, could trigger application of the PRCS standard.

The water in the confined space conceals an open pit. Since the water conceals a fall hazard, the combination of these conditions creates a serious hazard, which causes the space to be classified as a permit space.

- Refer to CPL 02-00-100, Questions #11 and #12 (pp. 26-27) for more information.



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Are Attics, Basements and Crawl Spaces Permit-required Confined Spaces?

Questions to ask:

- Confined Space?
 - Limited/restricted egress?
 - Fixed or pull-down stairs, egress window (not restricted)
 - Ladder and hatch (restricted)
 - Designed for occupancy?
- Permit-required confined space?
 - Hazards that would impede self-rescue?
 - Exposed active electrical wiring, extreme heat, or other hazards like spraying isocyanate foam insulation
- Federal OSHA [Fact Sheet for Residential Construction](#)
- MIOSHA Instruction [Confined Space in Construction](#)

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Crawl Spaces and Utility Service Lines

OSHA Letter of Interpretation 10/27/1995

- Usually contain utility service lines (e.g., water, natural gas, sewage, steam, power, etc.)
- If utility services do not terminate at end use equipment in the crawl space
 - The hazards do not have to be considered in a permit space determination unless...
 - There is reason to believe there is a reasonable probability of a rupture or leak where the contents of the piping would cause a serious safety or health hazard.



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Fall Hazards

OSHA Standard Interpretation on February 23, 1999

- Regarding a fall from 21 feet into a pit
- Specific fall protection requirements were not included in the PRCS standard
- Fall protection and ladder safety requirements are already addressed by other MIOSHA standards
- If the fall hazard is the only hazard within the pit, it is not regarded as a PRCS

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Permit-Required Confined Space Identification Group Exercise

Determine if each of the provided examples:

- Meet the definition of a “confined space”, and
- If so, do they have hazards that make them a permit space.
- Provide justification as to why each space is or is not a permit space.

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Module 3

Part 35, 90 and 490 Standards Overview

The attendee will:

- Differentiate between a horizontal and a vertical standard
- Describe the major components of Part 35, 90 and 490



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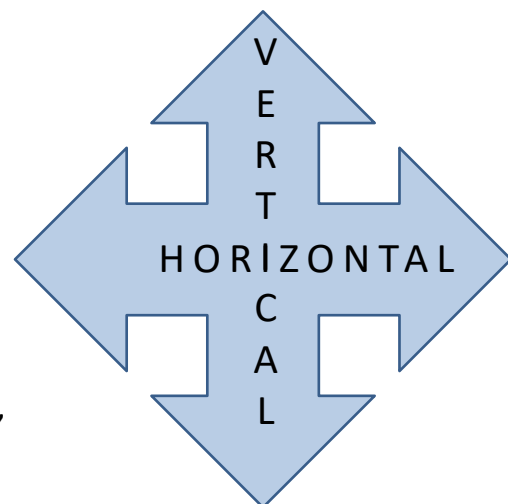
Horizontal vs. Vertical Standards

- **Horizontal standards:**

More general MIOSHA standards applicable to multiple industries.

- **Vertical standards:**

MIOSHA standards that apply to a particular industry or operations, practices, conditions, processes, means, methods, equipment or installations.



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Horizontal Permit Space Standards

- General Industry: **Permit-required Confined Spaces**
 - OSHA 29 CFR 1910.146
 - MIOSHA Part 90 (Safety)
 - MIOSHA Part 490 (Health)
- Construction: **Confined Spaces in Construction**
 - OSHA: 29 CFR 1926.1200 subpart AA
 - MIOSHA Part 35
- Agriculture: **None** (Cited under Act 154 – General Duty)

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Other Standards with Confined Space Requirements

<u>General Industry</u>	<u>Construction</u>
<ul style="list-style-type: none"> • Part 12 Welding and Cutting • Part 50 Telecommunications • Part 63 Pulp, Paper, and Paperboard Mills • Part 77 Grain Handling Facilities • Part 86 Electric Power Generation • Part 91 Process Safety Management of Highly Hazardous Chemicals* • Part 432 Hazardous Waste Operations and Emergency Response* • Part 529 Welding, Cutting and Brazing 	<ul style="list-style-type: none"> • Part 7 Welding & Cutting • Part 9 Excavation, Trenching & Shoring • Part 14 Tunnels, Shafts, Caissons and Cofferdams • Part 16 Power Transmission & Distribution • Part 17 Electrical Installations • Part 18 Fire Protection and Prevention • Part 30 Telecommunications • Part 621 Specific Equipment and Operations • Part 665 Underground Construction

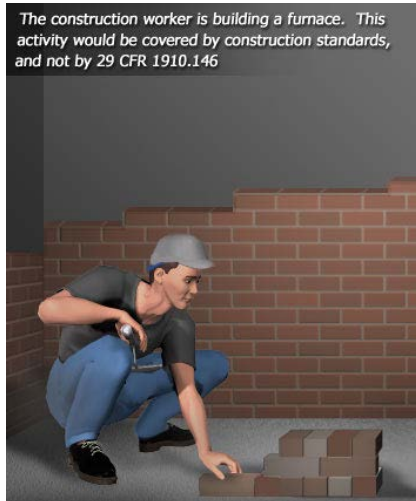
* Applies to General Industry and Construction

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Construction vs. Maintenance

Construction - Part 35



Maintenance - Part 90/490



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Overview of Differences Construction vs. General Industry Rules

Construction is substantially similar to general industry, **exceptions include:**

- A competent person identifies confined spaces
- Must inform employees' authorized representatives and the controlling contractor
- Must continuously monitor atmospheric hazards

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Overview of Differences Construction vs. General Industry Rules

