

# Permit Required Confined Space Entry

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# My Background

- 1974 to 1978 City of Willowick Ohio, Service Department
- 1978 to 2002 M Tech Company
- 2002 to 2023 Doheny Company
- NASSCO Comity member
- OTCO Contributor
- Former Instructor University of Findlay ERTC
- Former Firefighter
- Former Ohio State Fire Instructor

# Your Notes are the Test

- The back of your training manual are note pages
- We will review or verbally test using those notes at the end of the class.
- You will see ***Bold Italicized*** highlights threw out the training session, please fill in those notes either from your current knowledge, following alone with the class or cheat and look at your neighbors' notes.
- There will be group questions threw out the class.
- By answering questions and taking notes your retention level will increase dramatically.

# Overview

This class is based on OSHA 29 CFR 1910.146

All references from the OSHA standard will be highlighted in **bold**

All notes will be highlighted in ***Bold Italicized***

Phones should be on Vibrate and calls should be taken outside the classroom

Questions and life stories regarding this class are encouraged

# References

***OSHA*** ( ***O***ccupational ***S***afety and ***H***ealth ***A***dministration) [www.osha.gov](http://www.osha.gov)  
Laws, regulations and enforcement

***NIOSH*** ( ***N***ational ***I***nstitute of ***O***ccupational ***S***afety and ***H***ealth)  
[www.cdc.gov/niosh](http://www.cdc.gov/niosh) Technical data and research

***ANSI*** ( ***A***merican ***N***ational ***S***tandards ***I***nstitute) [www.ansi.org](http://www.ansi.org)  
Equipment manufacturing standards

# OSHA Standards

29 CFR **1910.146** Permit Required Confined Space Entry for ***General Industry***

29 CFR **1926.1201** through 1926.1213 Confined Spaces for ***Construction Industry***

***CFR*** (***C***ode of ***F***ederal ***R***egulations) There are 50 titles under the CFR such as title 40 CFR EPA and title 49 CFR DOT

# Training

## **1910.146(g)(1)**

The employer shall provide training so that all employees whose work is regulated by this section acquire the understanding, knowledge, and skills necessary for the safe performance of the duties assigned under this section

## **1910.146(g)(2)**

Training shall be provided to each affected employee:

### **1910.146(g)(2)(ii)**

Before there is a change in assigned duties

# Training

## **1910.146(g)(2)(iii)**

Whenever there is a change in permit space operations that presents a hazard about which an employee has not previously been trained;

## **1910.146(g)(2)(iv)**

Whenever the employer has reason to believe either that there are deviations from the permit space entry procedures required by paragraph (d)(3) of this section or that there are inadequacies in the employee's knowledge or use of these procedures.

# Training

## **1910.146(g)(3)**

The training shall establish employee proficiency in the duties required by this section and shall introduce new or revised procedures, as necessary, for compliance with this section.

