Introduction to Construction Confined Space Entry

I Chose to Look the Other Way

I could have saved a life that day,
But I chose to look the other way.
It wasn't that I didn't care,
I had the time, and I was there.

But I didn't want to seem a fool,
Or argue over a safety rule.
I knew he'd done the job before,
It I spoke up, he might get sore.

The chances didn't seem that bad,
I'd done the same, He knew I had.
So I shook my head and walked on by,
He knew the risks as well as I.

He took the chance, I closed an eye,
And with that act, I let him die.
I could have saved a life that day,
But I chose to look the other way.

Now every time I see his wife,
I'll know, I should have saved his life.
That guilt is something I must bear,
But it isn't something you need share.

If you see a risk that others take,
That puts their health or life at stake.
The question asked, or thing you say,
Could help them live another day.

If you see a risk and walk away,
Then hope you never have to say,
I could have saved a life that day,
*But **I chose**, to look the other way.*

Don Merrell
J.R. Simlot Company
Don Plant Traning Center

OSHA News Release

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Region 4

U.S. Department of Labor

July 18, 2017

OSHA investigation finds safety failures led to the death of 3 workers who entered a manhole containing lethal gases
Utility contractor cited for 10 serious violations

KEY LARGO, Fla. – The U.S. Department of Labor's Occupational Safety and Health Administration has cited a South Florida utility company and related contracting company after the agency's investigation into the deaths of three workers who succumbed to toxic gases in a manhole on Jan. 16, 2017.

A 34-year-old pipe layer entered the manhole – a confined space – and quickly became unresponsive. A 49-year-old laborer entered the hole and attempted to rescue the first employee. After the second employee also became unresponsive, a 24-year-old equipment operator followed to help his fallen coworkers. All three men died. Post-incident atmospheric testing in the manhole revealed lethal levels of hydrogen sulfide and carbon monoxide. Two other employees and a volunteer firefighter were also exposed to the toxic gases in the manhole during rescue attempts but survived.

OSHA investigators cited Douglas N. Higgins, Inc. and its related contracting company, McKenna Contracting, LLC with 10 serious violations totaling $119,507, in penalties. The incident-related serious violations are for failing to purge or ventilate the confined space before entry, exposing the workers to an asphyxiation hazard, and not providing necessary rescue and emergency equipment for employees that were overcome inside a permit-required confined space.

In addition, OSHA issued serious citations to Higgins and McKenna Contracting for failing to:

- Develop and implement a written hazard communication program for a worksite in which employees were exposed to dangerous chemicals and gases.
- Use a calibrated direct-reading device to test for toxic gases, creating an asphyxiation hazard.
- Create and document the confined space entry permit.
- Provide training to employees in the safe performance of their assigned duties in permit-required confined spaces.
- Provide a guardrail around the manhole opening, exposing employees to a fall hazard.

"The hazards of working in manholes are well established, but there are ways to make it safe," said Condell Eastmond, the OSHA area director in Fort Lauderdale. "Three employees needlessly lost their lives and others were injured due to their employer's failure to follow safe work practices."

The citations for D.N. Higgins can be viewed at: https://www.dol.gov/sites/default/files/newsroom/newsreleases/OSHA20171001.pdf

Founded in Ann Arbor, Michigan, D.N. Higgins expanded in 1989 with the opening of its Naples office. The company specializes in underground installations of mechanical systems, pump stations, storm water drainage systems and municipal infrastructure. McKenna Contracting, LLC was formed in 2012 and is a related company that provides contract administration and labor to Higgins' jobsites in Florida.

The companies have 15 business days from receipt of its citations and proposed penalties to contest the findings before the independent Occupational Safety and Health Review Commission.

To ask questions; obtain compliance assistance; file a complaint or report amputations, eye loss, workplace hospitalizations, fatalities or situations posing imminent danger to workers, the public should call OSHA's toll-free hotline at 800-321-OSHA (6742) or the agency's Fort Lauderdale Area Office at 954-424-0242.

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What Questions are Raised?

Construction Confined Space Entry Standard

1926.1200 Subpart AA

Subpart AA—Confined Spaces in Construction

Authority: 40 U.S.C. 3701 et seq.; 29 U.S.C. 653, 655, 657; Secretary of Labor's Order No. 1-2012 (77 FR 3912); and 29 CFR Part 1911.

§1926.1201 Scope.

(a) This standard sets forth requirements for practices and procedures to protect employees engaged in construction activities at a worksite with one or more confined spaces, subject to the exceptions in paragraph (b) of this section.

> **Note to paragraph §1926.1201(a).** Examples of locations where confined spaces may occur include, but are not limited to, the following: Bins; boilers; pits (such as elevator, escalator, pump, valve or other equipment); manholes (such as sewer, storm drain, electrical, communication, or other utility); tanks (such as fuel, chemical, water, or other liquid, solid or gas); incinerators; scrubbers; concrete pier columns; sewers; transformer vaults; heating, ventilation, and air-conditioning (HVAC) ducts; storm drains; water mains; precast concrete and other pre-formed manhole units; drilled shafts; enclosed beams; vessels; digesters; lift stations; cesspools; silos; air receivers; sludge gates; air preheaters; step up transformers; turbines; chillers; bag houses; and/or mixers/reactors.

(b) Exceptions. This standard does not apply to:

(1) Construction work regulated by§1926 subpart P—Excavations.

(2) Construction work regulated by §1926 subpart S—Underground Construction, Caissons, Cofferdams and Compressed Air.

(3) Construction work regulated by §1926 subpart Y—Diving.

(c) Where this standard applies and there is a provision that addresses a confined space hazard in another applicable OSHA standard, the employer must comply with both that requirement and the applicable provisions of this standard.

§1926.1202 Definitions.

The following terms are defined for the purposes of this subpart only:

Acceptable entry conditions means the conditions that must exist in a permit space, before an employee may enter that space, to ensure that employees can safely enter into, and safely work within, the space.

Attendant means an individual stationed outside one or more permit spaces who assesses the status of authorized entrants and who must perform the duties specified in §1926.1209.

Authorized entrant means an employee who is authorized by the entry supervisor to enter a permit space.

Barrier means a physical obstruction that blocks or limits access.

Blanking or blinding means the absolute closure of a pipe, line, or duct by the fastening of a solid plate (such as a spectacle blind or a skillet blind) that completely covers the bore and that is capable of withstanding the maximum pressure of the pipe, line, or duct with no leakage beyond the plate.

Competent person means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them.

Confined space means a space that:

(1) Is large enough and so configured that an employee can bodily enter it;

(2) Has limited or restricted means for entry and exit; and

(3) Is not designed for continuous employee occupancy.

Control means the action taken to reduce the level of any hazard inside a confined space using engineering methods (for example, by ventilation), and then using these methods to maintain the reduced hazard level. Control also refers to the engineering methods used for this purpose. Personal protective equipment is not a control.

Controlling Contractor is the employer that has overall responsibility for construction at the worksite.

Note. If the controlling contractor owns or manages the property, then it is both a controlling employer and a host employer.

Double block and bleed means the closure of a line, duct, or pipe by closing and locking or tagging two in-line valves and by opening and locking or tagging a drain or vent valve

in the line between the two closed valves.

Early-warning system means the method used to alert authorized entrants and attendants that an engulfment hazard may be developing. Examples of early-warning systems include, but are not limited to: alarms activated by remote sensors; and lookouts with equipment for immediately communicating with the authorized entrants and attendants.

Emergency means any occurrence (including any failure of power, hazard control or monitoring equipment) or event, internal or external, to the permit space that could endanger entrants.

Engulfment means the surrounding and effective capture of a person by a liquid or finely divided (flowable) solid substance that can be aspirated to cause death by filling or plugging the respiratory system or that can exert enough force on the body to cause death by strangulation, constriction, crushing, or suffocation.