Construction is substantially similar to general industry, **exceptions include:**

- Must provide an early-warning system that continuously monitors for non-isolated engulfment hazards
- May suspend an entry permit
- Rescue services availability must be communicated

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Major Sections of Part 35, 90 and 490

- Scope
- Definitions
- General requirements
- Permit-required confined space Program
- Permitting process
- Entry permit
- Training
- Duties of authorized entrants, attendants and entry supervisors
- Rescue and emergency services
- Employee Participation

Part 90/490 Only – General Industry Appendices A-F

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Part 90/490 General Industry Scope and Application

- To protect employees in general industry from the hazards of entry into permit-required confined spaces (permit spaces)
- This General Industry Standard does not apply to:
 - Agriculture (Part 1928), **or**
 - Construction (Part 1926), **or**
 - Shipyards (Part 1915)

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Part 35 Confined Spaces in Construction: Scope and Application

To protect employees engaged in construction activities at a worksite with one or more confined space(s).

Note: Excavations are covered under the vertical standard Part 9; **however**, confined spaces inside an excavation would need to comply with Part 35.



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Definitions

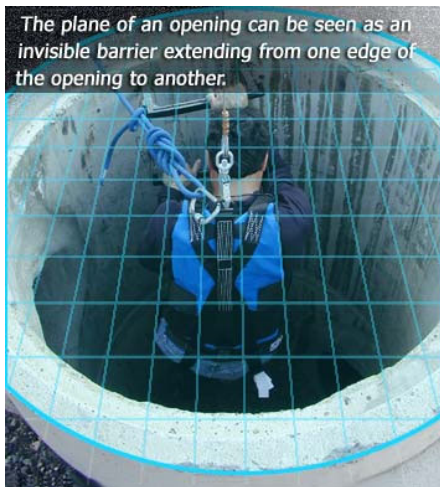
This section defines various words and phrases used by the standard such as:

- Confined Space (previously discussed in Module 1),
- Entry,
- Engulfment,
- Entry Supervisor,
- Hazardous Atmosphere,
- Isolation,
- Permit Space (previously discussed in Module 2),
- Rescue Service, etc.

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“Entry”



- The action by which a person passes through an opening into a permit space
- Includes ensuing work activities in that space
- Is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space

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“Isolation”

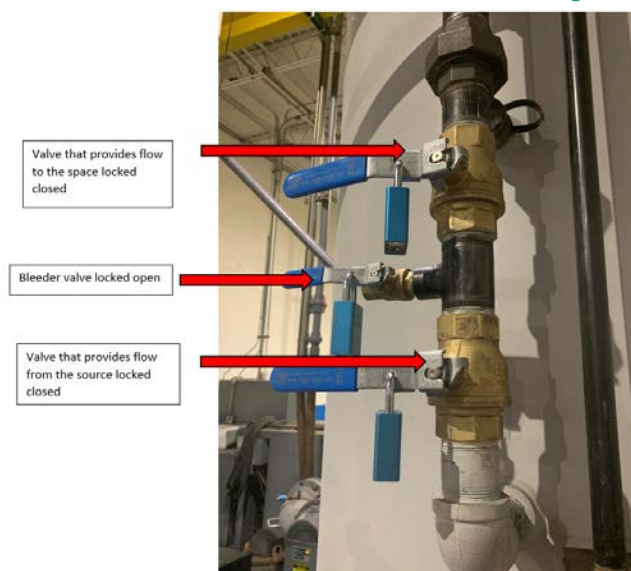
- A means by which hazards are eliminated from a permit space
- Includes:
 - Blanking or blinding
 - Misaligning or removing sections of lines, pipes, or ducts
 - Double block and bleed system
 - Lockout of electrical/mechanical hazardous energy sources



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Double Block and Bleed System



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Hazard Elimination

- Not defined in the definitions section
- The hazard is “**eliminated**” from the space
- Examples include the use of:
 - Isolation techniques (previous two slides)
 - Allowing a space to cool to room temperature before entry
 - Ventilation to eliminate a hazardous atmosphere (when there is no possibility for a hazardous atmosphere to reoccur)

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Hazard Control

- Not defined in the definitions section
- Hazard is “**controlled**”, but not “isolated” or “eliminated”
- Examples include the use of:
 - Continuous ventilation
 - PPE to protect against heat, air contaminants, or other hazards
 - Administrative or work practices
 - Lockout only of flowable materials such as steam, natural gas, grain, water, etc.

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Part 35 and 90/490 - General Requirements

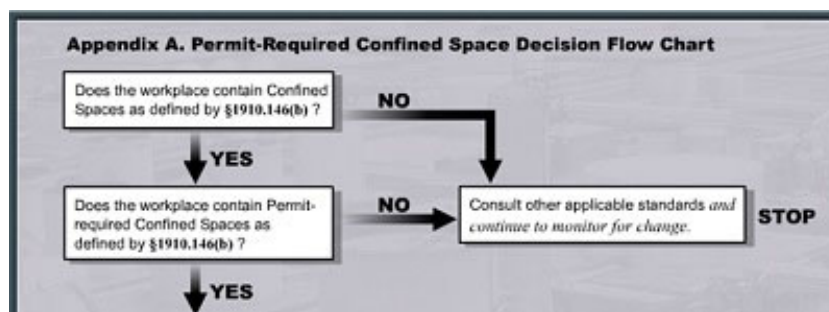
- **Evaluate the workplace for confined and permit spaces**
- Inform exposed employees (includes employee rep and controlling contractor for construction)
- Employees do not enter PRCs...take measures to prevent entry
- If employees enter...develop a written program
- Alternate procedures (c)(5)
- Evaluate changes in a non-permit space
- Reclassification of a permit space (c)(7)
- Host employer obligations
- Contactor obligations

Part 35 – Information exchange between Host, Controlling Contractor and Entry Employers (subs)

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Evaluate for Confined and Permit Spaces



- Determine if workplace contains permit spaces.
- For assistance with evaluation, see:
 - Part 90/490 Decision flow chart in Appendix A.
 - Confined Space Advisor on OSHA's web site.

