Confined Spaces in Construction:
29 CFR 1926 Subpart AA
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Resources

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Confined Spaces

Resources
Background

• General Industry Standard published 1993
• United Steelworkers settlement 1994
• Consultation with ACCSH and stakeholder meetings, SBREFA panel.
• Proposal 2007
  – Comment period & hearing
• Final Rule published May 4, 2015; effective August 3, 2015
Overview of Differences

- GI Standard, Plus
- A competent person must conduct worksite evaluation
- Employers using “alternate procedures” for permit space entry must prevent physical hazard exposures through elimination or isolation through methods such as LOTO
- Permits may be suspended instead of cancelled, provided the space is returned to permit conditions prior to re-entry
Overview of Differences, cont'd

- Continuous monitoring of atmospheric and engulfment hazards
- Employers relying on local emergency services for rescue must arrange for responders to notify in advance if responders will be unavailable
Overview of Differences, cont'd

- Specific information exchange requirements for multi-employer work sites
  - Host employer
  - Controlling Contractor
  - Entry Employer
General Industry vs. Construction

• What if an employer does construction AND maintenance work in the same space at the same time?
  – Employers with workers engaged in both types of work will be in compliance with both standards if they follow 1926 Subpart AA.
OSHA’s Temporary Enforcement Policy

• Full enforcement for residential construction postponed until 3/8/16
• Will not issue citations to employers making good faith efforts to comply
  – Provided: Employer is complying with training requirements of .1207 or .21(b)(6)(i)
Employers not providing training, will be cited under .1207
1926.21(b)(6)(i)

• All employees required to enter into confined or enclosed spaces shall be instructed as to the nature of the hazards involved, the necessary precautions to be taken, and in the use of protective and emergency equipment required. The employer shall comply with any specific regulations that apply to work in dangerous or potentially dangerous areas.”
Confined Space Challenges

- Lack of warnings
- Can’t see a bad atmosphere
- Changing conditions
- Previous experience
- Identifying spaces
  - Non-permit can become permit
What is a confined space?
Definitions 1926.1202
A Confined Space is...

- Large enough for an employee to enter
  - Entire body

- AND
• Limited or restricted means for entry and exit
  – Obstructions-pipes, etc.
  – Ladders, hoists needed for access
  – Rescue problems
  – Limited openings/opening size

AND…
Confined Space

• Not designed for continuous worker occupancy
  – No ventilation
  – No lighting
  – Designed to hold or carry materials: i.e. water, chemicals, etc.
What is a Permit Space?

• Permit-Required Confined Space (Permit Space)
  – A confined space WITH
    • Hazardous or potentially hazardous atmosphere;
    • Engulfment hazard;
    • Physical Hazard;
    • Other serious safety or health hazard
What is a Permit-Required Confined Space?

- A confined space which has **one or more** of the following:

  - Hazardous atmosphere

  1. Oxygen deficiency
  2. Combustible vapors
  3. Toxic gases
Atmosphere

Oxygen content;

Normal 20.9 - 21.0 %

Deficient @ 19.5% => alarm

Dangerous @ 16%

Deadly @ 13%
Permit-Required Confined Space

- Potential for engulfment
  - Water
  - Grain
  - Sawdust
  - Sand
Permit-Required Confined Space

- Internal configuration that could trap or asphyxiate entrant
  - Hoppers
  - Inwardly converging walls
  - Very tight openings
Permit-Required Confined Space

Any other recognized or **POTENTIAL serious** safety or health hazard:

- Serious = could case death/severe injury, interfere with self-rescue

Physical hazards
Fall hazards
Electrical
Heat
Fire hazards
Biological/Animal
Etc.
Hazards of the Space

• Thermal Hazards
  • Cold stress
    – Hypothermia
    – Increased with ventilation
    – Frost bite
  • Heat stress
    – Heat cramps
    – Heat stress
    – Heat stroke
    – Ex: steam lines, attics
Hazards of the Space

• Electrical hazards
  – Lines
  – Cords
  – High voltage equipment
Hazards of the Space

• Mechanical equipment
  – Accidental activation
  – Exposed moving parts
  – Separation of air couplings
  – Fans
Hazards of the Space

• Biological hazards
  – Organisms: algae, mold, infectious diseases
  – Rodents, snakes, insects, animal droppings, animal carcasses
Hazards of the Space

- Fall hazards
- Vibration
- Corrosives
- Radiation
- Unstable structures
- Falling objects
Hazards of the Activity Performed

- Flammable vapor migration
  - Ignition sources
  - Vapors migrate into crawl spaces
Hazards of the Activity Performed