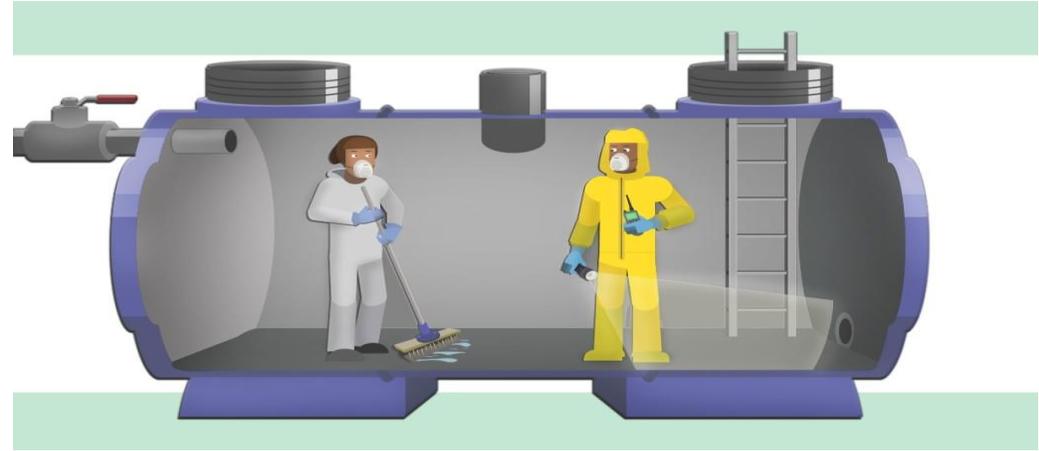
## **1910.146(g)(4)**

The employer shall certify that the training required by paragraphs (g)(1) through (g)(3) of this section has been accomplished. The certification shall contain each employee's name, the signatures or initials of the trainers, and the dates of training. The certification shall be available for inspection by employees and their authorized representatives.

# 1910.146 (b) Definition for a Confined Space

- (1) Is large enough and so configured that an employee can bodily enter and perform assigned work; and
  
- (2) Has limited or 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 Examples



# 1910.146 (b) Non-Permit Required Confined Space

*Non-permit confined space* means 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.

You will not find too many non-permit required confined spaces in our industry BUT there are many permit required confined spaces that can be reclassified under section (c) (7).

# 1910.146(b)

## Permit required Confined Space

*Permit-required confined space* (permit space) means a confined space that has one or more of the following characteristics

- (1) Contains or has a potential to contain a hazardous atmosphere;
- (2) Contains a material that has the potential for engulfing an entrant;

# Permit Required Confined Space

(3) Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or

(4) Contains any other recognized serious safety or health hazard.

If your confined space contains any of the above four items, you have a permit required confined space

# 29 CFR 1910.146 (b) Hazardous Atmosphere

*Hazardous atmosphere* means an atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue (that is, escape unaided from a permit space), injury, or acute illness from one or more of the following causes:

(1) Flammable gas, vapor, or mist in excess of **10 percent (LEL Alarm Level)** of its lower flammable limit (LEL);

# Hazardous Atmosphere

(2) Airborne combustible dust at a concentration that meets or exceeds its LEL;

Note: This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet (1.52 m) or less.

(3) Atmospheric oxygen concentration below **19.5 percent (Low Alarm)** or above **23.5 percent (High Alarm)**;

# Hazardous Atmosphere

(4) Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published in subpart G, Occupational Health and Environmental Control, or in subpart Z, Toxic and Hazardous Substances, of this part and which could result in employee exposure in excess of its dose or permissible exposure limit;

5) Any other atmospheric condition that is **IDLH** Immediately **D**angerous to **L**ife or **H**ealth.

# Oxygen

The Number 1 killer

While **O<sub>2</sub> oxygen** is necessary for most life on Earth, the majority of Earth's atmosphere is not oxygen. Earth's atmosphere is composed of about 78 percent nitrogen, **20.9 (Normal)** percent oxygen, 0.9 percent argon, and 0.1 percent other gases.

# Oxygen

At real altitude (in the mountains), the barometric pressure of the atmosphere is much lower than sea-level environments. The result is that oxygen molecules are spread further apart, lowering the oxygen content of each breath.

# Oxygen

***O2 / OXY / % VOL*** are symbols used on your air monitor to show the oxygen reading

O2     Molecular number for oxygen

OXY    Abbreviation for the word oxygen

% VOL   Oxygen is measured in % by volume

# Oxygen

**23.5%**

**High Alarm** Potentially flammable

**20.9%**

**Normal**

**19.5%**

**Low alarm**

**17.0%**

loss of night vision, increased breathing volume and accelerated heartbeat

# oxygen

**14.0% to 16.0%**

Physical effects, increased breathing volume, accelerated heartbeat, poor muscular coordination, rapid fatigue and intermittent respiration.

**6.0% to 10.0%**

Nausea vomiting, inability to perform and unconsciousness, death in minutes

# Flammable Atmospheres

***LEL / LFL / COMB / EXP*** are air monitor symbols for explosive gasses readings on your air monitor and the terms are interchangeable

***LEL***      Lower ***Explosive*** ***Level***

***LFL***      Lower ***Flammable*** ***Limit***

COMB    Abbreviation for the word combustible

EXP      Abbreviation for the word explosive

# Flammable Atmosphere

The LEL reading on your air monitor should be **zero (Normal)** in clean air. The **alarm point of 10% LEL** represents 10% of the amount of gas necessary to support combustion, in other words your missing 90% of what you need to support combustion.