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Inform Exposed Employees

If permit spaces are identified/located in the workplace...

Employers must inform employees of location and danger posed:

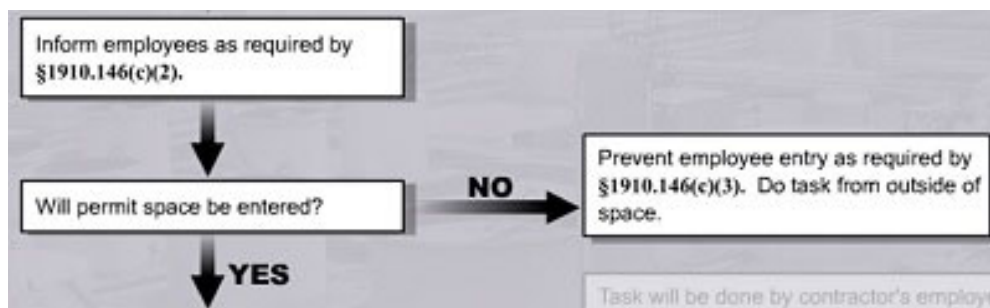
- By posting danger signs, **or**
- By any other equally effective means
- **Construction Part 35 –**
Inform controlling contractor
and employee representative
in a timely manner and
means other than posting



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Preventing Entry



If spaces will not be entered by employees, employers must take effective measures to prevent employee entry.

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Three Types of PRCS Entry

- Permit
- Alternate
- Reclassified as a Non-Permit Confined Space Prior To Entry

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Fourth Option – Do Not Enter

- Avoid entry entirely:
 - Use gauges, flow meters, remote cameras, or binoculars to monitor conditions from outside the space.
 - Use tools with extended handles.
- This worker is vacuuming out the contents of a tank, rather than entering to shovel out the waste.



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Permit Entry

Develop and implement a written permit space program that includes:

- General requirements
- Permit-required confined space program
- Permit System & Entry Permit
- Employee Training
- Duties of Authorized Entrants, Attendants, & Entry Supervisors
- Rescue & Emergency Services
- Employee Participation

81

81

Alternate Entry

- Only actual or potential atmospheric hazards are present
- Continuous forced-air ventilation alone is sufficient for atmospheric hazard control
- Employer develops monitoring and inspection data to support conclusions
- **Construction Part 35 (e)(2)– continuous monitoring during entry**
- Employer documents determinations and supporting data
- Documents made available to employees

82

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Alternate Entry

Exemptions

These sections do not apply to alternate entries:

- Permit-required confined space program
- Permit system
- Entry permit
- Duties of authorized entrants
- Duties of attendants
- Duties of entry supervisors
- Rescue and emergency services

83

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Alternate Entry

Training and Employee Participation

Use of alternate entry procedure does not exempt the employer from:

- Employee training
- Employee participation in the development and implementation of the program

84

84

If initial entry is needed to obtain monitoring or inspection data to determine if hazards are present...

Must enter using a permit!

85

85

Alternate Entry

Procedures

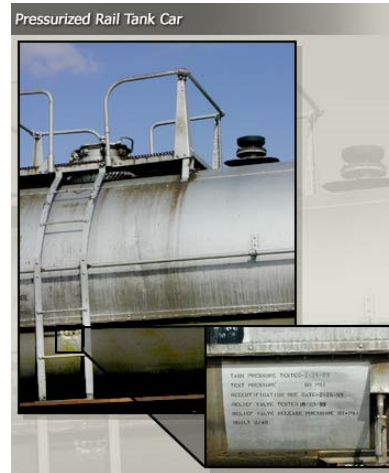
- Safe removal of entrance cover
- Guarded opening – barriers, railing, etc
- Atmospheric monitoring with calibrated instrument...
- No hazardous atmosphere present while employee inside space
- Continuous forced-air ventilation...
- Periodic monitoring of the atmosphere
- Employer certification
- Employee access to the certification

86

86

Removal of Entrance Covers

- Any conditions making it unsafe to remove an entrance cover must be eliminated before the cover is removed.
- Conditions within a permit space that may make it hazardous to remove the cover:
 - High temperature
 - High pressure



87

87

Guarded Opening

Once the entrance covers are removed, temporary barriers must be placed.



88

88

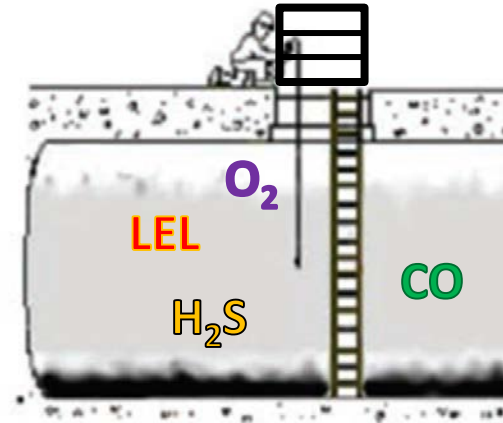
Air Monitoring

Testing for atmospheric hazards:

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)

Test in that order.