Entry means the action by which any part of a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space, whether or not such action is intentional or any work activities are actually performed in the space.

Entry Employer means any employer who decides that an employee it directs will enter a permit space.

> **Note**. An employer cannot avoid the duties of the standard merely by refusing to decide whether its employees will enter a permit space, and OSHA will consider the failure to so decide to be an implicit decision to allow employees to enter those spaces if they are working in the proximity of the space.

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 into a permit space and that contains the information specified in §1926.1206 of this standard.

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

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

> **Note.** An entry supervisor also may serve as an attendant or as an authorized entrant, as long as that person is trained and equipped as required by this standard for each role he or she fills. Also, the duties of entry supervisor may be passed from one individual to another during the course of an entry operation.

Hazard means a physical hazard or hazardous atmosphere. See definitions below.

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 of its lower flammable limit (LFL);

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

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

(3) Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent;

(4) Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published in Subpart D—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:

Note. An atmospheric concentration of any substance that is not capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or acute illness due to its health effects is not covered by this definition.

(5) Any other atmospheric condition that is immediately dangerous to life or health.

Note. For air contaminants for which OSHA has not determined a dose or permissible exposure limit, other sources of information, such as Safety Data Sheets that comply with the Hazard Communication Standard, §1926.59 of this part, published information, and internal documents can provide guidance in establishing acceptable atmospheric conditions.

Host employer means the employer that owns or manages the property where the construction work is taking place.

Note. If the owner of the property on which the construction activity occurs has contracted with an entity for the general management of that property, and has transferred to that entity the information specified in §1203(h)(1), OSHA will treat the contracted management entity as the host employer for as long as that entity manages the property. Otherwise, OSHA will treat the owner of the property as the host employer. In no case will there be more than one host employer.

Hot work means operations capable of providing a source of ignition (for example, riveting, welding, cutting, burning, and heating).

Immediately dangerous to life or health (IDLH) means any condition that would interfere with an individual's ability to escape unaided from a permit space and that poses a threat to life or that would cause irreversible adverse health effects.

Note. Some materials—hydrogen fluoride gas and cadmium vapor, for example—may

produce immediate transient effects that, even if severe, may pass without medical attention, but are followed by sudden, possibly fatal collapse 12-72 hours after exposure. The victim "feels normal" after recovery from transient effects until collapse. Such materials in hazardous quantities are considered to be "immediately" dangerous to life or health.

Inerting means displacing the atmosphere in a permit space by a noncombustible gas (such as nitrogen) to such an extent that the resulting atmosphere is noncombustible.

Note. This procedure produces an IDLH oxygen-deficient atmosphere.
Isolate or isolation means the process by which employees in a confined space are completely protected against the release of energy and material into the space, and contact with a physical hazard, by such means as: blanking or blinding; misaligning or removing sections of lines, pipes, or ducts; a double block and bleed system; lockout or tagout of all sources of energy; blocking or disconnecting all mechanical linkages; or placement of barriers to eliminate the potential for employee contact with a physical hazard.

Limited or restricted means for entry or exit means a condition that has a potential to impede an employee's movement into or out of a confined space. Such conditions include, but are not limited to, trip hazards, poor illumination, slippery floors, inclining surfaces and ladders.

Line breaking means the intentional opening of a pipe, line, or duct that is or has been carrying flammable, corrosive, or toxic material, an inert gas, or any fluid at a volume, pressure, or temperature capable of causing injury.

Lockout means the placement of a lockout device on an energy isolating device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

Lower flammable limit or lower explosive limit means the minimum concentration of a substance in air needed for an ignition source to cause a flame or explosion.

Monitor or monitoring means the process used to identify and evaluate the hazards after an authorized entrant enters the space. This is a process of checking for changes that is performed in a periodic or continuous manner after the completion of the initial testing or evaluation of that space. Non-entry rescue occurs when a rescue service, usually the attendant, retrieves
employees in a permit space without entering the permit space.

Non-permit confined space means 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.

Oxygen deficient atmosphere means an atmosphere containing less than 19.5 percent oxygen by volume.

Oxygen enriched atmosphere means an atmosphere containing more than 23.5 percent oxygen by volume.

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;

(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.

Permit-required confined space program (permit space program) means the employer's overall program for controlling, and, where appropriate, for protecting employees from, permit space hazards and for regulating employee entry into permit spaces.

Physical hazard means an existing or potential hazard that can cause death or serious physical damage.

Examples include, but are not limited to: explosives (as defined by paragraph (n) of §1926.914, definition of "explosive"); mechanical, electrical, hydraulic and pneumatic energy; radiation; temperature extremes; engulfment; noise; and inwardly converging surfaces. Physical hazard also includes chemicals that can cause death or serious physical damage through skin or eye contact (rather than through inhalation).

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 provides the appropriate PPE to each employee.

Qualified person means one who, by possession 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, the work, or the project.

Representative permit space means a mock-up of a confined space that has entrance openings that are similar to, and is of similar size, configuration, and accessibility to, the permit space that authorized entrants enter.

Rescue means retrieving, and providing medical assistance to, one or more employees who are in a permit space.

Rescue service means the personnel designated to rescue employees from permit spaces.

Retrieval system means the equipment (including a retrieval line, chest or full body

harness, wristlets or anklets, if appropriate, and a lifting device or anchor) used for non-entry rescue of persons from permit spaces.

Serious physical damage means an impairment or illness in which a body part is made functionally useless or is substantially reduced in efficiency. Such impairment or illness may be permanent or temporary and includes, but is not limited to, loss of consciousness, disorientation, or other immediate and substantial reduction in mental efficiency. Injuries involving such impairment would usually require treatment by a physician or other licensed health-care professional.

Tagout means:

(1) Placement of a tagout device on a circuit or equipment that has been De-energized, in accordance with an established procedure, to indicate that the circuit or equipment being controlled may not be operated until the tagout device is removed; and

(2) The employer ensures that

(i) tagout provides equivalent protection to lockout, or

(ii) that lockout is infeasible and the employer has relieved, disconnected, restrained and
otherwise rendered safe stored (residual) energy.

Test or testing means the process by which the hazards that may confront entrants of a permit space are identified and evaluated. Testing includes specifying the tests that are to be performed in the permit space.

Note. Testing enables employers both to devise and implement adequate control measures for the protection of authorized entrants and to determine if acceptable entry conditions are present immediately prior to, and during, entry.

Ventilate or ventilation means controlling a hazardous atmosphere using continuous forced-air mechanical systems that meet the requirements of §1926.57—Ventilation.

§1926.1203 General requirements.

(a) Before it begins work at a worksite, each employer must ensure that a competent person identifies all confined spaces in which one or more of the employees it directs may work, and identifies each space that is a permit space, through consideration and evaluation of the elements of that space, including testing as necessary.

(b) If the workplace contains one or more permit spaces, the employer who identifies, or who receives notice of, a permit space must:

(1) Inform exposed employees by posting danger signs or by any other equally effective means, of the existence and location of, and the danger posed by, each permit space; and

Note to paragraph §1926.1203(b)(1). A sign reading "DANGER -- PERMITREQUIRED

CONFINED SPACE, DO NOT ENTER" or using other similar language would satisfy the requirement for a sign.

(2) Inform, in a timely manner and in a manner other than posting, its employees' authorized representatives and the controlling contractor of the existence and location of, and the danger posed by, each permit space.

(c) Each employer who identifies, or receives notice of, a permit space and has not authorized employees it directs to work in that space must take effective measures to prevent those employees from entering that permit space, in addition to complying with all other applicable requirements of this standard.

(d) If any employer decides that employees it directs will enter a permit space, that employer must have a written permit space program that complies with §1926.1204 implemented at the construction site. The written program must be made available prior to and during entry operations for inspection by employees and their authorized representatives.