100% LEL in theory is the lowest level that will support combustion. Caution should be taken with any readings over the alarm level

# Flammable Atmosphere

***0% LEL is good, anything over 10% contact your supervisor***

Common gases mixed in air

% LEL

Methane CH<sub>4</sub>

5% = 100 % LEL

Benzene C<sub>6</sub>H<sub>6</sub>

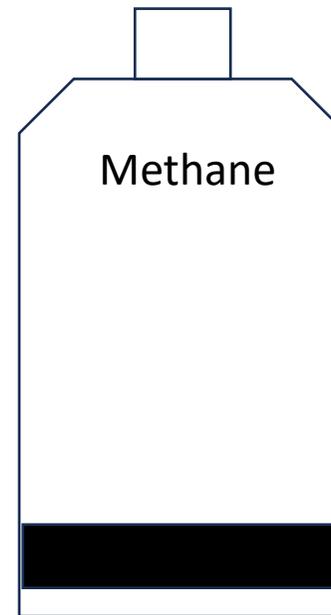
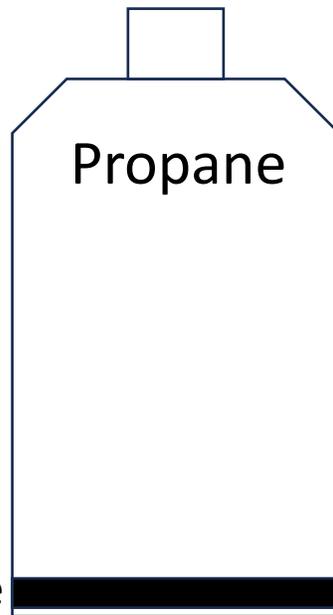
1.2% = 100% LEL

Propane CH<sub>3</sub>CH<sub>2</sub>CH<sub>3</sub>

2.1% = 100%LEL

# Flammable Atmosphere

Explosive gas by volume vary from gas to gas



Do not monitor toxic gas with the LEL meter

# Toxic

It's the dose that makes the poison

We measure toxic gases in **PPM Part Per Million**

What is a part per million

1 inch in 16 miles

One dollar in a million

One drop in 80 fifths of Jack Danials

# Toxic

Commonly used terms for toxic gas exposure

***PEL*** Permissible ***E***xposure ***L***imit

***TWA*** Time ***W***eighted ***A***verage (***8 Hour exposure average***)

***STEL*** Short ***T***erm ***E***xposure ***A***verage (***15 Minute exposure average***)

***IDLH*** Immediately ***D***angerous to ***L***ife and ***H***ealth (***no exposure***)

# Common Toxic gases

***Carbon Monoxide (CO)*** Above ground man made gas

CO TWA ***35 ppm (alarm)*** STEL 200 ppm IDLH 1200 ppm

***Hydrogen Sulfide (H<sub>2</sub>S)*** below ground naturally accruing gas

H<sub>2</sub>S TWA ***10 ppm (Alarm)*** STEL 15 ppm IDLH 100ppm

# Air sampling

A Minium of three *samples High, Medium and Low*, no more then *Four feet apart*.

The sample time will very from manufacture to manufacture, so you will need to read the owners manual. *30 seconds per sample* will work for most manufactures.

Take all samples from all levels and use the total combined readings to base your next actions (ventilation or not) and enter that reading on the permit.

# Sample pumps or aspirators

Sample pumps are battery operated, either from the monitors built in battery or separate battery contained in the pump. The additional sample time for a sample pump is three seconds per foot of hose.

Aspirators are a hand operated squeeze bulb, and in most cases require 3 pumps per foot of hose.

# Calibrating air monitors

Calibration and bump testing of the air monitor is the most important maintenance you can do to the air monitor..

Bump testing is using test gas to confirm the response of the air monitor and should be done prior to each use.