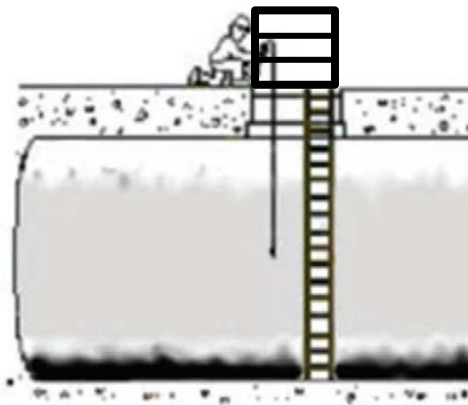
Do not lower the monitor into the space unless approved by the manufacturer!



89

89

Air Monitoring



Follow manufacturer's recommendations:

- Must be calibrated
- Use tubing to measure different levels in the space
- Allow adequate time for air to travel through tubing to monitor
- Protect monitor from liquid intrusion

90

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Alternate Entry – Safe for Entry

- Under a (c)(5) entry, a “safe atmosphere” is defined as a level that does not exceed:
 - 5% of the LFL/LEL, **or**
 - 50% of a concentration of a toxic substance that would constitute a hazardous atmosphere
- See agency instruction, [MIOSHA-STD-05-1R4](#), Page 11, question 8
- Entry under (c)(5) would not be acceptable if hazards in the space quickly increased if the ventilation were to stop. Sufficient time must be available for an entrant to safely exit the space if the ventilation stops

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Instrument Alarm Settings – Example of Typical Manufacturer Settings

Sensor	Low Alarm	High Alarm	MIOSHA PEL 8 hr TWA
Oxygen – O ₂	19.5	23.5	
Lower Explosive Limit - LEL	10%	20 %	Above PEL? 5% LEL for alternate entry
Carbon Monoxide - CO	35 ppm	200 ppm	35 ppm G.I. 50 ppm Construction
Hydrogen Sulfide – H ₂ S	10 ppm	20 ppm	10 ppm – 8 hr TWA

NOTE: Air contaminants must be maintained at 50% of the PEL for alternate entry procedures to be permissible.

92

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Hazardous Atmosphere Detected



- Employees must exit immediately, **and**
- The space must be evaluated, **and**
- Corrective measures must be taken before any subsequent entry takes place.

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Alternate Entry

- Continuous forced air (positive pressure) ventilation
- Directed to ventilate immediate area of employee location
- Clean source of supply air



Not acceptable!

94

94

Alternate Entry

- Entry not acceptable if hazards in space would quickly increase if ventilation were to stop
- Sufficient time must be available for an entrant to safely exit the space if ventilation stops



95

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Alternate Entry

- Employer must certify in writing that the space is safe for entry.
- Certification content:
 - Date,
 - Location of the space, **and**
 - Signature of the person certifying the space
- Must be made available to each employee

Confined Space Entry Program
Note: Atmospheric hazards only

Alternate Entry Certification

Location of space: Chemical Tank

Date and time of entry: 10/26/2009

Substance:	Readings:	Acceptable Limits:	Readings OK?
Oxygen by volume	<u>20.9%</u>	20.9%	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Permissible LEL	<u>5%</u>	Less than 10% LEL	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Carbon Monoxide	<u>0 ppm</u>	Less than 35 ppm	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydrogen sulfide	<u>0 ppm</u>	Less than 10 ppm	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Other:			

Comments: NONE

Have entrants received training? Yes ☒ No ☐

I certify that the permit space to be entered contains only atmospheric hazards and those hazards are being controlled by continuous forced air ventilation throughout the entire entry until all employees have left the space.

Signature: John Doe Date: 10/26/2009 Time: 8:55pm

96

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Reclassified as a Non-Permit Confined Space

- **All hazards must be eliminated**
- Becomes a permit-required confined space if hazards are reintroduced or arise
- Certification documenting there are:
 - No actual or potential atmospheric hazards, **and**
 - No other serious hazards
- The space remains reclassified as long as the hazards remain eliminated

97

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Lockout

Hazard Elimination

Lockout of electrical/mechanical hazardous energy sources

Hazard Control

Lockout only of flowable materials such as steam, natural gas, grain, water, etc.

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Reclassified as a Non-Permit Confined Space

Achieving Hazard Elimination



If entry is required to:

- Eliminate hazards, **or**
- Verify that the hazards have been eliminated

It must be performed as a permit entry

99

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Reclassified as a Non-Permit Confined Space



100

100

Reclassified as a Non-Permit Confined Space

Certification of Hazard Elimination

- Documents basis for determining all hazards in the space have been eliminated.
- Certification contents:
 - Date,
 - Location of the space, **and**
 - Signature of the person certifying the space
- Must be made available to each employee
- Valid only as long as all hazards in the space remain eliminated

Temporary Reclassification
(From PRCS To Non-PRCS Certification)

Location of Confined Space: Mixer in High Bay Area

Date & time space is reclassified as a non-PRCS:
Date: 6/11/2005 Time: 4:05pm

Certificate sections complying with this requirement may resemble the following:

Describe how hazards have been eliminated. Be detailed such as: lockout/tagout of electrical or mechanical hazards, isolation of gas lines, removal of entanglement hazards, etc.

Mixer has been locked out and no hazardous atmosphere present

I certify that all hazards have been eliminated.
Signature: John Doe Date: 6/11/2005 Time: 4:05

101

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Reclassified as a Non-Permit Confined Space

Hazards Arising in a Reclassified Space

- If hazards arise while employees are inside a space, they must exit the space
- Employer must then reevaluate space to determine whether it must be reclassified as a permit space



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Permit-Required Confined Space Entry Decision Group Exercise

Instructions: Answer the following questions for each of the following spaces. Be prepared to explain your decisions.