(e) An employer may use the alternate procedures specified in paragraph §1926.1203(e)(2) for entering a permit space only under the conditions set forth in paragraph §1926.1203(e)(1).

(1) An employer whose employees enter a permit space need not comply with §§1926.1204 through 1206 and §§1926.1208 through 1211, provided that all of the following conditions are met:

(i) The employer can demonstrate that all physical hazards in the space are eliminated or isolated through engineering controls so that the only hazard posed by the permit space is an actual or potential hazardous atmosphere;

(ii) The employer can demonstrate that continuous forced air ventilation alone is sufficient to maintain that permit space safe for entry, and that, in the event the ventilation system stops working, entrants can exit the space safely;

(iii) The employer develops monitoring and inspection data that supports the demonstrations required by paragraphs §1926.1203(e)(1)(i) and §1926.1203(e)(1)(ii);

(iv) If an initial entry of the permit space is necessary to obtain the data required by paragraph §1926.1203(e)(1)(iii), the entry is performed in compliance with §§1926.1204 through 1211 of this standard;

(v) The determinations and supporting data required by paragraphs §1926.1203(e)(1)(i), (e)(1)(ii), and (e)(1)(iii) are documented by the employer and are made available to each employee who enters the permit space under the terms of paragraph §1926.1203(e) or to that employee's authorized representative; and

(vi) Entry into the permit space under the terms of paragraph §1926.1203(e)(1) is performed in accordance with the requirements of paragraph §1926.1203(e)(2).

Note to paragraph §1926.1203(e)(1). See paragraph §1926.1203(g) for reclassification of a permit space after all hazards within the space have been eliminated.

(2) The following requirements apply to entry into permit spaces that meet the conditions set forth in paragraph §1926.1203(e)(1):

(i) Any conditions making it unsafe to remove an entrance cover must be eliminated before the cover is removed.

(ii) When entrance covers are removed, the opening must be immediately guarded by a railing, temporary cover, or other temporary barrier that will prevent an accidental fall through the opening and that will protect each employee working in the space from foreign objects entering the space.

(iii) Before an employee enters the space, the internal atmosphere must be tested, with a calibrated direct-reading instrument, for oxygen content, for flammable gases and vapors, and for potential toxic air contaminants, in that order. Any employee who enters the space, or that employee's authorized representative, must be provided an opportunity to observe the pre-entry testing required by this paragraph.

(iv) No hazardous atmosphere is permitted within the space whenever any employee is inside the space.

(v) Continuous forced air ventilation must be used, as follows:

(A) An employee must not enter the space until the forced air ventilation has eliminated any hazardous atmosphere;

(B) The forced air ventilation must be so directed as to ventilate the immediate areas where an employee is or will be present within the space and must continue until all employees have left the space;

(C) The air supply for the forced air ventilation must be from a clean source and must not increase the hazards in the space.

(vi) The atmosphere within the space must be continuously monitored unless the entry employer can demonstrate that equipment for continuous monitoring is not commercially available or periodic monitoring is sufficient.

If continuous monitoring is used, the employer must ensure that the monitoring equipment has an alarm that will notify all entrants if a specified atmospheric threshold is achieved, or that an employee will check the monitor with sufficient frequency to ensure that entrants have adequate time to escape.

If continuous monitoring is not used, periodic monitoring is required. All monitoring must ensure that the continuous

forced air ventilation is preventing the accumulation of a hazardous atmosphere.

Any employee who enters the space, or that employee's authorized representative, must be provided with an opportunity to observe the testing required by this paragraph.

(vii) If a hazard is detected during entry:

(A) Each employee must leave the space immediately;

(B) The space must be evaluated to determine how the hazard developed; and

(C) The employer must implement measures to protect employees from the hazard before any subsequent entry takes place.

(viii) The employer must ensure a safe method of entering and exiting the space. If a hoisting system is used, it must be designed and manufactured for personnel hoisting; however, a job-made hoisting system is permissible if it is approved for personnel hoisting by a registered professional engineer, in writing, prior to use.

(ix) The employer must verify that the space is safe for entry and that the pre-entry measures required by paragraph §1926.1203(e)(2) have been taken, through a written certification that contains the date, the location of the space, and the signature of the person providing the certification. The certification must be made before entry and must be made available to each employee entering the space or to that employee's authorized representative.

(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 permitrequired confined space.

(g) A space classified by an employer as a permit-required confined space may only be reclassified as a non-permit confined space when a competent person determines that all of the applicable requirements in paragraphs §1926.1203(g)(1) through (g)(4) have been met:

(1) If the permit space poses no actual or potential atmospheric hazards and if all hazards within the space are eliminated or isolated without entry into the space (unless the employer can demonstrate that doing so without entry is infeasible), the permit space may be reclassified as a non-permit confined space for as long as the non-atmospheric hazards remain eliminated or isolated;

(2) The entry employer must eliminate or isolate the hazards without entering the space, unless it can demonstrate that this is infeasible. If it is necessary to enter the permit space to eliminate or isolate hazards, such entry must be performed

under §§1926.1204 through 1211 of this standard. If testing and inspection during that entry demonstrate that the hazards within the permit space have been eliminated or isolated, the permit space may be reclassified as a non-permit confined space for as long as the hazards remain eliminated or isolated;

Note to paragraph §1926.1203(g)(2). Control of atmospheric hazards through forced air ventilation does not constitute elimination or isolation of the hazards. Paragraph §1926.1203(e) covers permit space entry where the employer can demonstrate that forced air ventilation alone will control all hazards in the space.

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

(4) If hazards arise within a permit space that has been reclassified as a non-permit space under paragraph §1926.1203(g), each employee in the space must exit the space. The entry employer must then reevaluate the space and reclassify it as a permit space as appropriate in accordance with all other applicable provisions of this standard.

(h) Permit Space Entry Communication and Coordination:

(1) Before entry operations begin, the host employer must provide the following information, if it has it, to the controlling contractor:

(i) The location of each known permit space;

(ii) The hazards or potential hazards in each space or the reason it is a permit space; and

(iii) Any precautions that the host employer or any previous controlling contractor or entry employer implemented for the protection of employees in the permit space.

(2) Before entry operations begin, the controlling contractor must:

(i) Obtain the host employer's information about the permit space hazards and previous entry operations; and

(ii) Provide the following information to each entity entering a permit space and any other entity at the worksite whose activities could foreseeably result in a hazard in the permit space:

(A) The information received from the host employer;

(B) Any additional information the controlling contractor has about the subjects listed in paragraph (h)(1) of this section; and

(C) The precautions that the host employer, controlling contractor, or other entry employers implemented for the protection of employees in the permit spaces.

(3) Before entry operations begin, each entry employer must:

(i) Obtain all of the controlling contractor's information regarding permit space hazards and entry operations; and

(ii) Inform the controlling contractor of the permit space program that the entry employer will follow, including any hazards likely to be confronted or created in each permit space.

(4) The controlling contractor and entry employer(s) must coordinate entry operations when:

(i) More than one entity performs permit space entry at the same time; or

(ii) Permit space entry is performed at the same time that any activities that could foreseeably result in a hazard in the permit space are performed.

(5) After entry operations:

(i) The controlling contractor must debrief each entity that entered a permit space regarding the permit space program followed and any hazards confronted or created in the permit space(s) during entry operations;

(ii) The entry employer must inform the controlling contractor in a timely manner of the permit space program followed and of any hazards confronted or created in the permit space(s) during entry operations; and

(iii) The controlling contractor must apprise the host employer of the information exchanged with the entry entities pursuant to this subparagraph.

Note to paragraph §1926.1203(h). Unless a host employer or controlling contractor has or will have employees in a confined space, it is not required to enter any confined space to collect the information specified in this paragraph (h).

