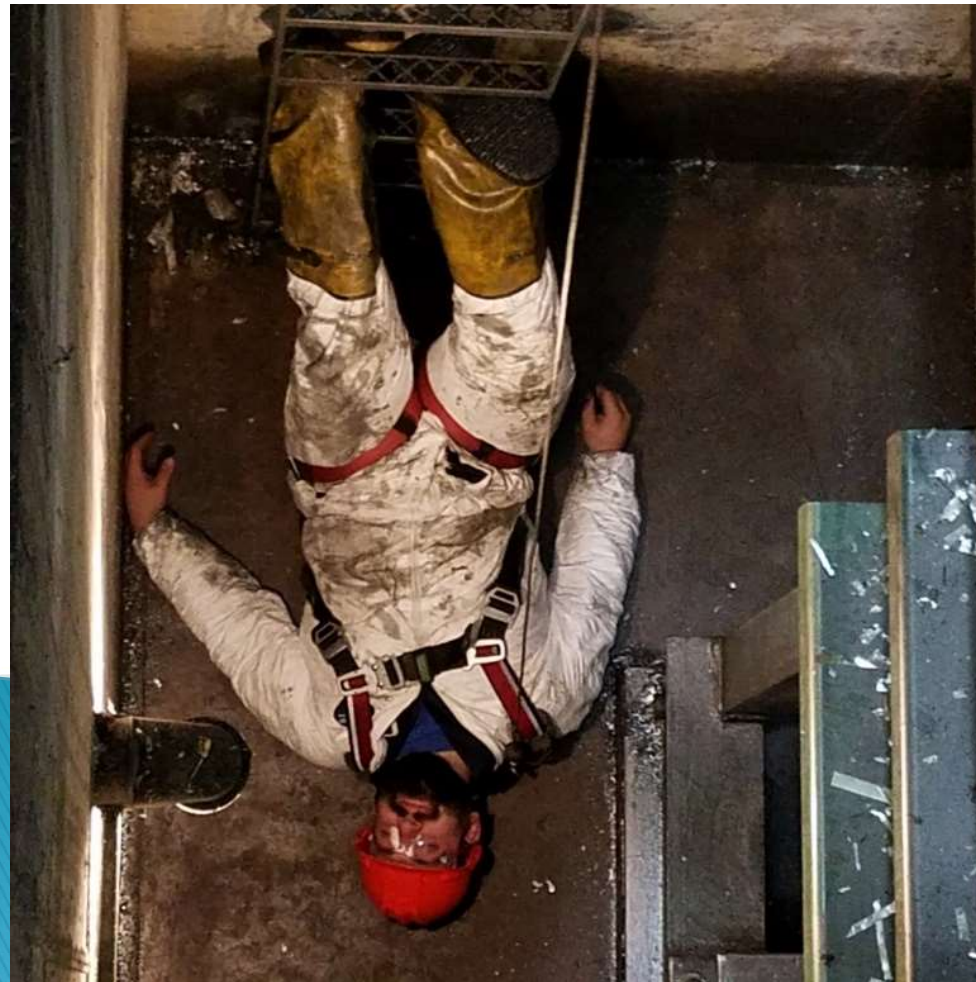


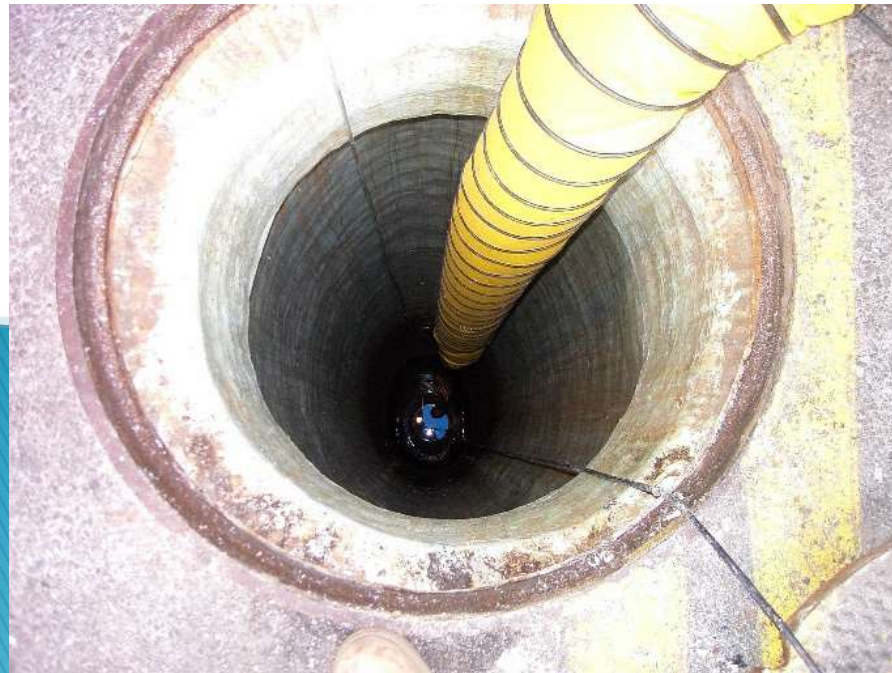
Confined Spaces A Death Trap Compliance and Beyond



Confined Spaces


Compliance and Beyond

Michael Ziskin, CHMM, CBCP, CUSP, FIHMM
Lead Instructor, OSHA Training Institute Education
Center New England, Keene State College




- ▶ **OSHA #7300 Understanding OSHA's Permit Required Confined Space Standards (1910) – 1 day**
- ▶ **OSHA #2264 Permit-Required Confined Space Entry (1910 and 1926) – 3 days**
- ▶ **Both online and at Ed Center venues**

Presentation Objectives


- ▶ Scope of OSHA General Industry 1910.134 and Construction 1926.1201–1213 Standards
 - ▶ Compare and contrast both OSHA Standards with ANSI Z117.1
 - ▶ Focus on definitions, training, testing, permits and rescue
 - ▶ New and recent information is highlighted in red font
- 

ANSI Z117.1 Standard


(originally adopted 1977, revised 2022)