1. Is the space a confined space?

- ☐ Yes
- ☐ No

2. Is the space a permit-required confined space?

- ☐ Yes
- ☐ No

3. If the space is entered, how would you enter?

- ☐ N/A
- ☐ Reclassified as a Non-Permit Confined Space Prior To Entry
- ☐ Alternate
- ☐ Permit

103

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Part 35 Host Employer Obligations

- *Owns or manages the property where construction is occurring*
- Inform contractor of PRCSS
- Discuss PRCSS, hazards, and characteristics
- Apprise of precautions and procedures (host actions)
- Coordinate entry
- Debrief contractor



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Part 35 Contractor Obligations

- Comply with PRCS requirements applicable to all employers, including having a permit space program
- Obtain any available information from the host
- Coordinate entry
- Inform the host employer of:
 - Permit space program to be followed (not required by the standard to follow the host employer program unless contractually required to do so), **and**
 - Any hazards found or created in the space (through a debriefing or during entry operations)



105

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PRCS Program

- Implement measures necessary to prevent unauthorized entry
- Identify and evaluate hazards of permit spaces before employees enter
- Develop and implement means, procedures, and practices necessary for safe permit space entry operations
- Provide, maintain, and properly use all needed equipment (including equipment calibration)

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PRCS Program

Continued

- Evaluate permit space conditions (testing/monitoring)
- Provide at least one attendant
- Designate employees/employee roles
- Procedures for summoning rescue & emergency services
- System for the preparation, issuance, use/cancellation of entry permits
- Procedures to coordinate entry operations
- Procedures for concluding PRCS entry

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PRCS Program

Review Requirements

- Review entry operations when there is any reason to believe the permit space program may not protect employees
- Review the permit space program using canceled permits within one year after each entry and revise the program as necessary
 - Employers may perform a single annual review covering all entries performed during a 12-month period

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Permit System

- Entry supervisor must:
 - Be identified on the permit and sign it to authorize entry
 - Sign/initial the permit if taking over from another entry supervisor
- The permit must be available to employees
- Duration of the permit cannot exceed the time required to complete the assigned task or job identified on the permit
- Construction Part 35 allows permits to be “suspended”
- Permits must be retained for at least one year

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Entry Permit

Must identify...

- | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none">• Space,• Purpose of entry,• Date and duration of entry,• Entrants in the space,• Attendant,• Entry supervisor,• Hazards of the space,• Measures taken to eliminate or control hazards,• Acceptable entry conditions, | <ul style="list-style-type: none">• Results of testing,• Summoning rescue/emergency services,• Communication procedures/equipment,• Other equipment and PPE required for entry,• Any other conditions necessary for safe entry,• Any additional permits such as hot work. |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

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Sample of Entry Permit – Construction

Confined Space in Construction – Sample Permit /Hazard Assessment/Certification

Entry #: _____

Entry Type: Full Permit Confined Space ☐ Alternate Entry Proc. ☐ Reclassified ☐ Explain: _____
 Note: Permit is not required for entry if using alternate entry procedures or for reclassified spaces (See MIOSHA Part 35 for details).

1. Permit space to be entered (i.e. sewer, tank, manhole, crawlspace, attic): _____		Host, GC and Subs notified of the work? Yes <input type="checkbox"/> NA <input type="checkbox"/>																																																	
2. Purpose of entry: _____		Location: _____																																																	
3. Date of entry: _____	Auth. duration of entry permit: _____	Entry supervisor print name/contact information: _____																																																	
4. Rescue type selected: Non-entry <input type="checkbox"/> or Entry <input type="checkbox"/> Equipment: Tri-pod/Davit arm <input type="checkbox"/> or ^o Emergency service <input type="checkbox"/> Emer. Service Available (Permit Space only): Onsite <input type="checkbox"/> or Off-site (name & phone): _____		Communication Equipment: Radio <input type="checkbox"/> Voice <input type="checkbox"/> Cell Phone <input type="checkbox"/> Air Horn <input type="checkbox"/> Other <input type="checkbox"/>																																																	
Rescuer(s) trained in 1 st Aid/CPR (Permit Space only): <input type="checkbox"/> (Note: Part 1 1 st Aid requirements)																																																			
5. Authorized entrants (Print Names) Use back or attach page for more entrants		<table border="1"> <thead> <tr> <th colspan="2">Entry time</th> <th colspan="2">Entry time</th> <th colspan="2">Entry time</th> <th colspan="2">Entry time</th> </tr> <tr> <th>In</th> <th>Out</th> <th>In</th> <th>Out</th> <th>In</th> <th>Out</th> <th>In</th> <th>Out</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>		Entry time		Entry time		Entry time		Entry time		In	Out	In	Out	In	Out	In	Out																																
Entry time		Entry time		Entry time		Entry time																																													
In	Out	In	Out	In	Out	In	Out																																												
6. Attendant (Print Name) _____		7. Current training for confined space workers verified?																																																	
Date and Time _____ AM <input type="checkbox"/> PM <input type="checkbox"/>		Yes <input type="checkbox"/> No <input type="checkbox"/>																																																	
_____ AM <input type="checkbox"/> PM <input type="checkbox"/>		_____ AM <input type="checkbox"/> PM <input type="checkbox"/>																																																	
8A. Identify, evaluate and record hazards of space to be entered.		8B. Specify equipment and measures required to eliminate/control hazards before and during entry																																																	
Yes	No	Continuous forced air ventilation <input type="checkbox"/> Blank, Block and Bleed <input type="checkbox"/> Purge, Clean, Drain <input type="checkbox"/> Intrinsic Safe Lighting <input type="checkbox"/> Respiratory Protection: Supplied Air with Escape Bottle <input type="checkbox"/> SCBA <input type="checkbox"/> Other (list) <input type="checkbox"/>																																																	
A. Lack of Oxygen or Inert Gas Present (i.e. Argon, Nitrogen)	<input type="checkbox"/>																																																		
B. Flammable Gas/Vapor (%LEL)	<input type="checkbox"/>																																																		
C. Toxic Gas/Vapor (i.e. CO and H ₂ S)	<input type="checkbox"/>																																																		
D. Chemical (impairs self-rescue)	<input type="checkbox"/>																																																		