- Oxygen displacement or consumption
  - Welding
  - Hot work
  - Combustion engines
Accident Report Detail

Accident: 202004891 - Employee Dies From Asphyxiation Due To Nitrogen

Accident: 202004891 -- Report ID: 0317000 -- Event Date: 01/19/2007

<table>
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<tr>
<th>Inspection</th>
<th>Open Date</th>
<th>SIC</th>
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<td>01/22/2007</td>
<td>8221</td>
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Between 9:30 a.m. and 1:00 p.m. on January 19, 2007, Employee #1 inserted his upper torso into a cardboard box. He was probably adjusting the placement of plastic tubing of which one end was attached to a wall mounted needle valve that was dispensing nitrogen. The other end was inserted into the box through a cut out opening. He was alone in a room with a self locking door. At approximately 8:30 p.m. a security officer found him in a non-responsive condition. Employee #1 died of asphyxiation due to the displacement of oxygen by nitrogen.
Hazards of the Activity Performed

• Hazardous dust or vapor inhalation
  – Spraying/painting
  – Cleaning/scraping
  – Sand blasting
  – Grinding/sanding
  – Applying adhesives/sealant
External Hazards

- Traffic
- Atmospheric
- Processes
- Contamination
Examples of Confined Spaces

- Crawl Spaces
- Pits
- Vaults
- Manholes
- Storage bins
- Sewers
- Tanks
- Silos
- Attics
- Shafts
- Pipelines
Confined Space? Permit space?
Crawl space- confined space?
Permit or Non-permit?
Who does what?

• Site evaluation:
  – Any employer whose employee may enter a confined space needs to ensure that the site is evaluated and spaces are posted, but the evaluation and posting may be coordinated through a single employer.
  – Site evaluation involves hazard recognition – hazards already in the space, and hazards created as a result of the work being done.
What do you mean by “posted”?

• Employers who identify or are made aware of permit spaces must make sure that exposed workers are made aware of the existence, location, and danger of each permit space.
  – A sign reading “DANGER – PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER” would satisfy the requirement for posting.
Will there be entry?

• No: Employer must take effective action to prevent employees from entering the permit space.

• Yes: Employer must implement a permit program or use “alternative procedures”.

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Who does what?

• Permit issuance:
  – Entry employers (employers who direct workers to enter a permit space) must develop and post permits.
  • Permits list required entry conditions, equipment that must be used, and track who is inside the space.
What is a permit space program?

• A permit space program is a plan that includes:
  – Identification and evaluation of the hazards in the permit space 1204(b)
  – Measures that will be used to prevent unauthorized entry 1204(a)
  – Means, procedures, and practices needed for safe entry, including: 1204(c)
What do you mean by “permit”?

• The term “permit” is used in the general industry rule, and was retained here for consistency.

• This is similar to a “hot work” permit, sometimes required for welding or use of other sparking tools on certain work sites.

• This rule does not require an employer to file a permit with OSHA or a municipal or other authority.
What needs to be on the permit?

• The space to which the permit applies.
• The purpose of the entry.
• The date and duration of the permit.
• The names or other designation of the authorized entrants (can refer to a roster or tracking system).
• Methods used to detect increases in hazardous atmospheric conditions.
What needs to be on the permit? (cont’d)

- Name of attendant(s).
- Name of entry supervisor(s), and signature or initials of each supervisor who authorizes entry.
- Hazards in the space and measures used to eliminate or control permit space hazards.
- Acceptable entry conditions.
- Results of atmospheric tests and monitoring and names/initials of testers, and dates of tests.
What needs to be on the permit? (cont’d)

• Rescue and emergency services that can be summoned and the means (such as equipment to use and numbers to call) for summoning those services.
• Communication procedures used by entrants and attendants during entry.
• Equipment necessary for entry.
• Any additional permits (such as hot work) issued to authorize work being performed in the space.
What do you mean by “program”? 

- A written program developed under this rule outlines what the employer will do to protect its workers from permit space hazards. 
  - Programs will often be used for more than one work site – they will give general information about the hazards and methods of addressing hazards used by that employer. 
  - In contrast, permits contain specific information about the particular space entered under that permit.
What’s in a Program?

• Site evaluation for confined spaces and permit-required confined spaces (permit spaces).
• Posting of all permit spaces.
• Steps taken to prevent unauthorized entry of permit spaces.
• Training of all workers exposed to permit space hazards, including hazards of unauthorized rescue.
What’s in a Program? (cont’d)

- Plans for elimination or isolation of physical hazards.
- Plans for air testing and monitoring.
- Plans for ventilation.
- Plans for engulfment hazard monitoring, if necessary.
- Plans for rescue (non-entry if possible).
- Plans and training for entrants, attendants, and entry supervisors.
What’s in a Program?