(iv) If there is no controlling contractor present at the worksite, the requirements for, and role of, controlling contactors in §1926.1203 must be fulfilled by the host employer or other employer who arranges to have employees of another employer perform work that involves permit space entry.

§1926.1204 Permit-Required Confined Space Program.

Each entry employer must:

(a) Implement the measures necessary to prevent unauthorized entry;

(b) Identify and evaluate the hazards of permit spaces before employees enter them;

(c) Develop and implement the means, procedures, and practices necessary for safe permit space entry operations, including, but not limited to, the following:

(1) Specifying acceptable entry conditions;

(2) Providing each authorized entrant or that employee's authorized representative with the opportunity to observe any monitoring or testing of permit spaces;

(3) Isolating the permit space and physical hazard(s) within the space;

(4) Purging, inerting, flushing, or ventilating the permit space as necessary to eliminate or control atmospheric hazards;

Note to paragraph §1204(c)(4). When an employer is unable to reduce the atmosphere below 10 percent LFL, the employer may only enter if the employer inerts the space so as to render the entire atmosphere in the space noncombustible, and the employees use PPE to address any other atmospheric hazards (such as oxygen deficiency), and the employer eliminates or isolates all physical hazards in the space.

(5) Determining that, in the event the ventilation system stops working, the monitoring procedures will detect an increase in atmospheric hazard levels in sufficient time for the entrants to safely exit the permit space;

(6) Providing pedestrian, vehicle, or other barriers as necessary to protect entrants from external hazards;

(7) Verifying that conditions in the permit space are acceptable for entry throughout the duration of an authorized entry, and ensuring that employees are not allowed to enter into, or remain in, a permit space with a hazardous atmosphere unless the employer can demonstrate that personal protective equipment (PPE) will provide effective protection for each employee in the permit space and provides the appropriate PPE to each employee; and

(8) Eliminating any conditions (for example, high pressure) that could make it unsafe to remove an entrance cover.

(d) Provide the following equipment (specified in paragraphs §1926.1204(d)(1) through (d)(9)) at no cost to each employee, maintain that equipment properly, and ensure that each employee uses that equipment properly:

(1) Testing and monitoring equipment needed to comply with paragraph §1926.1204(e);

(2) Ventilating equipment needed to obtain acceptable entry conditions;

(3) Communications equipment necessary for compliance with paragraphs §1926.1208(c) and §1926.1209(e), including any necessary electronic communication equipment for attendants assessing entrants' status in multiple spaces;

(4) Personal protective equipment insofar as feasible engineering and work-practice controls do not adequately protect employees;

Note to paragraph §1926.1204(d)(4). The requirements of subpart E of this part and other PPE requirements continue to apply to the use of PPE in a permit space. For example, if employees use respirators, then the respirator requirements in §1926.103 (Respiratory protection) must be met.

(5) Lighting equipment that meets the minimum illumination requirements in §1926.56, that is approved for the ignitable or combustible properties of the specific gas, vapor, dust, or fiber that will be present, and that is sufficient to enable employees to see well enough to work safely and to exit the space quickly in an emergency;

(6) Barriers and shields as required by paragraph §1926.1204(c)(4);

(7) Equipment, such as ladders, needed for safe ingress and egress by authorized entrants;

(8) Rescue and emergency equipment needed to comply with paragraph §1926.1204(i), except to the extent that the equipment is provided by rescue services; and

(9) Any other equipment necessary for safe entry into, safe exit from, and rescue from, permit spaces.

(e) Evaluate permit space conditions in accordance with the following paragraphs (e)(1) through (6) of this section when entry operations are conducted:

(1) Test conditions in the permit space to determine if acceptable entry conditions exist before changes to the space's natural ventilation are made, and before entry is authorized to begin, except that, if an employer demonstrates that isolation of the space is infeasible because the space is large or is part of a continuous system (such as a sewer), the employer must:

(i) Perform pre-entry testing to the extent feasible before entry is authorized; and,

(ii) If entry is authorized, continuously monitor entry conditions in the areas where authorized entrants are working, except that employers may use periodic monitoring in accordance with paragraph §1926.1204(e)(2) for monitoring an atmospheric hazard if they can demonstrate that equipment for continuously monitoring that hazard is not commercially available;

(iii) Provide an early-warning system that continuously monitors for nonisolated engulfment hazards. The system must alert authorized entrants and attendants in sufficient time for the authorized entrants to safely exit the space.

(2) Continuously monitor atmospheric hazards unless the employer can demonstrate that the equipment for continuously monitoring a hazard is not

commercially available or that periodic monitoring is of sufficient frequency to ensure that the atmospheric hazard is being controlled at safe levels. If continuous monitoring is not used, periodic monitoring is required with sufficient frequency to ensure that acceptable entry conditions are being maintained during the course of entry operations;

(3) When testing for atmospheric hazards, test first for oxygen, then for combustible gases and vapors, and then for toxic gases and vapors;

(4) Provide each authorized entrant or that employee's authorized representative an opportunity to observe the pre-entry and any subsequent testing or monitoring of permit spaces;

(5) Reevaluate the permit space in the presence of any authorized entrant or that employee's authorized representative who requests that the employer conduct such reevaluation because there is some indication that the evaluation of that space may not have been adequate; and

(6) Immediately provide each authorized entrant or that employee's authorized representative with the results of any testing conducted in accordance with §1926.1204 of this standard.

(f) Provide at least one attendant outside the permit space into which entry is authorized for the duration of entry operations;

(1) Attendants may be assigned to more than one permit space provided the duties described in §1926.1209 of this standard can be effectively performed for each permit space.

(2) Attendants may be stationed at any location outside the permit space as long as the duties described in §1926.1209 of this standard can be effectively performed for each permit space to which the attendant is assigned.

(g) If multiple spaces are to be assigned to a single attendant, include in the permit program the means and procedures to enable the attendant to respond to an emergency affecting one or more of those permit spaces without distraction from the attendant's responsibilities under §1926.1209 of this standard;

(h) Designate each person who is to have an active role (as, for example, authorized entrants, attendants, entry supervisors, or persons who test or monitor the atmosphere in a permit space) in entry operations, identify the duties of each such employee, and provide each such employee with the training required by §1926.1207 of this standard;

(i) Develop and implement procedures for summoning rescue and emergency services (including procedures for summoning emergency assistance in the event of a failed non-entry rescue), for rescuing entrants from permit spaces, for providing necessary emergency services to rescued employees, and for preventing unauthorized personnel from attempting a rescue;

(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;

(k) Develop and implement procedures to coordinate entry operations, in consultation with the controlling contractor, when employees of more than one employer are working simultaneously in a permit space or elsewhere on the worksite where their activities could, either alone or in conjunction with the activities within a permit space, foreseeably result in a hazard within the confined space, so that employees of one employer do not endanger the employees of any other employer;

(l) Develop and implement procedures (such as closing off a permit space and canceling the permit) necessary for concluding the entry after entry operations have been completed;

(m) Review entry operations when the measures taken under the permit space program may not protect employees and revise the program to correct deficiencies found to exist before subsequent entries are authorized; and
Note to paragraph §1926.1204(m). Examples of circumstances requiring the review of the permit space program include, but are not limited to: any unauthorized entry of a permit space, the detection of a permit space hazard not covered by the permit, the detection of a condition prohibited by the permit, the occurrence of an injury or near-miss during entry, a change in the use or configuration of a permit space, and employee complaints about the effectiveness of the program.

(n) Review the permit space program, using the canceled permits retained under paragraph §1926.1205(f), within 1 year after each entry and revise the program as necessary to ensure that employees participating in entry operations are protected from permit space hazards.