111

111

When can a permit be suspended? Construction Part 35

Suspend or cancel the entry permit and fully reassess the space before allowing reentry when:

- A condition that is not allowed under the entry permit arises in or near the permit space
 - That condition is temporary in nature
 - Does not change the configuration of the space
 - Does not create any new hazards within the space

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Employee Training

- All affected employees must acquire knowledge, understanding, and skills
- Provided to each affected employee:
 - Construction Part 35: Language and vocabulary that is understood
 - Prior to first assigned duties,
 - Before change in assigned duties,
 - New hazard present – employee untrained on, **and**
 - Deviations and/or inadequacies arise
- Establish employee proficiency
- **Certification of employee training**

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Employee Training Construction Part 35 “Extras”

- Training must result in an understanding of the:
 - Hazards in the permit space
 - Methods used to isolate, control, or in other ways protect employees from these hazards
- For employees not authorized to perform entry rescues, train in the dangers of attempting such rescues

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Employee Training

Retraining and Additional Training

- **No annual training requirement**
- Retraining and/or additional training must be given when:
 - The employer has reason to believe either that there are deviations from the permit space entry procedures, **or**
 - There are inadequacies in the employee's knowledge or use of these procedures, **or**
 - Any changes in assigned duties

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Employee Training

Certification

- Employee name
- Initials of the trainer(s) or **Construction Part 35: Name of trainer(s)**
- Date(s) of the training

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Authorized Entrant

- Know the hazards:
 - Mode,
 - Signs or symptoms, **and**
 - Consequences of exposure
- Properly use the equipment
- Communicate with attendant
- Exit quickly when ordered to evacuate

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Attendant

- Know the hazards:
 - Mode,
 - Signs or symptoms, **and**
 - Consequences of exposure
- Know the possible behavioral effects of any hazardous exposure in the entrants
- Maintains count of entrants
- Remains outside the space
- Communicates with the entrants and alerts entrants of evacuation

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Attendant

Continued

- Monitors activities in and outside the space
- Summons rescue/emergency services
- Keeps unauthorized people away
- Performs non-entry rescue
- Performs no other duty that could interfere with this responsibility

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Entry Supervisor

- Know the hazards:
 - Mode,
 - Signs or symptoms, **and**
 - Consequences of exposure
- Verifies:
 - All permit conditions are in place prior to entry – signs permit.
 - Rescue/emergency services are available and means of summoning them are operable
- Cancels the permit
- Construction Part 35: Allowed to suspend the permit
- Removes any unauthorized personnel
- Ensures consistent operation and acceptable entry conditions

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Rescue and Emergency Services

- Evaluate the rescue service's ability to:
 - Respond in a timely manner considering the hazards
 - Perform rescue and use necessary equipment
- Inform rescue service of hazards
- Provide access to all PRCs for planning and practice purposes
- Best practice in General Industry but required in Construction: Have rescue service inform the employer if not available during a permit space entry

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Rescue and Emergency Services

In-house PRCS Rescue

- Ensure members are properly trained and equipped to:
 - Use of personal protective equipment,
 - Perform assigned rescue duties,
 - Act as an authorized entrant, **and**
 - **Provide basic first aid and CPR**
- **Practice rescues at least once every 12 months**



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122

Rescue and Emergency Services

Non-entry Rescue

- A retrieval system or method must be used when a permit space is entered
 - Exception: If equipment increases risk or would not contribute to rescue
- Retrieval system must meet the following:
 - Chest or full body harness
 - Wristlets can only be used if safe and a harness is infeasible or creates a greater hazard
- Mechanical device must be used for retrieval from a space more than five (5) feet deep

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Employee Participation

- Employer shall consult with affected employees on all aspects of the PRCS program
- Employer must make available all information required to be developed by Parts 35, 90 and 490

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Module 4

Application of Entry

The attendee will be able to identify the three types of entry that can be performed:

- Permit
- Alternate
- Reclassified as a Non-Permit Confined Space Prior To Entry



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Permit Entry

This should be a last resort for the company:

- It is the most hazardous entry method
- All hazards may not be fully known or characterized
- It is the most costly means of entry