• Personal protective equipment, if necessary.
• Plans for working around and with other contractors.
• Plans for summoning emergency services.
• Plans for regular review (at least annually) of permits and identification of areas in need of improvement.
What are “alternate procedures”?

• For an employer to use “alternate procedures” to enter a permit-required space, the space must:
  – Have only atmospheric hazards (or potential hazards)
    • If physical hazards must be eliminated or isolated, this has to happen without entering the space OR by entering under full permit conditions until the physical hazards are eliminated.
What are “alternate procedures”? (cont’d)

• To use “alternate procedures” to enter a permit space, the employer:
  – Must show that continuous forced air ventilation is sufficient to control atmospheric hazards and that workers can exit the space safely in the event of an emergency
  – Must use continuous or periodic monitoring to ensure the forced air is effective.
  – Must document that the space is safe and that pre-entry measures have been taken.
From the Executive Summary…

• Although the final rule does not prohibit the use of suction, **suction is not an adequate means of providing the general ventilation required by this final rule.** The general industry standard does not include a definition of “ventilation,” but OSHA interpreted that standard as precluding the use of “negative” suction ventilation to meet the requirements of the standard.
Proper Prior Planning…

• Awareness of hazards
• Addressing hazards BEFORE entering
• Preparation for rescue in the event of an emergency/unanticipated condition.
• With planning and forethought, many construction employers will be able to avoid the need for a permit space program.
What do workers need to know?

• Training must cover:
  – Hazards in permit spaces and methods used to protect workers from those hazards.
  – The dangers of unauthorized rescues.
  – Must result in proficiency in the duties assigned under this standard and new or revised procedures, as necessary.
When should workers be trained?

• Before the worker is assigned duties.
• Before there is a change in assigned duties.
• Whenever there is a change in permit space entry operations.
• Whenever there is a deviation from procedures or deficiencies in the worker’s knowledge or use of those procedures.
More about Training

• Training must be provided at no cost to the worker.
• Training must be provided in a language and vocabulary the worker can understand.
Participants

- Entrant
- Attendant
- Supervisor
- Rescue
Entrant Duties

- Know the hazards
- Properly use equipment
- Communicate with attendant
Entrant Duties

• Alert attendant:
  – Recognize warning signs or symptoms of exposure to dangerous situation
  – Detect a prohibited condition

• Exit space quickly:
  – Above conditions occur
  – Order to evacuate is given
  – Evacuation alarm is activated
Attendant Duties

• Primary duty to monitor and protect authorized entrants
Attendant Duties

- Remain immediately outside the permit space during entry operations
- Communicate with entrants
- Monitor activities inside and outside the space
Attendant Duties

• Know the hazards
• Be aware of possible behavioral effects of hazard exposure in entrants
• Continuously maintain accurate count of entrants in space
Attendant Duties

• Order evacuation:
  – Prohibited condition
  – Behavioral effect of hazard exposure detected
  – Dangerous situation outside space
  – Cannot effectively and safely perform duties
Attendant Duties

- Summon rescue and emergency services
- Keep unauthorized persons away from space
- Perform/assist with non-entry rescue
Entry Supervisor Duties

• Know the hazards
• Verify tests completed and all procedures and equipment in place
• Verify rescue services are available and means of summoning are operational
Entry Supervisor Duties

- Remove unauthorized persons
- Determine that entry operations remain consistent and acceptable entry conditions are maintained
- Terminate entry and cancel permit
Rescue

• Non-entry rescue must be provided unless it increases risk or would not contribute to a successful rescue
  – Full-body harness with retrieval line
    • Attached at dorsal attachment point, or above the entrant’s head, or at another point which allows the entrant to be pulled out safely.
    • The other end of the line must be attached to a mechanical device or fixed point outside the space. A mechanical device (such as a winch) must be available if the space is more than 5 feet deep.
  – Unsuitable equipment must not be used.
Rescue

• If entry rescue is required, the employer must ensure the rescue service:
  – Can respond in a timely manner
  – Can perform rescue in the specific space(s)
  – Can reach victims in a time frame appropriate for the hazards identified
  – Is equipped for and proficient in the necessary services
  – Agrees to notify the employer in the event the service becomes unavailable
Rescue

• Entry rescue (cont’d)
  – Employers must inform the rescue service of the hazards it may confront
  – Employers must provide the rescue service with access to all permit spaces from which rescue may be necessary
What about the rescuers?