Calibration is using a certified bottle of gas to calibrate the air monitor to an exact concentration of gas, and each manufacture will state the calibration intervals. (read your owners manual for calibration intervals)

# Air monitor selection guide

What gases are you looking for, most manufactures have a wide range of sensors available, the most common are O<sub>2</sub>, LEL, H<sub>2</sub>S and CO, BUT IR and PID are available and should be considered for gases like CO<sub>2</sub>.

Operating temperature range

Warranty

Ease of calibration

Size and readability of display

Background lighting

# Air monitor selection guide

Charging options; 12-volt, 110 volt and gang chargers

Alkaline batteries

Pumps; for remote sampling

Data loggers; for record keeping

Customer support

Durability

Training by qualified personal

# Hazard assessment

Atmosphere is one of the big ones, the one you can't see, smell or touch.

Dust

Falls

Chemical reaction

Skin absorption

Noise

Irritants and corrosives

Vibration

Mechanical

Temperature extremes

Stored and potential energy

# Hazard assessment

Drive systems / moving parts

Pressurized systems

Steam

Electrical

Improper grounding

General safety

Lighting and poor visibility

Lack of communication

Traffic

Pedestrians

Outside activities

Untrained personal

# Ventilation

Moving fresh air through a confined space can be done in many ways. Such as electrical, gas, pneumatic, natural, and hydraulic driven blowers.

Do you draw air out of the space or blow air into the space?

Will you need explosion proof blowers? **CATION**, are you trained for explosive atmospheres?

**CATION** should be taken when working in or ventilating a flammable atmosphere, this could prove to be a fatal operation!

# Ventilation

The length of time you ventilate a confined space will be dictated by the size of the space and the **CFM** (**Cubic Feet per Minute**) air flow of the ventilator. The standard in the industry is four air changes a minute. If ventilation is required, you must ventilate through the duration of the entry.

The location of the inlet and the outlet of the ventilator must be taken into consideration, drawing air from a contaminated source or blowing contaminated air into a work area is not safe.

Use air monitor to confirm proper ventilation.

# Types of ventilators



# *PPE* Personal *P*rotective *E*quipment

## Things to consider when selecting PPE

- 1) Site hazards
- 2) Limitations of the equipment
- 3) Mission duration
- 4) Maintenance of the PPE
- 5) Decontamination or disposal of the PPE
- 6) Training and proper fit
- 7) Donning and doffing of the PPE
- 8) Inspection before during and after use
- 9) Evaluation of the PPE program effectiveness
- 10) Limitations in extreme temperatures

# PPE selection

There are several documents that can help with the selection of your PPE

Link for NIOSH pocket guide for chemical hazards mobile APP  
[www.cdc.gov/npg/mobilpocketguide.html](http://www.cdc.gov/npg/mobilpocketguide.html)

**SDS** (**S**afety **D**ata **S**heet); the SDS is available threw the substance manufacture

[www.poison.org](http://www.poison.org) Poison Control

# Entrant Responsibilities

## **1910.146(h)(1)**

Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;

## **1910.146(h)(2)**

Properly use equipment as required by paragraph (d)(4) of this section;

## **1910.146(h)(3)**

Communicate with the attendant as necessary to enable the attendant to monitor entrant status and to enable the attendant to alert entrants of the need to evacuate the space as required by paragraph (i)(6) of this section;

# Entrant Responsibilities

## **1910.146(h)(4)**

Alert the attendant whenever:

### **1910.146(h)(4)(i)**

The entrant recognizes any warning sign or symptom of exposure to a dangerous situation, or

### **1910.146(h)(4)(ii)**

The entrant detects a prohibited condition; and

## **1910.146(h)(5)**

Exit from the permit space as quickly as possible whenever:

### **1910.146(h)(5)(i)**

An order to evacuate is given by the attendant or the entry supervisor

# Entrant Responsibilities

## **1910.146(h)(5)(ii)**

The entrant recognizes any warning sign or symptom of exposure to a dangerous situation,

## **1910.146(h)(5)(iii)**

The entrant detects a prohibited condition, or

## **1910.146(h)(5)(iv)**

An evacuation alarm is activated.