- ▶ Scope – Minimum safety requirements ... in confined spaces at normal atmospheric pressure
 - ▶ Exceptions – underground mining, tunneling, caisson work, intentionally inert confined spaces or similar tasks that have established national consensus standards
 - ▶ Purpose – establish minimum requirements and procedures ... confined spaces
 - ▶ Application – voluntary application
- 

ANSI Z117.1 Standard (originally adopted 1977, revised 2022)

- ▶ The standard covers a wide range of topics, including:
 - atmospheric testing, isolation and lockout/tagout, ventilation,
 - cleaning and decontamination, protective equipment and
 - rescue.
- 

ANSI Z117.1 Standard (originally adopted 1977, revised 2022)

- ▶ Some key revisions include:
 - updated standards and other referenced materials related to confined spaces
 - examples of confined space surveys and permits.
 - The requirements for teams entering confined spaces have been clarified
- 

ANSI Z117.1 Standard does not cover

- ▶ Since ANSI/ASSP Z117.1–2022 is a performance standard, it does not deal with confined space design.

ANSI Z117.1 Standard does not cover

- ▶ When considering design modifications, another American National Standard, ANSI/ASSP Z590.3–2021: Prevention Through Design Guidelines For Addressing Occupational Hazards And Risks In Design And Redesign Processes, should be consulted.


ANSI Z117.1 Standard does not cover

- ▶ It is also noted in the Foreword of ANSI/ASSP Z117.1–2022 that the design process is best handled by the purchaser, employer, or owner during a project's design, acquisition, or construction.

ANSI Z117.1 Standard does not cover

- ▶ This standard does not apply to industries that have their own specific national consensus standards for confined spaces. This includes the maritime, agriculture, and construction industries, among others.

ANSI Z117.1 Standard does not cover

- ▶ This standard does not apply to industries that have their own specific national consensus standards for confined spaces. This includes the maritime, agriculture, and construction industries, among others.
 - ▶ Some of these are addressed by OSHA confined spaces standards.
- 

ANSI Z117.1 Standard does not cover

- ▶ ANSI/ASSP Z117.1–2022 also specifically excludes the following activities: underground mining, tunneling, caisson work, excavations, and intentionally inert confined spaces or other similar tasks.

NIOSH

- ▶ Criteria for a Recommended Standard – Working in Confined Spaces, 1979
 - Publication #80-106

1910.146 General Industry (effective 1993)

Scope

- ▶ Practices and procedures to protect employees in general industry from hazards of entry into permit–required confined spaces
- ▶ Does not apply to
 - Agriculture Part 1928
 - Construction Part 1926
 - Shipyard employment Part 1915

OSHA Letter of Interpretation 1910.146

to Mr. Spielvogel, 8/8/94:
Vertical Standards Take Precedence

“where permit space hazards identified by the initial determination requirement of paragraph (c)(1) are addressed by 29 CFR 1910.268(o), Underground lines, the telecommunications standard, not the permit space standard, applies.”



<http://www.undergroundconstructionmagazine.com/sites/default/files/confinedart1.jpg>



<http://www.cdc.gov/niosh/topics/confinedspace/>


“If the work area could not be made safe before entry, as required by 1910.268(o)(2)(i)(B), entry would have to be performed under the provisions of 1910.146.”

1926.1201 Construction (effective 2015)


Scope

- ▶ Practices and procedures to protect employees engaged in construction activities at a worksite with confined spaces
- ▶ Does not apply to:
 - Subpart P Excavations
 - Subpart S Caissons, Cofferdams and Compressed Air
 - Subpart Y Diving

Human Factors

- ▶ Not addressed in any of the confined space standards
 - ▶ Physical fitness
 - ▶ Ergonomics
 - ▶ Heat Stress
 - ▶ Claustrophobia only mentioned once in ANSI
- 

6 Questions Answered

1. What is a confined space?
 2. What are the hazards?
 3. How do I mitigate hazards?
 4. Do I need a Permit?
 5. What PPE do my workers need?
 6. What if something goes wrong?
- 

Confined Space Definition 1910.146

- ▶ **OSHA 1910.146** Permit-required confined spaces defines the following in paragraph (b):
 - **Confined space** means a space that:
 1. Is large enough and so configured that an employee can bodily enter and perform assigned work; and
 2. Has limited and restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry.) and
 3. Is not designed for continuous employee occupancy

Confined Space Definition 1926.1202

- ▶ OSHA 1926.1202 Confined Spaces in Construction:
 - **Confined space** means a space that:
 - Is large enough and so configured that an employee can bodily enter ~~and perform assigned work~~ **it**:
 - Has limited or restricted means for entry or “**and**” exit; and
 - Is not designed for continuous employee occupancy.

Confined Space Definition ANSI Z117.1

- ▶ **ANSI Z117.1** Safety Requirements for Entering Confined Spaces defines the following in section 2):
 - **Confined Space** – Enclosed area large enough and configured to allow a person to bodily enter and has the following characteristics:
 - Its primary function is other than human occupancy
 - Has restricted entry and exit. Note – Restricted entry and exit is a physical configuration, which requires the use of the hands for support or contortion of the body to enter into or exit from a confined space.

Enclosed Space 1910.269


(operation and maintenance of electric power generation, control, transformation, transmission, and distribution lines and equipment)

- It does not apply to vented vaults if the employer makes a determination that the ventilation system is operating to protect employees before they enter the space.
- This paragraph applies to routine entry into enclosed spaces in lieu of the permit space entry requirements contained in paragraphs (d) through (k) of § 1910.146.

Enclosed Space 1910.269

- If, after the employer takes the precautions given in paragraphs (e) and (t) of this section, the hazards remaining in the enclosed space endanger the life of an entrant or could interfere with an entrant's escape from the space, then entry into the enclosed space shall meet the permit-space entry requirements of paragraphs (d) through (k) of § 1910.146.

Non-permit Confined Space Definition 1910.146

- ▶ A confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.
- 

Non-Permit Confined Space Definition 1926.1202

- ▶ A confined space that meets the definition of a confined space but does not meet the requirements for a permit-required confined space, as defined in this subpart.