> **Note to paragraph §1926.1204(n).** Employers may perform a single annual review covering all entries performed during a 12-month period. If no entry is performed during a 12-month period, no review is necessary.

§1926.1205 Permitting Process.

(a) Before entry is authorized, each entry employer must document the completion of measures required by paragraph §1926.1204(c) of this standard by preparing an entry permit.

(b) Before entry begins, the entry supervisor identified on the permit must sign the entry permit to authorize entry.

(c) The completed permit must be made available at the time of entry to all authorized entrants or their authorized representatives, by posting it at the entry portal or by any other equally effective means, so that the entrants can confirm that pre-entry preparations have been completed.

(d) The duration of the permit may not exceed the time required to complete the assigned task or job identified on the permit in accordance with paragraph §1926.1206(b) of this standard.

(e) The entry supervisor must terminate entry and take the following action when any of the following apply:

(1) Cancel the entry permit when the entry operations covered by the entry permit have been completed; or

(2) 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 and that condition is temporary in nature and does not change the configuration of the space or create any new hazards within it; and

(3) Cancel the entry permit when a condition that is not allowed under the entry permit arises in or near the permit space and that condition is not covered by subparagraph (e)(2) of this section.

(f) The entry employer must retain each canceled entry permit for at least 1 year to facilitate the review of the permit-required confined space program required by paragraph §1926.1204(n) of this standard. Any problems encountered during an entry operation must be noted on the pertinent permit so that appropriate revisions to the permit space program can be made.

§1926.1206 Entry permit.

The entry permit that documents compliance with this section and authorizes entry to a permit space must identify:

(a) The permit space to be entered;

(b) The purpose of the entry;

(c) The date and the authorized duration of the entry permit;

(d) 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;

Note to paragraph §1926.1206(d). This requirement may be met by inserting a reference on the entry permit as to the means used, such as a roster or tracking system, to keep track of the authorized entrants within the permit space.

(e) Means of detecting an increase in atmospheric hazard levels in the event the ventilation system stops working;

(f) Each person, by name, currently serving as an attendant;

(g) The individual, by name, currently serving as entry supervisor, and the signature or initials of each entry supervisor who authorizes entry;

(h) The hazards of the permit space to be entered;

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

Note to paragraph §1926.1206(i). Those measures can include, but are not limited to, the lockout or tagging of equipment and procedures for purging, inerting, ventilating, and flushing permit spaces.

(j) The acceptable entry conditions;

(k) The results of tests and monitoring performed under paragraph §1926.1204(e) of this standard, accompanied by the names or initials of the testers and by an indication of when the tests were performed;

(l) 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;

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

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

(o) Any other information necessary, given the circumstances of the particular confined space, to ensure employee safety; and

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

§1926.1207 Training.

(a) The employer must provide training to each employee whose work is regulated by this standard, at no cost to the employee, and ensure that the employee possesses the understanding, knowledge, and skills necessary for the safe performance of the duties assigned under this standard. This training must result in an understanding of the hazards in the permit space and the methods used to isolate, control or in other ways protect employees from these hazards, and for those employees not authorized to perform entry rescues, in the dangers of attempting such rescues.

(b) Training required by this section must be provided to each affected employee:

(1) In both a language and vocabulary that the employee can understand;

(2) Before the employee is first assigned duties under this standard;

(3) Before there is a change in assigned duties;

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

(5) Whenever there is any evidence of a deviation from the permit space entry procedures required by paragraph §1926.1204(c) of this standard or there are inadequacies in the employee's knowledge or use of these procedures.

(c) The training must establish employee proficiency in the duties required by this

standard and must introduce new or revised procedures, as necessary, for compliance with this standard.

(d) The employer must maintain training records to show that the training required by paragraphs §1926.1207(a) through (c) of this standard has been accomplished. The training records must contain each employee's name, the name of the trainers, and the dates of training. The documentation must be available for inspection by employees and their authorized representatives, for the period of time the employee is employed by that employer.

§1926.1208 Duties of authorized entrants.

The entry employer must ensure that all authorized entrants:

(a) Are familiar with and understand the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;

(b) Properly use equipment as required by paragraph §1926.1204(d) of this standard;

(c) Communicate with the attendant as necessary to enable the attendant to assess entrant status and to enable the attendant to alert entrants of the need to evacuate the space as required by paragraph §1926.1209(f) of this standard;

(d) Alert the attendant whenever:

(1) There is any warning sign or symptom of exposure to a dangerous situation; or

(2) The entrant detects a prohibited condition; and

(e) Exit from the permit space as quickly as possible whenever:

(1) An order to evacuate is given by the attendant or the entry supervisor;

(2) There is any warning sign or symptom of exposure to a dangerous situation;

(3) The entrant detects a prohibited condition; or

(4) An evacuation alarm is activated.

§1926.1209 Duties of attendants.

The entry employer must ensure that each attendant:

(a) Is familiar with and understands the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;

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

(c) Continuously maintains an accurate count of authorized entrants in the permit space and ensures that the means used to identify authorized entrants under paragraph 1926.1206(d) of this standard accurately identifies who is in the permit space;

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

Note to paragraph §1926.1209(d). Once an attendant has been relieved by another attendant, the relieved attendant may enter a permit space to attempt a rescue when the employer's permit space program allows attendant entry for rescue and the attendant has been trained and equipped for rescue operations as required by paragraph §1926.1211(a).

(e) Communicates with authorized entrants as necessary to assess entrant status and to alert entrants of the need to evacuate the space under paragraph §1926.1208(e);

(f) Assesses activities and conditions 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:

(1) If there is a prohibited condition;

(2) If the behavioral effects of hazard exposure are apparent in an authorized entrant;

(3) If there is a situation outside the space that could endanger the authorized entrants; or

(4) If the attendant cannot effectively and safely perform all the duties required under §1926.1209 of this standard;

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

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

(1) Warns the unauthorized persons that they must stay away from the permit space;

(2) Advises the unauthorized persons that they must exit immediately if they have entered the permit space; and

(3) Informs the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space;

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

(j) Performs no duties that might interfere with the attendant's primary duty to assess and protect the authorized entrants.

§1926.1210 Duties of entry supervisors.

The entry employer must ensure that each entry supervisor:

(a) Is familiar with and understands the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;

(b) 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;

(c) Terminates the entry and cancels or suspends the permit as required by paragraph 1926.1205(e) of this standard;

(d) Verifies that rescue services are available and that the means for summoning them are operable, and that the employer will be notified as soon as the services become unavailable;

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

(f) 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.

§1926.1211 Rescue and emergency services.

(a) An employer who designates rescue and emergency services, pursuant to paragraph §1926.1204(i) of this standard, must:

(1) Evaluate a prospective rescuer's ability to respond to a rescue summons in a timely manner, considering the hazard(s) identified;

Note to paragraph §1926.1211(a)(1). What will be considered timely will vary according to the specific hazards involved in each entry. For example, §1926.103—Respiratory Protection requires that employers provide a standby person or persons capable of immediate action to rescue employee(s) wearing respiratory protection while in work areas defined as IDLH atmospheres.

(2) 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;

(3) Select a rescue team or service from those evaluated that:

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

(ii) Is equipped for, and proficient in, performing the needed rescue services;

(iii) Agrees to notify the employer immediately in the event that the rescue service becomes unavailable;

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

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

(b) An employer whose employees have been designated to provide permit space rescue and/or emergency services must take the following measures and provide all equipment and training at no cost to those employees:

(1) Provide each affected employee with the personal protective equipment (PPE) needed to conduct permit space rescues safely and train each affected employee so the employee is proficient in the use of that PPE;

(2) Train each affected employee to perform assigned rescue duties. The employer must ensure that such employees successfully complete the training required and establish proficiency as authorized entrants, as provided by §§1926.1207 and 1926.1208 of this standard;

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

(4) Ensure that affected employees practice making permit space rescues before attempting an actual rescue, and 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, except practice rescue is not required where the affected employees properly performed a rescue operation during the last 12 months in the same permit space the authorized entrant will enter, or in a similar permit space. Representative permit spaces must, with respect to opening size, configuration, and accessibility, simulate the types of permit spaces from which rescue is to be performed.