# Attendant Responsibilities

## **1910.146(i)(1)**

Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;

## **1910.146(i)(2)**

Is aware of possible behavioral effects of hazard exposure in authorized entrants;

## **1910.146(i)(3)**

Continuously maintains an accurate count of authorized entrants in the permit space and ensures that the means used to identify authorized entrants under paragraph (f)(4) of this section accurately identifies who is in the permit space;

# Attendant Responsibilities

## **1910.146(i)(4)**

Remains outside the permit space during entry operations until relieved by another attendant;

## **1910.146(i)(5)**

Communicates with authorized entrants as necessary to monitor entrant status and to alert entrants of the need to evacuate the space under paragraph (i)(6) of this section;

## **1910.146(i)(6)**

Monitors activities inside and outside the space to determine if it is safe for entrants to remain in the space and orders the authorized entrants to evacuate the permit space immediately under any of the following conditions;

# Attendant Responsibilities

## **1910.146(i)(6)(i)**

If the attendant detects a prohibited condition;

## **1910.146(i)(6)(ii)**

If the attendant detects the behavioral effects of hazard exposure in an authorized entrant;

## **1910.146(i)(6)(iii)**

If the attendant detects a situation outside the space that could endanger the authorized entrants; or

## **1910.146(i)(7)**

Summon rescue and other emergency services as soon as the attendant determines that authorized entrants may need assistance to escape from permit space hazards;

# Attendant Responsibilities

## **1910.146(i)(8)**

Takes the following actions when unauthorized persons approach or enter a permit space while entry is underway:

### **1910.146(i)(8)(i)**

Warn the unauthorized persons that they must stay away from the permit space;

### **1910.146(i)(8)(ii)**

Advise the unauthorized persons that they must exit immediately if they have entered the permit space; and

### **1910.146(i)(8)(iii)**

Inform the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space;

# Attendant Responsibilities

## **1910.146(i)(9)**

Performs non-entry rescues as specified by the employer's rescue procedure; and

## **1910.146(i)(10)**

Performs no duties that might interfere with the attendant's primary duty to monitor and protect the authorized entrants

# Entry Supervisor Responsibilities

## **1910.146(j)(1)**

Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;

## **1910.146(j)(2)**

Verifies, by checking that the appropriate entries have been made on the permit, that all tests specified by the permit have been conducted and that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin;

## **1910.146(j)(3)**

Terminates the entry and cancels the permit as required by paragraph (e)(5) of this section

# Entry Supervisor Responsibilities

## **1910.146(j)(4)**

Verifies that rescue services are available and that the means for summoning them are operable;

## **1910.146(j)(5)**

Removes unauthorized individuals who enter or who attempt to enter the permit space during entry operations; and

## **1910.146(j)(6)**

Determines, whenever responsibility for a permit space entry operation is transferred and at intervals dictated by the hazards and operations performed within the space, that entry operations remain consistent with terms of the entry permit and that acceptable entry conditions are maintained.

# The Entry Permit

## **1910.146(f)(1)**

The permit space to be entered;

## 1910.146(f)(2)

The purpose of the entry;

## **1910.146(f)(3)**

The date and the authorized duration of the entry permit

## **1910.146(f)(4)**

The authorized entrants within the permit space, by name or by such other means (for example, through the use of rosters or tracking systems) as will enable the attendant to determine quickly and accurately, for the duration of the permit, which authorized entrants are inside the permit space;

# The Entry Permit

## **1910.146(f)(5)**

The personnel, by name, currently serving as attendants;

## **1910.146(f)(6)**

The individual, by name, currently serving as entry supervisor, with a space for the signature or initials of the entry supervisor who originally authorized entry;

## **1910.146(f)(7)**

The hazards of the permit space to be entered;

## **1910.146(f)(8)**

The measures used to isolate the permit space and to eliminate or control permit space hazards before entry;

# The Entry Permit

## **1910.146(f)(9)**

The acceptable entry conditions;

## **1910.146(f)(10)**

The results of initial and periodic tests performed under paragraph (d)(5) of this section, accompanied by the names or initials of the testers and by an indication of when the tests were performed;