Non-Permit Confined Space Definition

ANSI Z117.1

- ▶ **Non-Permit Confined Space (NPCS).** A space that by configuration meets the definition of a confined space, but which after evaluation presents no potential or serious hazards to the entrants, or has the hazards removed by engineering controls.
- ▶ **Note:** In these circumstances, a safe work procedure as per Z117.1 Section 4 lists safeguards that may be used to safely enter NPCS areas.



Permit–required Confined Space Definition 1910.146 & 1926.1202

- ▶ **Permit–required confined space (permit space)** means a confined space that has one or more of the following:
 - (1) Contains or has the potential to contain a hazardous atmosphere;
 - (2) Contains a material that has the potential for engulfing an entrant;
 - (3) Has an internal configuration that an entrant could be trapped or asphyxiated by inwardly converging walls...or
 - (4) Contains any other recognized serious safety or health hazard.

[Same definition as in 1910.146 general industry standard]

Permit Confined Space Definition

ANSI Z117.1

- ▶ **Permit Confined Space (PCS).** A confined space, which after evaluation, is found to contain actual or potential serious hazards. Because of the severity of the hazards, the confined space requires written authorization for entry.



Confined Space Defined

A Space that: has limited/restricted means of entry or exit; *and*

“Restricted entry and exit is a physical configuration, which requires the use of the hands for support or contortion of the body to enter into or exit from a confined space.”

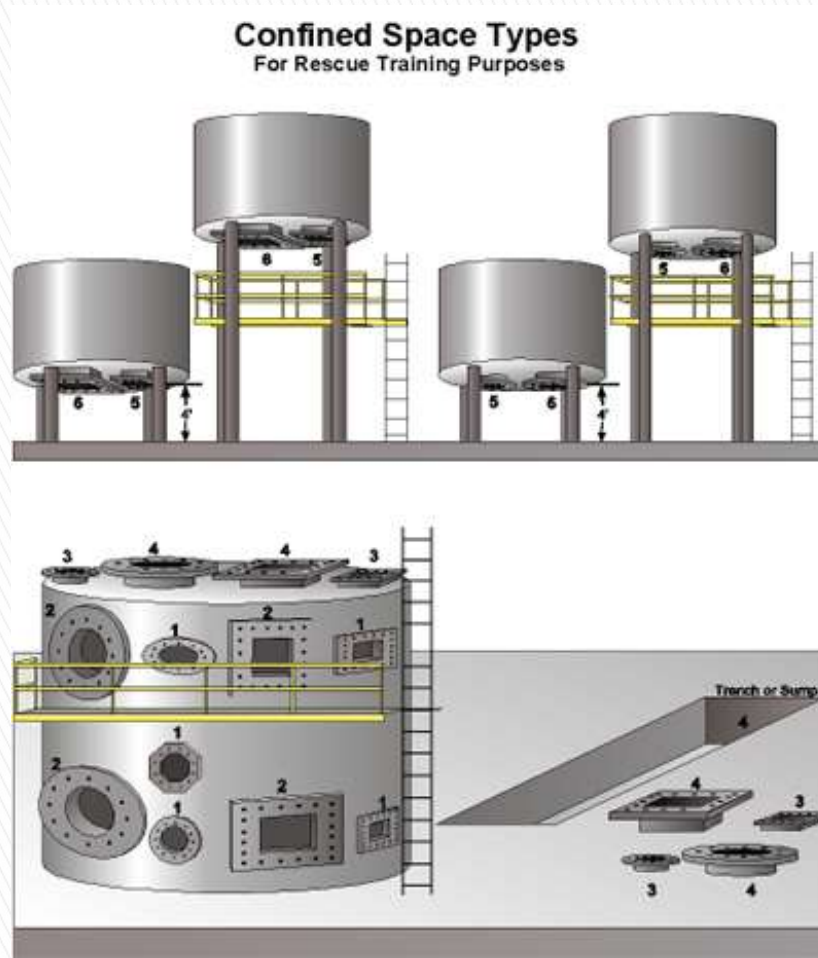
Safety Requirements for Confined Spaces (ANSI Z117.1-2009)



http://www.offshore-technology.com/contractor_images/ptsamsontiara/3-confined-space.jpg

Examples of Confined Spaces

- Tanks
- Pits
- Hoppers
- Ductwork
- Vats
- Boilers
- Vaults



- Mixers
- Sewers
- Pipelines
- Tunnels
- Manholes
- Trenches
- Sumps

Confined Space Hazards

- ▶ Physical Configuration
 - Atmosphere
 - Engulfment/ Entrapment
 - Converging Walls
 - Entry Point Hazards
 - Size of opening
 - Vertical drop
 - Ladders
 - Mechanical, Electrical Hazards
 - Thermal Hazards
 - Human Factors
 - Fear Factors
 - Noise
 - Vibration
 - Slips, trips, and falls
- ▶ Combination Hazards
- ▶ Health Hazards
 - Biological
 - Organic decay
 - Chemical
 - Toxic and/ or IDLH
 - Oxygen deprivation (Rust)
 - Flammable/explosive
 - Radiation
- ▶ Aggravating Factors
 - Delay in rescue time

1910.146 General Requirements

“Changes” – (c)(6)


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* reevaluate that space and, if necessary, reclassify it as a permit-required confined space.”

This has been expanded in 1926.1203




OSHA's Confined Spaces in Construction

1926.1203(f) – “When there are changes in the use or configuration of a non-permit confined space that might increase the hazards to entrants, **or some indication that the initial evaluation of the space may not have been adequate, each entry employer must have a competent person** reevaluate that space and, if necessary, reclassify it as a permit-required confined space. .”