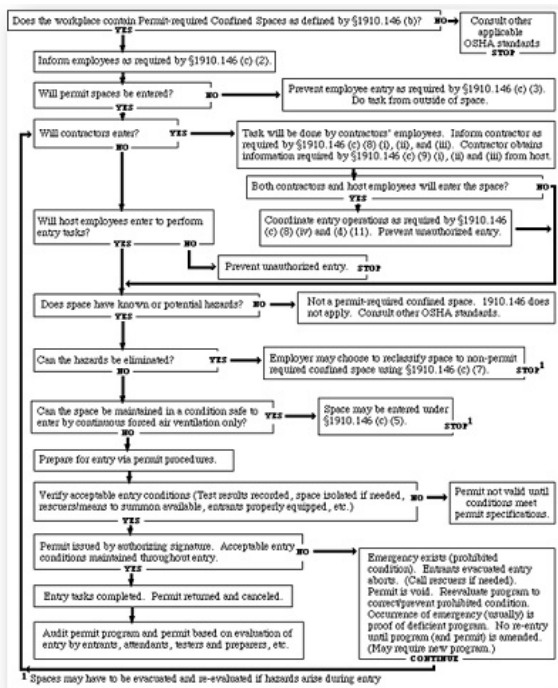
126

126

Permit Entry

Evaluation Steps

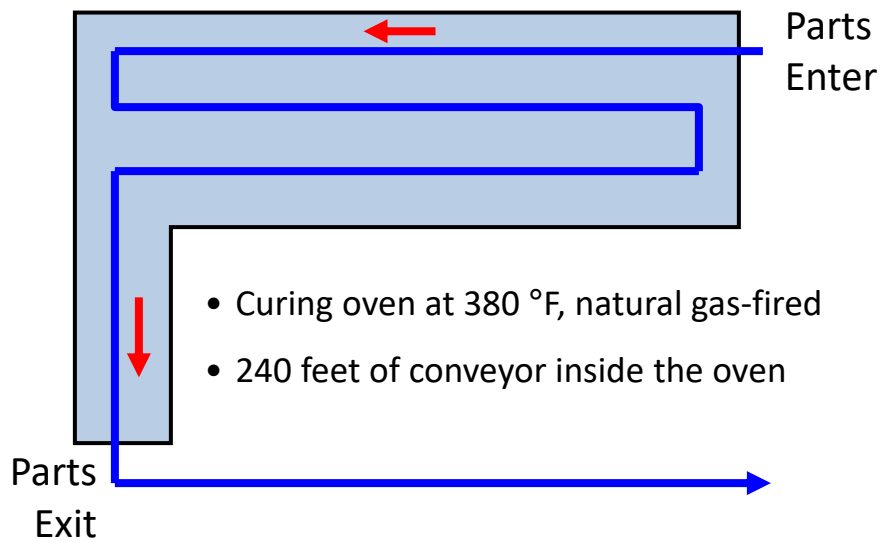
- Is it a confined space?
- Is it a permit space?
- What are the hazards in the space?
- Can the permit space be entered using:
 - Reclassification?, or
 - Alternate entry?, or
 - Permit entry?



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128

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129

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Assessment

- Is it a confined space?
- Is it a permit space?
- What are the potential or actual atmospheric hazards?
 - 1.
 - 2.
 - 3.
- Other recognized serious hazards:
 - 1.
 - 2.

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130

Powder Coat Curing Oven

Entry Options

Three options are available for entry into this permit space:

1. Permit
2. Alternate
3. Reclassification



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Permit Entry

- To be utilized as a last resort for entry into a permit space; when the task cannot be performed either:
 - From outside the space **or**
 - By alternate or reclassified methods of entry
- **Requires all of these elements:**
 - A written program
 - Use of a permit system with retention of permits for at least one year after the entry for program evaluation
 - Additional, specific employee training
 - Use of a standby person
 - Use of appropriate entry equipment
 - Provision of rescue and emergency services

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Alternate Entry

- The only remaining hazard can be a potential or an actual hazardous atmosphere; no others present, or they have been eliminated
- Forced, continuous ventilation alone is sufficient to maintain the space safe for entry
- No hazardous atmosphere must be present within the space during the entry process (i.e., all limits less than 50% of those identified)
- Monitoring and inspection data supports the above conditions
- Written certification verifies the space safe for entry
- What must be done in order to enter this permit space using alternate entry procedures?

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Alternate Entry

1. Eliminate the mechanical hazard posed by the conveyor (i.e., perform appropriate lockout procedure)
2. Eliminate the temperature hazard (i.e., allow the space to cool)
3. Control the atmospheric hazard(s):
 - a. Lockout the natural gas valve – note that this is not a hazard elimination procedure for an atmospheric hazard
 - b. Utilize continuous, force air ventilation:
 - To reduce the hazardous atmospheric concentrations to less than 50% of their limits
 - Direct ventilation into the immediate area where employees will work
 - c. Test the permit space atmosphere prior to entry and periodically thereafter with a properly calibrated device

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Reclassification

- No hazards may be present – all must be eliminated prior to entry using this procedure:
 - Actual and potential atmospheric hazards, **and**
 - Engulfment hazards, **and**
 - Entrapment hazards, **and**
 - All other recognized serious hazards
- Only a temporary classification that applies as long as all hazards remain eliminated
- What must be done in order to enter this permit space using reclassification entry procedures?

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135

Powder Coat Curing Oven

Reclassification

1. Eliminate the mechanical hazard posed by the conveyor (i.e., perform appropriate lockout procedure)
2. Eliminate the temperature hazard (i.e., allow the space to cool)
3. Eliminate the atmospheric hazard(s):
 - a. Isolate the natural gas valve – Use of double block and bleed system, blanking or blinding, etc.
 - b. Utilize ventilation as necessary to eliminate any residual atmospheric hazard; space cannot require continued ventilation to maintain the atmosphere safe for entry
 - c. Test the permit space atmosphere to ensure it is safe for entry with a properly calibrated device

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Re-evaluation of the Space

When there are changes in use or configuration of the space (i.e., new hazards are introduced into the space increasing the risk to the entrants), the standard requires a re-evaluation of the space:

- If an entry is in process and new hazards are introduced, remove entrants until the reclassification has been completed
- If necessary, appropriately reclassify the space



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Module 5

Ventilation of Permit Spaces

The attendee will be able to:

- Differentiate between using ventilation to control vs. eliminate a hazard in a permit space
- Describe the ventilation requirements
- Apply the basic principles of confined space ventilation

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Ventilation of Permit Spaces

May be performed to:

- Control atmospheric hazards...
- Eliminate atmosphere hazards...