(c) Non-entry rescue is required unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant. The employer must designate an entry rescue service whenever non-entry rescue is not selected. Whenever non-entry rescue is selected, the entry employer must ensure that retrieval systems or methods are used whenever an authorized entrant enters a permit space, and must confirm, prior to entry, that emergency assistance would be available in the event that non-entry rescue fails. Retrieval systems must meet the following requirements:

(1) Each authorized entrant must 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 or

anklets 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 or anklets is the safest and most effective alternative.

(2) The other end of the retrieval line must 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 must be available to retrieve personnel from vertical type permit spaces more than 5 feet (1.52 meters) deep.

(3) Equipment that is unsuitable for retrieval must not be used, including, but not limited to, retrieval lines that have a reasonable probability of becoming entangled with the retrieval lines used by other authorized entrants, or retrieval lines that will not work due to the internal configuration of the permit space.

(d) 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 SDS or written information must be made available to the medical facility treating the exposed entrant.

§1926.1212 Employee participation.

(a) Employers must consult with affected employees and their authorized representatives on the development and implementation of all aspects of the permit space program required by §1926.1203 of this standard.

(b) Employers must make available to each affected employee and his/her authorized representatives all information required to be developed by this standard.
§1926.1213 Provision of documents to Secretary.
For each document required to be retained in this standard, the retaining employer must make the document available on request to the Secretary of Labor or the Secretary's designee.

OSHA® FactSheet

Confined Spaces in Construction: Pits

Confined spaces can present conditions that are immediately dangerous to workers if not properly identified, evaluated, tested, and controlled. This fact sheet highlights many of the confined space hazards associated with pits and how employers can protect their workers in these environments.

OSHA has developed a new construction standard for Confined Spaces (29 CFR 1926 Subpart AA)— any space that meets the following three criteria:

- Is large enough for a worker to enter it;
- Has limited means of entry or exit; and
- Is not designed for continuous occupancy.

A space may also be a **permit-required confined space** if it has a hazardous atmosphere, the potential for engulfment or suffocation, a layout that might trap a worker through converging walls or a sloped floor, or any other serious safety or health hazard.

Fatal Incidents

Confined space hazards in pits have led to worker deaths. Several tragic incidents included:

- Two workers suffocated while attempting to close gate valves in a valve pit.
- A worker lost consciousness, fell, and was killed while climbing down a ladder into an unventilated underground valve vault to turn on water valves.
- While replacing a steam-operated vertical pump, an equipment repair technician died from burns and suffocation after falling into an industrial waste pit.

Training

The new Confined Spaces standard requires employers to ensure that their workers know about the existence, location, and dangers posed by each permit-required confined space, and that they may not enter such spaces without authorization.

Employers must train workers involved in permit-required confined space operations so that they can perform their duties safely and understand the hazards in permit spaces and the methods used to isolate, control or protect workers from these hazards. Workers not authorized to perform entry rescues must be trained on the dangers of attempting such rescues.

Safe Entry Requirements

The new Confined Spaces standard includes several requirements for safe entry.

Preparation: Before workers can enter a confined space, employers must provide pre-entry planning. This includes:

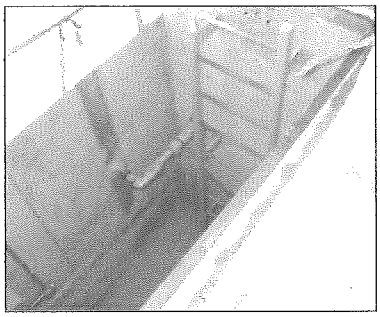
- Having a competent person evaluate the work site for the presence of confined spaces, including permit-required confined spaces.
- Once the space is classified as a permit-required confined space, identifying the means of entry and exit, proper ventilation methods, and elimination or control of all potential hazards in the space.
- Ensuring that the air in a confined space is tested, before workers enter, for oxygen levels, flammable and toxic substances, and stratified atmospheres.
- If a permit is required for the space, removing or controlling hazards in the space and determining rescue procedures and necessary equipment.
- If the air in a space is not safe for workers, ventilating or using whatever controls or protections are necessary so that employees can safely work in the space.

Ongoing practices: After pre-entry planning, employers must ensure that the space is monitored for hazards, especially atmospheric hazards. Effective communication is important because there can be multiple contractors operating on a site, each with its own workers

needing to enter the confined space. Attendants outside confined spaces must make sure that unauthorized workers do not enter them. Rescue attempts by untrained personnel can lead to multiple deaths.

Confined Spaces in Pits

Even though a pit is typically open on top and over 4 feet deep, it can still be a confined space or permit-required confined space. Additionally, pits can be completely underground or below grade, such as a utility vault within a sewer system or a pit within a pit in a wastewater treatment plant.



Pits are found in many environments. Examples include sump pits, valve pits or vaults (e.g., wastewater treatment plants, municipal water systems), electrical pits/vaults, steam pits/vaults, vehicle service/garage pits, elevator pits, dock leveler pits, industrial chemical waste pits, and many more. Many of these spaces qualify as permit-required confined spaces.

Employers must take all necessary steps to keep workers safe in confined spaces, including following the OSHA Construction Confined Spaces standard. This standard applies to both new construction in a pit and alterations and/or upgrades. Among the pit-related tasks covered by the standard are:

- Opening or closing valves during renovation work.
- Installing or upgrading pump equipment, cables, or junction boxes.

Construction work can create confined spaces, even if there are none at the start of a project. Changes to the entry/exit, the ease of exit, and air flow could produce a confined space or cause one to become permit-required.

Personal protective equipment: Employers should assess the worksite to determine what personal protective equipment (PPE) is needed to protect workers. Employers should provide workers with the required PPE and proper training on its use and about any related hazards before the work starts.

How to Contact OSHA

For questions or to get information or advice, to find out how to contact OSHA's free on-site consultation program, order publications, report a fatality or severe injury, or to file a confidential complaint, visit www.osha.gov or call 1-800-321-OSHA (6742).

Additional Information

OSHA's Confined Spaces in Construction Standard (29 CFR 1926 Subpart AA)

Confined Spaces: OSHA Construction Industry Topics by Standard

OSHA Fact Sheet: Procedures for Atmospheric Testing in Confined Spaces

Confined Spaces: NIOSH Workplace Safety and Health Topics Page

State Plan Guidance: States with OSHA-approved state plans may have additional requirements for confined space safety.

Help for Small and Medium-Sized Employers: OSHA's On-site Consultation Program offers free and confidential advice to businesses nationwide.

This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory-impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: 1-877-889-5627.

For assistance, contact us. We can help. It's confidential.

OSHA® Occupational Safety and Health Administration

www.osha.gov (800) 321-OSHA (6742)

U.S. Department of Labor

OSHA FactSheet

Procedures for Atmospheric Testing in Confined Spaces[1]

Atmospheric testing is required for two distinct purposes: evaluation of the hazards of the permit space and verification that acceptable conditions exist for entry into that space.

A confined space is one that is large enough to enter and perform assigned work in; it has limited or restricted ways to enter or exit the space; and it was not designed to be occupied continuously by a worker.

Evaluation testing

The atmosphere within a confined space must be tested using equipment that is designed to detect the chemicals that may be present at levels that are well below the defined exposure limits. Evaluation testing is done to:

- determine what chemical hazards are or may become present in the space's atmosphere, and
- identify what steps must be followed and what conditions must be met to ensure that atmospheric conditions are safe for a worker to enter the space.