OSHA's Confined Spaces in Construction Definitions 1926.1202

- ▶ **Competent person** means one who is capable of identifying hazards and working conditions which are unsanitary, hazardous, or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them.
 - ▶ [This definition is not in 1910.146(b) or in ANSI Z117.1].
- 

1910.146 General Requirements


(c)(1) – (3)

The Employer *Shall*:

- ▶ Evaluate the workplace for permit required confined spaces
 - ▶ If permit spaces, the employer shall inform exposed employees, by posting danger signs or by any other equally effective means
 - ▶ If no entry by employer, take effective measures to prevent its employees from entering the permit spaces
- 

1910.146 General Requirements

1910.146 (c)(4) – (7)

- ▶ Employer entry into permit spaces – develop and implement a written permit space program
 - ▶ Use of alternate procedures and comply with 14 specific requirements in 1910.146 (c)(5) [A] through [F] and (c) (5) [A] through [H].
 - ▶ Changes in NPCP – reevaluation
 - ▶ Reclassification of PRCS
- 

Options for Entry


1910.146 (c)(5) Alternate Entry Procedures	1910.146 (c)(7) Reclassification to Non-PRCS
Hazardous Atmosphere ONLY Hazard	No Hazardous Atmosphere
Controlled by Ventilation	All Hazards are Eliminated
Document Determinations and Supporting Data	Document Determinations and Supporting Data
Signed Certificate	Signed Certificate
No (d) – (f) and (h) – (k)	If Entry Required for Hazard Elimination, Must Follow (d) – (k)
Training Required (g)	
(c)(5)(ii)(G): If Conditions Change, Reevaluate	(c)(7)(iv): If Conditions Change, Reevaluate

OSHA Letter of Interpretation 1910.146

To Mr. Saunders, 9/20/94:

Removal of material may not be enough; residues could persist posing potential atmospheric hazards

Examples of conditions which would render paragraph (c)(7) inoperative:

- oxidation of the tank shell
 - leaching of the former contents or by-products absorbed by the tank coating or lining into the permit space;
 - leaking of the contents trapped between the lining and the tank shell by a defective tank coating or lining.
 - rising or falling outside temperature
 - changing or stratified tank shell temperature from exposure to sunlight or other sources of radiant energy;
- 

1910.146 General Requirements

Host Employers and Contractors (c)(8)


1910.146 (c)(8) The Host Employer *Shall*:

- ▶ Inform the contractor
- ▶ Apprise the contractor of:
 - hazards identified and experience with the space
 - precautions and procedures for protecting employees
- ▶ Coordinate entry operations with the contractor
- ▶ Debrief the contractor at the conclusion of the entry operations

1910.146 General Requirements

Host Employers and Contractors (c)(9)

1910.146 (c)(9) The Contractor *Shall*:

- ▶ Obtain any available information regarding permit space hazards and entry operations from the host employer
 - ▶ Coordinate entry operations with the host
 - ▶ Inform the host employer of their program and of any hazards confronted or created in permit spaces
- 

OSHA Letter of Interpretation 1910.146

To Mr. Barber, 10/20/93:

Who is Responsible for Compliance with Standard?

...“in addition to citing employers whose employees are exposed to hazards (the exposing employer), the following employers shall normally be cited, whether or not their own employees are exposed”


(1) The employer who actually creates the hazard (the "creating employer")

(2) The employer who is responsible, by contract or through actual practice, for safety and health conditions on the worksite; i.e., the employer who has the authority .. (the "controlling employer")

(3) The employer who has the responsibility for actually correcting the hazard (the "correcting employer")

OSHA's Confined Spaces in Construction

1926.1202

- ▶ Competent Person
 - ▶ Controlling Contractor
 - ▶ Entry Employer
 - ▶ Host Employer
 - ▶ Qualified Person
-
- ▶ 1910.146 does not include these definitions
- 


OSHA's Confined Spaces in Construction

1926.1203 General Requirements

Each employer must...

- (a) Competent person identifies confined and permit spaces
- (b) Inform exposed employees
- (c) Prevent unauthorized entry
- (d) Written program to enter PRCS
- (e) Alternate procedures with testing and written certification
- (f) Competent person reevaluates non-permit spaces
- (g) Competent person reclassifies a PRCS to a NPCCS
- (h) Permit space entry communication/coordination
- (i) No Controlling Contractor – Host Employer

Requirements specified in 1926.1203

- ▶ Employers who allow workers to enter a permit space without using a complete permit system, follow **Alternate Entry Procedures** in 1203 such as elimination of physical hazards, continuous monitoring and ventilation.
 - ▶ Requiring continuous monitoring of engulfment hazards such as a sewer, post a monitor upstream from the work or provide an electronic sensor giving warning to entrants of the engulfment danger and need to exit space.
- 

Requirements specified in 1926.1203

Alternate Entry Certificate by 1203(e)

Space _____

Area _____

I certify that all the non-atmospheric hazards have been eliminated and the atmospheric hazards are being controlled by forced air ventilation. Date: _____

Time: _____

Supervisor's #

Signature: _____

OSHA's Confined Spaces in Construction Definitions 1926.1202

- ▶ **Control** refers to the engineering methods used to reduce the hazard within acceptable limits like ventilation.
 - PPE is NOT a control
- ▶ **Controlling Contractor** has the overall responsibility for construction at the worksite.
- ▶ [These definitions are not in 1910.146(b) or in ANSI Z117.1].



OSHA's Confined Spaces in Construction Definitions 1926.1202

- ▶ **Early-warning system** means the method used to alert authorized entrants and attendants of an engulfment hazard. Examples of early-warning systems include...


Lookout person stationed upstream

[This definition is not in general industry 1910.146(b) or Z117.1]

Entry Definition 1910.146 standard

- ▶ Definitions continued:
- ▶ Entry permit (permit) means the written or printed document that is provided by the employer who designated the space a permit space to allow and control entry.

[ANSI Z117.1 does not have a definition for entry permit, however does have a definition for permit system which is a similar definition]



Entry Definition 1926.1202

- ▶ Entry – means **any part** of a person passes into a PRCS.
- ▶ Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrants body breaks the plan of an opening into the space, **whether or not such action is intentional or any work activities are actually performed in the space.**
- ▶ **[Highlighted sections are different than the 1910.146(b) definition and have been added in this construction standard]**



Entry Definition ANSI Z117.1

- ▶ **Entry** – Ingress by persons into a confined space, which occurs upon breaking the plane of the confined space portal with any part of the body. Entry includes all periods of time in which the confined space is occupied.