## **1910.146(f)(11)**

The rescue and emergency services that can be summoned and the means (such as the equipment to use and the numbers to call) for summoning those services;

## **1910.146(f)(12)**

The communication procedures used by authorized entrants and attendants to maintain contact during the entry;

# The Entry Permit

## **1910.146(f)(13)**

Equipment, such as personal protective equipment, testing equipment, communications equipment, alarm systems, and rescue equipment, to be provided for compliance with this section;

## **1910.146(f)(14)**

Any other information whose inclusion is necessary, given the circumstances of the particular confined space, in order to ensure employee safety; and

## **1910.146(f)(15)**

Any additional permits, such as for hot work, that have been issued to authorize work in the permit space.

# Permit work Sheet

**(f)(1)** Location \_\_\_\_\_

**(f)(3)** Date and Duration of permit \_\_\_\_\_ Start \_\_\_\_ End \_\_\_\_\_

**(f)(2)** Purpose of entry \_\_\_\_\_

**(f)(4)** Entrant name \_\_\_\_\_

**(f)(5)** Attendant Name \_\_\_\_\_

**(f)(6)** Entry Supervisor Name \_\_\_\_\_

**(f)(7)** Hazards

_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

**(f)(8)** Isolation or Lock out Tag out

_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

# Permit work sheet

**(f)(9)** Acceptable entry conditions

**(f)(10)** Results of initial and periodic tests

Name _____	Time	:	:	:	:	:	:	:	:	:	:	:	:
Oxygen (O <sub>2</sub> ) _____		—	—	—	—	—	—	—	—	—	—	—	—
Combustible (LEL) _____		—	—	—	—	—	—	—	—	—	—	—	—
Carbon Monoxide (CO) _____		—	—	—	—	—	—	—	—	—	—	—	—
Hydrogen Sulfide (H <sub>2</sub> S) _____		—	—	—	—	—	—	—	—	—	—	—	—

**(f)(11)** Rescue \_\_\_\_\_

**(f)(12)** Communication between Entrant and Attendant

**(f)(13)** Equipment

_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

**(f)(14)** Special Precautions \_\_\_\_\_

**(f)(15)** Additional Permits \_\_\_\_\_

# Reclassification from Permit to Non-Permit

## **1910.146(c)(7)**

A space classified by the employer as a permit-required confined space may be reclassified as a non-permit confined space under the following procedures:

### **1910.146(c)(7)(i)**

If the permit space poses no actual or potential atmospheric hazards and if all hazards within the space are eliminated without entry into the space, the permit space may be reclassified as a non-permit confined space for as long as the non-atmospheric hazards remain eliminated.

### **1910.146(c)(7)(ii)**

If it is necessary to enter the permit space to eliminate hazards, such entry shall be performed under paragraphs (d) through (k) of this section. If testing and inspection during that entry demonstrate that the hazards within the permit space have been eliminated, the permit space may be reclassified as a non-permit confined space for as long as the hazards remain eliminated.

# Reclassification from Permit to Non-Permit

## **1910.146(c)(7)(iii)**

The employer shall document the basis for determining that all hazards in a permit space have been eliminated, through a certification that contains the date, the location of the space, and the signature of the person making the determination. The certification shall be made available to each employee entering the space or to that employee's authorized representative.

## **1910.146(c)(7)(iv)**

If hazards arise within a permit space that has been declassified to a non-permit space under paragraph (c)(7) of this section, each employee in the space shall exit the space. The employer shall then reevaluate the space and determine whether it must be reclassified as a permit space, in accordance with other applicable provisions of this section.

# Reclassification Form

Location \_\_\_\_\_

Date \_\_/\_\_/\_\_

Signature \_\_\_\_\_

Although not required, adding the acceptable entry conditions and periodic air monitor readings to this form will help the employee remember the alarm points.