The testing results and the decisions about what steps must be followed before entry must be evaluated by, or reviewed by, a technically qualified professional like an OSHA consultation service, a certified industrial hygienist, a registered safety engineer, or a certified safety professional. The technically qualified professional must consider all of the serious hazards in his/her evaluation or review.

A permit space is a confined space that has one or more of the following features: it has or may contain a hazardous atmosphere; it contains a material that can engulf a person who enters; it has an inside design that could trap or asphyxiate a person who enters (inwardly converging walls, or a floor that slopes downward to a smaller section); or it has any other serious safety or health hazards.

Verification Testing

Before a permit space that may have a hazardous atmosphere can be entered, the atmosphere must be tested using the steps identified on the permit (developed during evaluation testing). Verification testing is done to make sure that the chemical hazards that may be present are below the levels necessary for safe entry, and that they meet the conditions identified on the permit. Test the atmosphere in the following order: (1) for oxygen, (2) for combustible gases, and then (3) for toxic gases and vapors.[2] The testing results -- the actual test concentrations -- must be recorded on the permit near the levels identified for safe entry.

Duration of Testing

For each test required on the permit, you must allow enough time for the air from the space to be drawn into the equipment and for the sensor (or other detection device) to react to the chemical if it is present. This is considered the "minimum response time" and it will be noted by the manufacturer in the operator's manual. Be aware that you will need to add time to this "minimum response time" if you have attached hosing or a probe extension to the inlet. The additional time is needed to allow the air from the different depths of the space to be pulled into the equipment inlet.

Additional Aids

OSHA® BRIEF

Hazard Communication Standard: Safety Data Sheets

The Hazard Communication Standard (HCS) (29 CFR 1910.1200(g)), revised in 2012, requires that the chemical manufacturer, distributor, or importer provide Safety Data Sheets (SDSs) (formerly MSDSs or Material Safety Data Sheets) for each hazardous chemical to downstream users to communicate information on these hazards. The information contained in the SDS is largely the same as the MSDS, except now the SDSs are required to be presented in a consistent user-friendly, 16-section format. This brief provides guidance to help workers who handle hazardous chemicals to become familiar with the format and understand the contents of the SDSs.

The SDS includes information such as the properties of each chemical; the physical, health, and environmental health hazards; protective measures; and safety precautions for handling, storing, and transporting the chemical. The information contained in the SDS must be in English (although it may be in other languages as well). In addition, OSHA requires that SDS preparers provide specific minimum information as detailed in Appendix D of 29 CFR 1910.1200. The SDS preparers may also include additional information in various section(s).

Sections 1 through 8 contain general information about the chemical, identification, hazards, composition, safe handling practices, and emergency control measures (e.g., fire fighting). This information should be helpful to those that need to get the information quickly. Sections 9 through 11 and 16 contain other technical and scientific information, such as physical and chemical properties, stability and reactivity information, toxicological information, exposure control information, and other information including the date of preparation or last revision. The SDS must also state that no applicable information was found when the preparer does not find relevant information for any required element.

The SDS must also contain Sections 12 through 15, to be consistent with the UN Globally Harmonized System of Classification and Labeling of Chemicals (GHS), but OSHA will not enforce the content of these sections because they concern matters handled by other agencies.

A description of all 16 sections of the SDS, along with their contents, is presented below:

Section 1: Identification

This section identifies the chemical on the SDS as well as the recommended uses. It also provides the essential contact information of the supplier. The required information consists of:

- Product identifier used on the label and any other common names or synonyms by which the substance is known.
- Name, address, phone number of the manufacturer, importer, or other responsible party, and emergency phone number.
- Recommended use of the chemical (e.g., a brief description of what it actually does, such as flame retardant) and any restrictions on use (including recommendations given by the supplier).

Section 2: Hazard(s) Identification

This section identifies the hazards of the chemical presented on the SDS and the appropriate warning information associated with those hazards. The required information consists of:

- The hazard classification of the chemical (e.g., flammable liquid, category[1]).
- Signal word.
- Hazard statement(s).
- Pictograms (the pictograms or hazard symbols may be presented as graphical reproductions of the symbols in black and white or be a description of the name of the symbol (e.g., skull and crossbones, flame).
- Precautionary statement(s).
- Description of any hazards not otherwise classified.
- For a mixture that contains an ingredient(s) with unknown toxicity, a statement describing how much (percentage) of the mixture consists of ingredient(s) with unknown acute toxicity. Please note that this is a total percentage of the mixture and not tied to the individual ingredient(s).

Section 3: Composition/Information on Ingredients

This section identifies the ingredient(s) contained in the product indicated on the SDS, including impurities and stabilizing additives. This section includes information on substances, mixtures, and all chemicals where a trade secret is claimed. The required information consists of:

Substances

- Chemical name.
- Common name and synonyms.
- Chemical Abstracts Service (CAS) number and other unique identifiers.
- Impurities and stabilizing additives, which are themselves classified and which contribute to the classification of the chemical.

Mixtures

- Same information required for substances.
- The chemical name and concentration (i.e., exact percentage) of all ingredients which are classified as health hazards and are:
  - Present above their cut-off/concentration limits or
  - Present a health risk below the cut-off/concentration limits.
- The concentration (exact percentages) of each ingredient must be specified except concentration ranges may be used in the following situations:
  - A trade secret claim is made,
  - There is batch-to-batch variation, or
  - The SDS is used for a group of substantially similar mixtures.

Chemicals where a trade secret is claimed

- A statement that the specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret is required.

[1] Chemical, as defined in the HCS, is any substance, or mixture of substances.

Section 4: First-Aid Measures

This section describes the initial care that should be given by untrained responders to an individual who has been exposed to the chemical. The required information consists of:

- Necessary first-aid instructions by relevant routes of exposure (inhalation, skin and eye contact, and ingestion).
- Description of the most important symptoms or effects, and any symptoms that are acute or delayed.
- Recommendations for immediate medical care and special treatment needed, when necessary.

Section 5: Fire-Fighting Measures

This section provides recommendations for fighting a fire caused by the chemical. The required information consists of:

- Recommendations of suitable extinguishing equipment, and information about extinguishing equipment that is not appropriate for a particular situation.
- Advice on specific hazards that develop from the chemical during the fire, such as any hazardous combustion products created when the chemical burns.
- Recommendations on special protective equipment or precautions for firefighters.

Section 6: Accidental Release Measures

This section provides recommendations on the appropriate response to spills, leaks, or releases, including containment and cleanup practices to prevent or minimize exposure to people, properties, or the environment. It may also include recommendations distinguishing between responses for large and small spills where the spill volume has a significant impact on the hazard. The required information may consist of recommendations for:

- Use of personal precautions (such as removal of ignition sources or providing sufficient ventilation) and protective equipment to prevent the contamination of skin, eyes, and clothing.
- Emergency procedures, including instructions for evacuations, consulting experts when needed, and appropriate protective clothing.
- Methods and materials used for containment (e.g., covering the drains and capping procedures).
- Cleanup procedures (e.g., appropriate techniques for neutralization, decontamination, cleaning or vacuuming; adsorbent materials; and/or equipment required for containment/clean up).

Section 7: Handling and Storage

This section provides guidance on the safe handling practices and conditions for safe storage of chemicals. The required information consists of:

- Precautions for safe handling, including recommendations for handling incompatible chemicals, minimizing the release of the chemical into the environment, and providing advice on general hygiene practices (e.g., eating, drinking, and smoking in work areas is prohibited).
- Recommendations on the conditions for safe storage, including any incompatibilities. Provide advice on specific storage requirements (e.g., ventilation requirements).