OSHA's Confined Spaces in Construction Definitions 1926.1202

- ▶ Entry permit (permit) is the written document the employer has designated to allow and control entry...contains information specified in 1926.1206.

[Highlighted sections are different than 1910.146(b)].

CONFINED SPACE ENTRY PERMIT
ALL COPIES OF PERMIT WILL REMAIN AT JOB SITE UNTIL JOB IS COMPLETED.

LOCATION/DESCRIPTION OF CONFINED SPACE _____ DATE _____
PURPOSE OF ENTRY _____ TIME _____
DEPARTMENT _____ PERSON IN CHARGE OF WORK _____ EXPIRATION _____

COMMUNICATIONS:

SUPERVISOR(S) In Charge of Crews	Type of Crew	Phone

SPECIAL REQUIREMENTS:

	YES	NO		YES	NO
Lockout De-energize			Escape Harness Required		
Lines Broken - Capped or Blanked			Tripod Emergency Escape Unit		
Purge - Flush and Vent			Lifelines		
Ventilation			Fire Extinguishers		
Secure Area			Lighting		
Breathing Apparatus			Protective Clothing		
Resuscitator - Inhalator			Respirator		

TEST(S) TO BE TAKEN
(VALID FOR ONE 8 HOUR TURN ONLY) P.E.L.*

	YES	NO	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date
			M	M	M	M	M	M	M	M	M	M	M	M
% of Oxygen														
% of L.E.L.*														
Carbon Monoxide														
Aromatic Hydrocarbon														
Hydrocyanic Acid														
Hydrogen Sulfide														
Sulfur Dioxide														
Ammonia														

NAME OF GAS TESTER _____

NOTE: Continuous/periodic tests shall be established before beginning the job.
Any questions pertaining to test requirements should be directed to _____

TESTING INSTRUMENTS USED	NAME	TYPE	IDENTIFICATION NO.

AUTHORIZED ENTRANTS: _____ AUTHORIZED ATTENDANTS: _____

PERMIT AUTHORIZATION:
I certify that all actions and conditions necessary for safe entry have been performed.

NAME (Print) _____ SIGNATURE _____
DATE _____ TIME _____

*P.E.L. Permissible Entry Level
*L.E.L. Lower Explosion Level

FIRE CALL _____ AMBULANCE CALL _____ RESCUE CALL _____

OSHA's Confined Spaces in Construction Definitions 1926.1202

- ▶ Entry Employer decides that an employee it directs will enter a permit space.

Note to the definition of “Entry Employer”. An employer cannot avoid the duties by not making a decision...OSHA's decision: Considers employees to enter those spaces if they are in the proximity of the space.

[This definition is not in the general industry 1910.146(b) or ANSI Z117.1, but Z117.1 has defined Entry Supervisor]

Entry Supervisor Definition


1926.1202

- ▶ Entry supervisor means the **qualified** person (such as the employer, foreman, or crew chief) responsible for determining if acceptable entry conditions are present at the permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required by this standard.

[This is the same for 1910.146(b) except for the addition of **qualified**. Z117.1 has also defined Entry Supervisor, but is different]

Entry Supervisor Definition

ANSI Z117.1

- ▶ **Entry Supervisor (Entry Leader).** Due to the extensive knowledge, skills and experience, this individual is given the authority and responsibility to direct and implement all aspects of the confined space operation. This could be done personally or designated to a qualified person.
- 

OSHA's Confined Spaces in Construction Definitions 1926.1202

- ▶ **Entry rescue occurs when a rescue service enters a permit space to rescue one or more employees.**

[This is a new definition, 1910.146(b) has not defined Entry rescue but has defined Rescue Service. Z117.1 has also not defined Entry Rescue.]

Hazardous Atmosphere Definition

1910.146 & 1926.1202

- ▶ Hazardous atmosphere is an atmosphere that may cause death, incapacitation, impairment of ability to self rescue, or acute illness from one or more of the following causes: (1), (2), (3), (4), (5) (see next slide)

[The definition in 1910.146(b) is the same except (4) Subpart G is substituted for D and (5) Haz Com Std 1910.1200 is substituted for 1926.59. ANSI Z117.1 definition I the preceding slide is more general]

Hazardous Atmosphere Definition 1926.1202

- ▶ Hazardous atmosphere means an atmosphere...from one or more of the following causes:
 - (1) Flammable gas, vapor or mist in excess of 10% LFL
 - (2) Airborne combustible dust at a concentration at or above its LFL;
 - (3) Atmospheric oxygen concentration <19.5 or >23.5%
 - (4) Atmospheric concentration of any published PEL in subpart D that is capable of causing death or serious harm or cause inability to escape unaided from the space,
 - (5) Any other atmospheric condition that is immediately dangerous to life or health (IDLH)

Hazardous Atmosphere

ANSI Z117.1

- ▶ **Hazardous atmosphere.** An atmosphere that exists or has the potential to exist and cause serious harm or death to occupants by reason of: gas, vapor, dust; toxicity.



OSHA's Confined Spaces in Construction Definitions 1926.1202

- ▶ **Limited or restricted means for entry or exit** means a condition that has a potential to impede...into or out of a confined space. Such conditions may include: trip hazards, poor lighting, slippery floors, inclining surfaces and ladders.

[This is not defined in 1910.146(b) however Z117.1 covers it in the definition of confined space]



ANSI Z117.1 Standard Definitions

- ▶ **Lockout/Tagout.** The placement of a lock/tag on an energy isolating device in accordance with established procedures. (the term lockout/tagout allows the use of a lockout device, a tag or a combination of both.)