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Control of Atmospheric Hazards

- Control of atmospheric hazards through forced air ventilation does not constitute elimination of the hazards:
 - Contaminant may continue to evolve in the permit space
 - Ventilation maintains generated air contaminants below acceptable limits
 - Not permitted for reclassified entry as the hazard must be eliminated
- Control of atmospheric hazards through forced air ventilation must maintain acceptable air limits for:
 - Alternate entries: Below 50% of PELs and/or 5% of LELs
 - Permit entries: As necessary

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Ventilation of Permit Spaces

Alternate Entry

Continuous forced air ventilation shall be used, as follows:

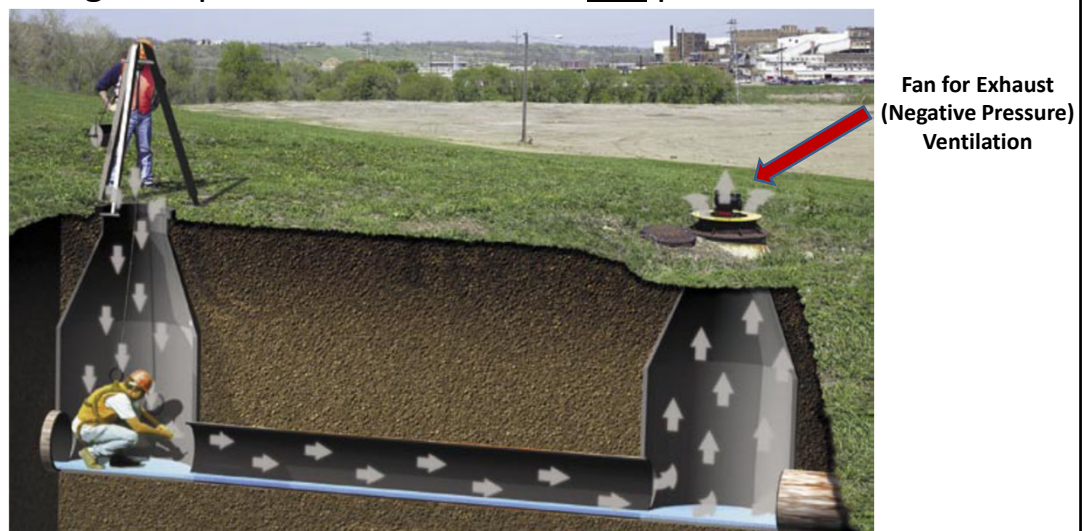
- The forced air ventilation shall be so directed as to ventilate the immediate areas where an employee is or will be present within the space and shall continue until all employees have left the space;
- The air supply for the forced air ventilation shall be from a clean source and may not increase the hazards in the space

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Exhaust Ventilation

Negative pressure ventilation is not permitted.

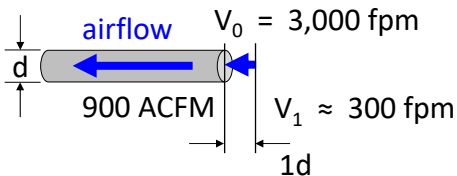


142

142

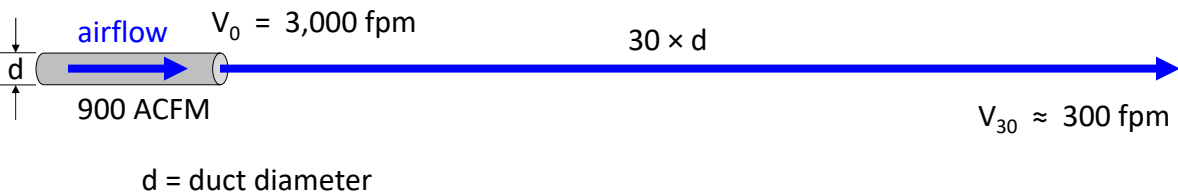
Why Forced Air Ventilation?

Exhaust (Negative Pressure) Ventilation:



Do you “suck” out **or** “blow” out candles?

Forced Air (Positive Pressure) Ventilation:



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Ventilation of Permit Spaces

Permit vs. Reclassified Entries

- Permit entries:
 - Purging, inserting, flushing, or ventilating the permit space as necessary to eliminate or control atmospheric hazards
- Reclassified entries:
 - ...the permit space poses no actual or potential atmospheric hazards...
 - That is, either no atmospheric hazards were present, or ventilation was used to eliminate the hazardous atmosphere prior to entry

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Ventilation of Permit Spaces Summary

- Provide forced air (positive pressure) ventilation for all alternate entries
- Provide continuously for all alternate entries
- Provide where employees are or will be working
- Used primarily as a means of hazard control...that sometimes can be used as a means of hazard elimination



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Any Questions?

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Assessment

- The purpose of this assessment is to validate the knowledge learned in class
- A passing score of 70% correct is required
- Not allowed during the assessment:
 - Use of class reference materials/books
 - Collaboration/discussion with others
- Answers will be reviewed after everyone completes and submits their assessment

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Thank you.

Don't Forget to Take the Survey



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Part 35. Confined Spaces in Construction & Parts 90/490. Permit-Required Confined Spaces in GI

Student Resources

MIOSHA Standards/Publications:

Part 35. Confined Space in Construction
[Standard](#), [Division Instruction](#), [Website](#)

Part 90 and 490. Permit-Required Confined Spaces
[Standard](#), [Agency Instruction](#)

MIOSHA Training Calendar:

www.michigan.gov/mioshatraining



Michigan Department of Labor and Economic Opportunity
Michigan Occupational Safety and Health Administration
Consultation Education and Training Division
525 W. Allegan St., P.O. Box 30643
Lansing, Michigan 48909-8143

For further information or to request consultation, education and training services
call 517-284-7720

or

visit our website at www.michigan.gov/miosha

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