• If an employer’s workers will perform rescue, the employer must, at no cost to the workers:
  – Provide the necessary PPE and training
  – Train each worker how to perform assigned rescue duties
  – Train each worker in basic first aid and CPR, and ensure one member of the team has a current certification in both
  – Ensure each worker practices rescue before attempting an actual rescue, and at least every 12 months.
Can you use Non-Entry rescue in a crawl space or attic?

• How would you rescue someone?
• Challenges with configuration
• May require entry rescue
Who will rescue me?
Information Exchange

- Host Employer
- Controlling Contractor
- Sub Contractor

Pre entry:
- Host Employer to Sub Contractor
- Sub Contractor to Host Employer
- Sub Contractor to Sub Contractor

Post entry:
- Host Employer to Sub Contractor
- Sub Contractor to Host Employer
- Sub Contractor to Sub Contractor

Coordinate during entry:
- Sub Contractor to Sub Contractor
The host employer has to give any information it already has to the controlling contractor. 1203(h)(i)-(h)(iii)

- If the host employer does not have information about the location of each known permit space, the hazards or potential hazards in the space(s), and previous precautions taken regarding the space(s), it is not required to acquire that information.
Before entry operations begin, the controlling contractor must:

– Obtain information from the host employer if it has it. 1203(h)(2)(i)

– Provide the following information to each entry employer entering a permit space and any other employer whose activities could affect the space:
  • Information from the host employer 1203(h)(2)(ii)(a)
  • Any additional information the controlling contractor has 1203(h)(2)(ii)(b)
  • Precautions that the host employer, controlling contractor, or other entry employers have implemented 1203(h)(2)(ii)(c)
Information Exchange, cont'd

• Before entry operations begin, each entry employer must:
  – Obtain all of the controlling contractor’s information regarding permit space hazards and entry operations 1203(h)(3)(i)
  – Inform the controlling contractor of the permit space program to be followed, including likely hazards to be found or created in the space 1203(h)(3)(ii)
Information Exchange, cont'd

• Coordination
  – The controlling contractor and entry employer(s) must coordinate entry operations when
    • More than one entity performs entry operations in the same space at the same time 1203(h)(4)(i)
    • Permit space entry is performed at the same time that any activities that could cause a hazard in the permit space are performed 1203(h)(4)(ii)
• After entry operations
  – The controlling contractor must talk to each entity that entered a permit space about the program followed and any hazards found or created in the permit space(s) while in the space 1203(h)(5)(i)
  – The entry employer must inform the controlling contractor in a timely manner of the program followed and of any hazards found or created while in the space 1203(h)(5)(ii)
Information Exchange, cont'd

• After entry operations continued
  – The controlling contractor must give the host employer the information exchanged with entry employers
• If there is no controlling contractor, the requirements for and role of controlling contractor must be fulfilled by the host employer or whichever employer arranges (contracts) to have an employer perform work in a permit space 1203(h)(5)(iv)
  – *This is likely the case with most home builders
Example- Builder directly hires a contractor to apply spray foam in attic

• Builder acts as host and controlling
• Provides info to sub, including info on conditions, previous entries, precautions
• Sub must inform builder of it’s permit program, hazards likely to encounter
• Post entry brief-sub and builder meet, discuss entry operations, hazards encountered, permit program followed
Example: Builder hires controlling contractor, who hires sub to apply foam

- Builder hires ABC Construction to perform all work at site
- ABC Construction hires XYZ Insulation
- Builder = host
- ABC = Controlling contractor
- XYZ = Entry employer
• Builder gives info to ABC Construction about its spaces, prior entries, etc.
• ABC must obtain this info. from builder
• ABC then provides this info. to XYZ Insulation along with any addtl. info about its program, space.
• XYZ must obtain this info. from ABC
• XYZ must inform ABC of its program, hazards it will encounter, etc.
Double Fatality: August 28, 2014

• Employee 1 entered a manhole at a construction site to apply aerosol sealant to a juncture approximately 5-7 feet down from the top of the space. This was his second entry to perform this task that day.
• He had previously noted the strong fumes from the sealant.
• He was overcome by fumes and fell face first into 3 feet of water at the bottom.
Double Fatality: August 28, 2014

• Employee 2, the site superintendent and Employee 1’s uncle, entered the manhole to attempt rescue. He became unconscious and fell on top of Bo.

• Employee 3 left the site in order to call emergency services. He returned with a volunteer who had his own SCBA.
Double Fatality: August 28, 2014

• The volunteer attempted rescue, but a crack in the mask forced him to stop.
• EMTs arrived and extracted the victims 45 minutes after Bo’s initial loss of consciousness.
Double Fatality: August 28, 2014