[This definition is not in the 1910.146(b)]



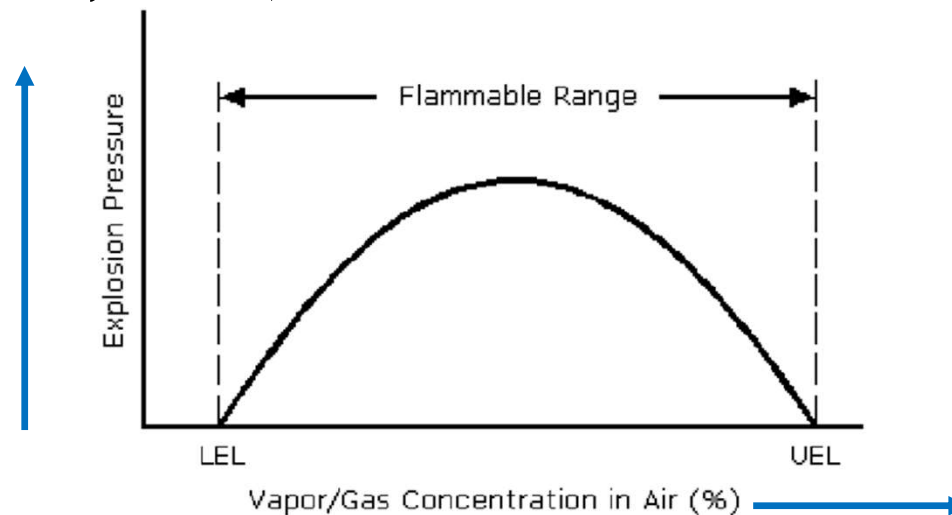
OSHA's Confined Spaces in Construction Definitions 1926.1202

- ▶ Lockout means the placement of a lockout device on...an...isolating device ensuring...the equipment...cannot be operated until the lockout device is removed.
- ▶ [This definition is not in the 1910.146(b)]



Explosive / Flammable Limits ANSI Z117.1

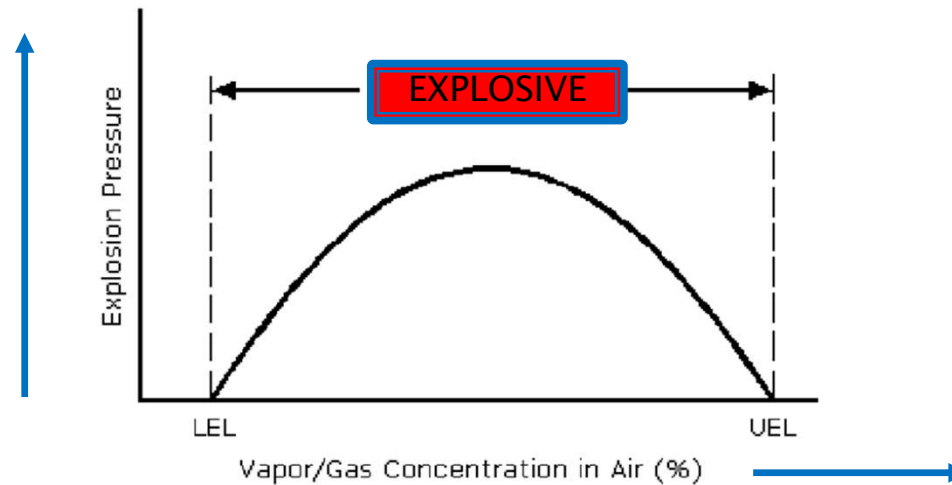
- ▶ **Lower Explosive Limit/Lower Flammability Limit (LEL/LFL).** The lowest concentration (percentage) of a gas or a vapor in air capable of producing a flash of fire in the presence of an ignition source (arc, flame, heat).



[This definition is not in 1910.146(b)]

Explosive / Flammable Limits 1926.1202

- ▶ **Lower Explosive Limit or Lower Flammability Limit** means the minimum concentration of a substance in air needed for an ignition source to cause a flame or explosion.

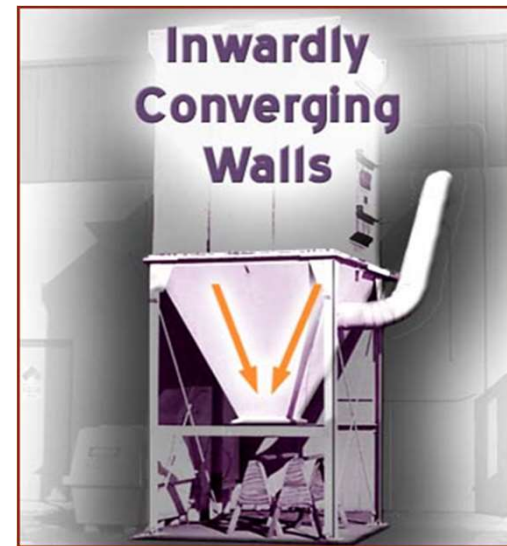


[This definition is not in 1910.146(b)]

OSHA's Confined Spaces in Construction

Definitions 1926.1202

- ▶ Physical hazard means...hazards that can cause death or serious physical damage.
- ▶ Such as: explosives; mechanical; electrical; hydraulic & pneumatic; radiation; temp. extremes; engulfment; noise; and inwardly converging surfaces.
- ▶ This also includes chemicals that can cause death...other than through inhalation.



[This definition is not in 1910.146(b) Permit-required confined space standard.]

OSHA's Confined Spaces in Construction Definitions 1926.1202

- ▶ Prohibited condition means any condition in a permit space that is not allowed by the permit during the period when entry is authorized. **A hazardous atmosphere is a prohibited condition unless the employer can demonstrate that personal protective equipment (PPE) will provide effective protection for each employee in the permit space and provide the appropriate PPE to each employee.**

[The first sentence of the definition is in 1910.146(b) Permit-required confined space, **the second sentence is new to confined spaces in construction.**]

Qualified Person Definition

ANSI Z117.1

- ▶ **Qualified person.** A person, who by reason of training, education and experience is knowledgeable in the operation to be performed and is competent to judge the hazards involved and specify controls and/or protective measures.

[This definition is not in 1910(b)]



Qualified Person Definition


1910.146 & 1926.1202

- ▶ Qualified person means one who, knows their stuff and are able to make the correct decision to control the hazards and ensure the entry is done safely.
- ▶ Qualified person means one who, by position of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, has successfully demonstrated his ability to solve or resolve problems relating to the subject matter, work, or the project.

ANSI Z117.1 Standard Definitions

- ▶ **Serious Hazards.** Conditions which may cause death, temporary or permanent impairment, functional disorder or an inability to exit the space.