	Time	__:	__:	__:	__:	__:	__:	__:
Oxygen (O <sub>2</sub> ) _____		___	___	___	___	___	___	___
Combustible (LEL) _____		___	___	___	___	___	___	___
Carbon Monoxide (CO) _____		___	___	___	___	___	___	___
Hydrogen Sulfide (H <sub>2</sub> S) _____		___	___	___	___	___	___	___

# Rescue

## **1910.146(k)(1)**

An employer who designates rescue and emergency services, pursuant to paragraph (d)(9) of this section, shall:

## **1910.146(k)(1)(ii)**

Evaluate a prospective rescue service's ability, in terms of proficiency with rescue-related tasks and equipment, to function appropriately while rescuing entrants from the particular permit space or types of permit spaces identified;

## **1910.146(k)(1)(iii)(A)**

Has the capability to reach the victim(s) within a time frame that is appropriate for the permit space hazard(s) identified;

# Rescue

## **1910.146(k)(1)(iii)(B)**

Is equipped for and proficient in performing the needed rescue services;

## **1910.146(k)(1)(iv)**

Inform each rescue team or service of the hazards they may confront when called on to perform rescue at the site; and

## **1910.146(k)(1)(v)**

Provide the rescue team or service selected with access to all permit spaces from which rescue may be necessary so that the rescue service can develop appropriate rescue plans and practice rescue operations.

# Rescue

## **1910.146(k)(2)**

An employer whose employees have been designated to provide permit space rescue and emergency services shall take the following measures:

### **1910.146(k)(2)(i)**

Provide affected employees with the personal protective equipment (PPE) needed to conduct permit space rescues safely and train affected employees, so they are proficient in the use of that PPE, at no cost to those employees;

### **1910.146(k)(2)(ii)**

Train affected employees to perform assigned rescue duties. The employer must ensure that such employees successfully complete the training required to establish proficiency as an authorized entrant, as provided by paragraphs (g) and (h) of this section;

# Rescue

## **1910.146(k)(2)(iii)**

Train affected employees in basic first-aid and cardiopulmonary resuscitation (CPR). The employer shall ensure that at least one member of the rescue team or service holding a current certification in first aid and CPR is available; and

## **1910.146(k)(2)(iv)**

Ensure that affected employees practice making permit space rescues at least once every 12 months, by means of simulated rescue operations in which they remove dummies, manikins, or actual persons from the actual permit spaces or from representative permit spaces. Representative permit spaces shall, with respect to opening size, configuration, and accessibility, simulate the types of permit spaces from which rescue is to be performed.

# Rescue

## **1910.146(k)(3)**

To facilitate non-entry rescue, retrieval systems or methods shall be used whenever an authorized entrant enters a permit space, unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant. Retrieval systems shall meet the following requirements.

## **1910.146(k)(3)(i)**

Each authorized entrant shall use a chest or full body harness, with a retrieval line attached at the center of the entrant's back near shoulder level, above the entrant's head, or at another point which the employer can establish presents a profile small enough for the successful removal of the entrant. Wristlets may be used in lieu of the chest or full body harness if the employer can demonstrate that the use of a chest or full body harness is infeasible or creates a greater hazard and that the use of wristlets is the safest and most effective alternative.

# Rescue

## **1910.146(k)(3)(ii)**

The other end of the retrieval line shall be attached to a mechanical device or fixed point outside the permit space in such a manner that rescue can begin as soon as the rescuer becomes aware that rescue is necessary. A mechanical device shall be available to retrieve personnel from vertical type permit spaces more than 5 feet (1.52 m) deep

## **1910.146(k)(4)**

If an injured entrant is exposed to a substance for which a Safety Data Sheet (SDS) or other similar written information is required to be kept at the worksite, that MSDS or written information shall be made available to the medical facility treating the exposed entrant.