OSHA's Confined Spaces in Construction Definitions 1926.1202

- ▶ **Serious physical damage** means an impairment or illness in which a body part is made functionally useless...Such impairment or illness may be permanent or temporary and includes loss of consciousness...Injuries involving such impairment would usually require treatment by a physician or other licensed health-care professional.
 - ▶ [This definition is not in 1910.146(b)]
- 

Confined Spaces in Construction

Definitions 1926.1202

- ▶ Test or testing means the process by which the hazards...are identified and evaluated. Testing includes specifying the tests...performed in the permit space.



[This definition is identical in 1910.146(b), and similar in ANSI Z117.1 i.e. Atmospheric tester].

ANSI Z117.1 Atmospheric Testing

- ▶ The ANSI Z117.1 revised 2016 supplies the reader very detailed information on ensuring the test instrument is functioning properly and how to use it.
- ▶ This is discussed in section 6, Atmospheric Testing and in section 15.5 under training of the atmospheric tester.
- ▶ Again, the ANSI Z117.1 goes well beyond the minimum requirements specified by OSHA in GI and the new construction standards concerning atmospheric testing of permit spaces.
- ▶ It discusses bump testing, remote sampling, sensor interferences and poisons.



Atmospheric Testing Construction and GI

Construction

- ▶ Addresses testing the atmosphere prior to entry **under alternate entry procedures in paragraph 1203(e)(iii)** with a calibrated direct-reading instrument for oxygen content, for flammable gases and vapors, and for potential toxic air contaminants, in that order

General Industry

- ▶ This alternate entry procedure is the exact same language in 1946(c)(5)(ii) except:

1203(e)(vi) specifies that continuous monitoring must be done unless the employer can demonstrate that equipment is not commercially available or periodic monitoring is OK

Atmospheric Testing Construction and GI (Cont'd)

Construction – PCS

- ▶ 1204(e)1–6 addresses testing the atmosphere prior to entry for oxygen, then for combustible (not flammable) gases and vapors, and for toxic gases and vapors

General Industry – PRCS

- 1910.146(d)(5)(ii) specifies to test or monitor as necessary unless the space is part of a continuous system that cannot be isolated like a sewer, then continuous monitoring shall be done


Neither 1926.1204(e) or 1910.146(d)(5) specify with a calibrated direct-reading instrument or discusses bump/function testing of the instrument, sensor interferences or how to do remote sampling

AIHA Competency Framework Using DRI's in Gas Monitoring and Detection

▶ Knowledge levels

- **Awareness Level** – Works under close supervision with review by supervisor or Operations Level person to ensure compliance with proper procedures.
- **Operations Level** – Works without close supervision in subject area...consults Specialist Level person(s) for assistance as needed; ...Has subject-area expertise and may be consulted for assistance; provides hands-on assistance when needed; charged with instrument maintenance.
- **Specialist Level** – Provides expert guidance to the Operations Level person(s); knowledgeable about pertinent standards; may set company-level procedures; responsible for high-level data interpretation; selects appropriate instruments for purchase and use; sets exposure sampling strategies and appropriate alarms.

AIHA Competency Framework Using DRI's in Gas Monitoring and Detection

- ▶ Competency Areas
 - Chemical Properties
 - Instrument Use and Operation
 - Instrument Maintenance
 - Troubleshooting
 - Data Interpretation
 - Incident Response
 - Instrument Selection
 - Instrument Technology and Operational Theory
 - Regulatory Framework
- 


Construction Entry Permits and Processing

- ▶ Entry permits are required in 1926.1204(j) Develop and implement a system for the preparation, issuance, use and cancellation of entry permits as required by this standard, including the safe termination of entry operations under both planned and emergency conditions. Permits are detailed in 1206.
- ▶ 1926.1205 Permitting process
 - (a) Develop written permit
 - (b) Before entry begins the entry supervisor must sign the permit to allow entry to begin.

1926.1206 Entry Permits for Confined Spaces in Construction are the same as listed in 1910.146(f)

- ▶ Entry permits are required to have the following information:
 - (a) The permit space to be entered
 - (b) The purpose of the entry
 - (c) The date and authorized duration of the permit (usually one shift)
 - (d) The authorized entrants by name or roster
 - (e) Means of detecting atmospheric hazard level if the ventilation system stops working
 - (f) Each person, by name, serving as attendant
 - (g) The name of the current entry supervisor

1926.1206 Entry Permits (Cont'd)

- (h) The hazards of the permit space to be entered
 - (i) The means to isolate, control or eliminate hazards
 - (j) The acceptable entry conditions
 - (k) The date, time, results & who performed the test
 - (l) The rescue and emergency service & how to summons them
 - (m) The communication means – entrants and attendant
 - (n) Equipment needed for safe entry such as: PPE, testing & communication equipment, alarms, etc.
 - (o) Any other information necessary for safe entry
 - (p) Any additional permits such as hot work permits
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OSHA's Training Requirements of the Entry Team

- ▶ Both 1926.1207 and 1910.146(g) have very similar if not identical training requirements. The employer shall provide training so that all employees...acquire the understanding, knowledge, and skills necessary for the safe performance of the duties.

The employer shall provide training:

- ▶ To each affected employee
- ▶ Before the employee is first assigned duties under this section


OSHA's Training Requirements of the Entry Team

- ▶ Before there is a change in employee's duties
- ▶ Whenever there is a change in permit space operations
- ▶ When any new hazards are introduced or employee's knowledge is deficient
- ▶ To establish employee proficiencies
- ▶ The employer must maintain training records containing employee's name, the name of the trainers, and the dates of the training.

Add other topics taught!



OSHA's Training Requirements of the Entry Team (Cont'd)

- ▶ Both federal standards 1910.146(g) and 1926.1207 discuss the duties of the team members such as knowledge of the hazards and in 1926, their specific job tasks in sections 1208, 1209, and 1210.
 - ▶ The new confined spaces in construction standard goes into greater detail than 1910.146 requiring understanding of the hazards in the employee's language and vocabulary.
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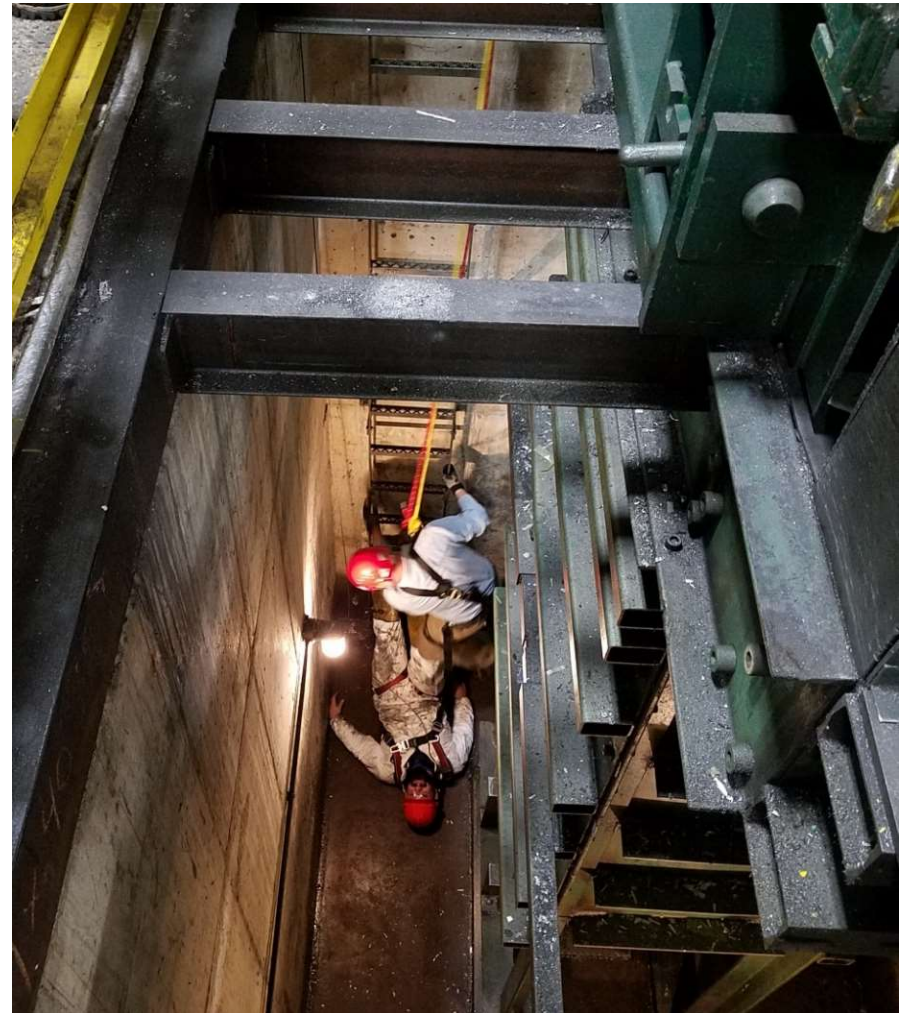
ANSI Z117.1 2016 Training Requirements:

- ▶ The ANSI Z117.1 revised in 2016 elaborates on employee training by following the guidelines in Z490.1 Accepted Practices in Safety Health and Environmental Training.
- ▶ The revised ANSI 117.1 section 15 outlines individual team member training in great detail giving examples, best practices and emphasizes proficiency through testing and hands-on workshops.
- ▶ ANSI Z117.1 and ASSP believes Z490.1 and Z117.1 go well beyond the minimum requirements for training of either OSHA's 1910.146(g) or the new 1926.1207 standards.

Rescue Issues

Construction

- ▶ Section 1926.1211 addresses rescue and is very similar to general industry 1910.146(k)
- ▶ Entry team members are cautioned in 1926.1211 not to attempt a rescue unless they are trained and equipped



Rescue Issues (Cont'd)


- ▶ 1926.1211 covers providing rescue equipment...at no cost to employees and ensure they are proficient on the equipment.
- ▶ This new standard is more detailed than 1910.146 by addressing such issues as **training in-house rescue personnel to be proficient to respond in a timely manner dependent on the hazards of the space.**
- ▶ **To practice with dummies, manikins, or actual persons from permit spaces at least once every 12 months with respect to opening size, configuration and accessibility.**
- ▶ **An outside service must contact the employer I advance when they are not available to respond to an emergency.**



Rescue Issues (Cont'd)

- ▶ The ANSI Z117.1 standard not only addresses the rescue services equipment, capabilities and proficiencies in section 14 but also elaborates on the training of the rescue team in section 15 and gives greater detail using examples and emphasizes rescue practice and proficiency by stressing practices at least once a year for vertical as well as horizontal and high angle rescue.
- ▶ This standard discusses non-entry rescue and issues with extraction of entrant when not in line of site. Z117.1 also requires a written Emergency Response Plan.


Related Standards and Guidance Documents

- ▶ OSHA Fall Protection 1926.502, 1910 Subparts D & I
 - ▶ ANSI Z359 series Fall Protection
 - ▶ ANSI/ASSP Z490.1 Safety Practices, Procedures & Training (2016)
 - ▶ NFPA 1006 and 1670 Technical Rescue
 - ▶ NFPA 350 Guide For Safe Confined Space Entry and Work, 2019 Edition
 - ▶ NFPA 1989 Standard On Breathing Air Quality For Emergency Services Respiratory Protection, 2019 Edition
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Related Standards and Guidance Documents

- ▶ ASTM F1764–97 (2018) Standard Guide For Selection Of Hardline Communication Systems For Confined–Space Rescue
 - ▶ Z1006–16 – Management of Work in Confined Spaces – Canadian Safety Association
 - ▶ ANSI/ASABE S607 OCT2010 (R2019) Ventilating Manure Storages To Reduce Entry Risk
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At the end of the day...

- ▶ Confined spaces are death traps
 - ▶ Prevention through design
 - ▶ Compliance is not enough; we must achieve competency in managing risk
 - ▶ Hazard assessment = A R E C
 - ▶ Always first ask if it is necessary to enter a confined space
 - ▶ Have a process to manage change
 - ▶ Have complete, consistent control throughout the entry activities
 - ▶ Continuous improvement
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