# Rescue Equipment

Tri Pod System



Davit system



Davit Bases



# Tri Pod or Davit Arm selection guide

- Does the tri pod meet ANSI standards
- Overall weight
- Height
- Ease of deployment
- Adjustable for uneven surfaces
- Type of winch mounts
- Nonslip feet and spiked edges for loose surfaces
- Will a leg chain be required

# Fall Protection / Rescue Retravel / SRL

- Does it meet the ANSI standards
- Weight
- Type of mount
- Eases of installation
- Eases of engagement for retrieval
- Construction
- Cable length
- Type of cable
- Overload protection or slip clutch
- Stress indicator
- Construction

# Work Support / Raising and lowering winch

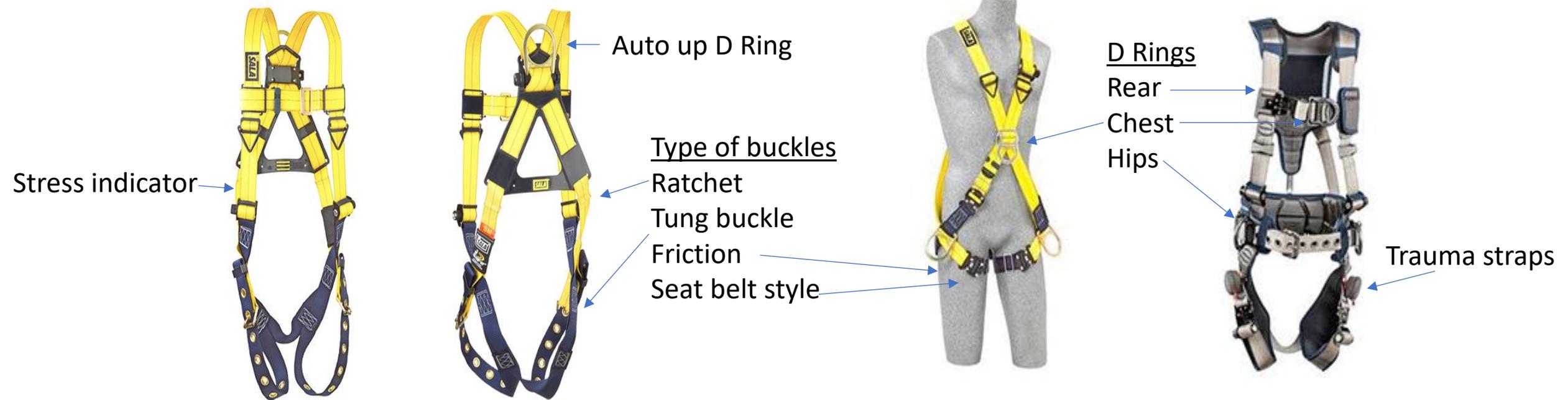
- Does it meet the ANSI standards
- Weight
- Type of mount
- Eases of installation
- Construction
- Cable length
- Can the cable loop and fall off the drum
- Overload protection

# Full Body Harness

Vest Style

Crossover Style for the Ladies

Padded for comfort



# Notes for test

- OSHA \_\_\_\_\_
- NIOSH \_\_\_\_\_
- ANSI \_\_\_\_\_
- CFR \_\_\_\_\_
- 1910 \_\_\_\_\_
- 1926 \_\_\_\_\_
- O2 /OXY /% VOL \_\_\_\_\_
- Normal Oxygen in air \_\_\_\_\_
- High Oxygen Alarm \_\_\_\_\_
- Low Oxygen Alarm \_\_\_\_\_
- LEL / LFL / COMB / EXP \_\_\_\_\_
- Normal LEL Reading \_\_\_\_\_
- LEL Alarm \_\_\_\_\_
- PPM \_\_\_\_\_
- PEL \_\_\_\_\_

# Notes for test

TWA \_\_\_\_\_  
STEL \_\_\_\_\_  
IDLH \_\_\_\_\_  
CO \_\_\_\_\_  
CO Alarm \_\_\_\_\_  
H2S \_\_\_\_\_  
H2S Alarm \_\_\_\_\_  
Minimum number of air samples \_\_\_\_\_  
Maximum feet between samples \_\_\_\_\_  
How long should an air sample take \_\_\_\_\_  
CFM \_\_\_\_\_  
PPE \_\_\_\_\_  
SDS \_\_\_\_\_

# Test Time

Thank You for attending and please don't hesitate to call 440 223 8060 or email me [eafitzgerald@outlook.com](mailto:eafitzgerald@outlook.com) with any questions.