Section 8: Exposure Controls/Personal Protection

This section indicates the exposure limits, engineering controls, and personal protective measures that can be used to minimize worker exposure. The required information consists of:

- OSHA Permissible Exposure Limits (PELs), American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs), and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the safety data sheet, where available.
- Appropriate engineering controls (e.g., use local exhaust ventilation, or use only in an enclosed system).
- Recommendations for personal protective measures to prevent illness or injury from exposure to chemicals, such as personal protective equipment (PPE) (e.g., appropriate types of eye, face, skin or respiratory protection needed based on hazards and potential exposure).
- Any special requirements for PPE, protective clothing or respirators (e.g., type of glove material, such as PVC or nitrile rubber gloves; and breakthrough time of the glove material).

Section 9: Physical and Chemical Properties

This section identifies physical and chemical properties associated with the substance or mixture. The minimum required information consists of:

- Appearance (physical state, color, etc.);
- Odor;
- Odor threshold;
- pH;
- Melting point/freezing point;
- Initial boiling point and boiling range;
- Flash point;
- Evaporation rate;
- Flammability (solid, gas);
- Upper/lower flammability or explosive limits;
- Vapor pressure;
- Vapor density;
- Relative density;
- Solubility(ies);
- Partition coefficient: n-octanol/water;
- Auto-ignition temperature;
- Decomposition temperature; and
- Viscosity.

The SDS may not contain every item on the above list because information may not be relevant or is not available. When this occurs, a notation to that effect must be made for that chemical property. Manufacturers may also add other relevant properties, such as the dust deflagration index (Kst) for combustible dust, used to evaluate a dust's explosive potential.

Section 10: Stability and Reactivity

This section describes the reactivity hazards of the chemical and the chemical stability information. This section is broken into three parts: reactivity, chemical stability, and other. The required information consists of:

Reactivity

- Description of the specific test data for the chemical(s). This data can be for a class or family of the chemical if such data adequately represent the anticipated hazard of the chemical(s), where available.

Chemical stability

- Indication of whether the chemical is stable or unstable under normal ambient temperature and conditions while in storage and being handled.
- Description of any stabilizers that may be needed to maintain chemical stability.
- Indication of any safety issues that may arise should the product change in physical appearance.

Other

- Indication of the possibility of hazardous reactions, including a statement whether the chemical will react or polymerize, which could release excess pressure or heat, or create other hazardous conditions. Also, a description of the conditions under which hazardous reactions may occur.
- List of all conditions that should be avoided (e.g., static discharge, shock, vibrations, or environmental conditions that may lead to hazardous conditions).
- List of all classes of incompatible materials (e.g., classes of chemicals or specific substances) with which the chemical could react to produce a hazardous situation.
- List of any known or anticipated hazardous decomposition products that could be produced because of use, storage, or heating. (Hazardous combustion products should also be included in Section 5 (Fire-Fighting Measures) of the SDS.)

Section 11: Toxicological Information

This section identifies toxicological and health effects information or indicates that such data are not available. The required information consists of:

- Information on the likely routes of exposure (inhalation, ingestion, skin and eye contact). The SDS should indicate if the information is unknown.
- Description of the delayed, immediate, or chronic effects from short- and long-term exposure.
- The numerical measures of toxicity (e.g., acute toxicity estimates such as the LD50 (median lethal dose)) - the estimated amount [of a substance] expected to kill 50% of test animals in a single dose.
- Description of the symptoms. This description includes the symptoms associated with exposure to the chemical including symptoms from the lowest to the most severe exposure.
- Indication of whether the chemical is listed in the National Toxicology Program (NTP) Report on Carcinogens (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest editions) or found to be a potential carcinogen by OSHA.

Section 12: Ecological Information (non-mandatory)

This section provides information to evaluate the environmental impact of the chemical(s) if it were released to the environment. The information may include:

- Data from toxicity tests performed on aquatic and/or terrestrial organisms, where available (e.g., acute or chronic aquatic toxicity data for fish, algae, crustaceans, and other plants; toxicity data on birds, bees, plants).
- Whether there is a potential for the chemical to persist and degrade in the environment either through biodegradation or other processes, such as oxidation or hydrolysis.
- Results of tests of bioaccumulation potential, making reference to the octanol-water partition coefficient (K_{ow}) and the bioconcentration factor (BCF), where available.
- The potential for a substance to move from the soil to the groundwater (indicate results from adsorption studies or leaching studies).
- Other adverse effects (e.g., environmental fate, ozone layer depletion potential, photochemical ozone creation potential, endocrine disrupting potential, and/or global warming potential).

Section 13: Disposal Considerations (non-mandatory)

This section provides guidance on proper disposal practices, recycling or reclamation of the chemical(s) or its container, and safe handling practices. To minimize exposure, this section should also refer the reader to Section 8 (Exposure Controls/Personal Protection) of the SDS. The information may include:

- Description of appropriate disposal containers to use.
- Recommendations of appropriate disposal methods to employ.
- Description of the physical and chemical properties that may affect disposal activities.
- Language discouraging sewage disposal.
- Any special precautions for landfills or incineration activities.

Section 14: Transport Information (non-mandatory)

This section provides guidance on classification information for shipping and transporting of hazardous chemical(s) by road, air, rail, or sea. The information may include:

- UN number (i.e., four-figure identification number of the substance)[2].
- UN proper shipping name[2].
- Transport hazard class(es)[2].
- Packing group number, if applicable, based on the degree of hazard[2].
- Environmental hazards (e.g., identify if it is a marine pollutant according to the International Maritime Dangerous Goods Code (IMDG Code)).
- Guidance on transport in bulk (according to Annex II of MARPOL 73/78[3] and the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (International Bulk Chemical Code (IBC Code)).
- Any special precautions which an employee should be aware of or needs to comply with, in connection with transport or conveyance either within or outside their premises (indicate when information is not available).

[2] Found in the most recent edition of the United Nations Recommendations on the Transport of Dangerous Goods.

[3] MARPOL 73/78 means the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto, as amended.

Section 15: Regulatory Information (non-mandatory)

This section identifies the safety, health, and environmental regulations specific for the product that is not indicated anywhere else on the SDS. The information may include:

- Any national and/or regional regulatory information of the chemical or mixtures (including any OSHA, Department of Transportation, Environmental Protection Agency, or Consumer Product Safety Commission regulations).

Section 16: Other Information

This section indicates when the SDS was prepared or when the last known revision was made. The SDS may also state where the changes have been made to the previous version. You may wish to contact the supplier for an explanation of the changes. Other useful information also may be included here.

Employer Responsibilities

Employers must ensure that the SDSs are readily accessible to employees for all hazardous chemicals in their workplace. This may be done in many ways. For example, employers may keep the SDSs in a binder or on computers as long as the employees have immediate access to the information without leaving their work area when needed and a back-up is available for rapid access to the SDS in the case of a power outage or other emergency. Furthermore, employers may want to designate a person(s) responsible for obtaining and maintaining the SDSs. If the employer does not have an SDS, the employer or designated person(s) should contact the manufacturer to obtain one.

References

OSHA, 29 CFR 1910.1200(g) and Appendix D.

United Nations Globally Harmonized System of Classification and Labelling of Chemicals (GHS), third revised edition, United Nations, 2009.

These references and other information related to the revised Hazard Communication Standard can be found on OSHA's Hazard Communication Safety and Health Topics page, located at: http://www.osha.gov/dsg/hazcom/index.html.

Disclaimer: This brief provides a general overview of the safety data sheet requirements in the Hazard Communication Standard (see 29 CFR 1910.1200(g) and Appendix D of 29 CFR 1910.1200). It does not alter or determine compliance responsibilities in the standard or the Occupational Safety and Health Act of 1970. Since interpretations and enforcement policy may change over time, the reader should consult current OSHA interpretations and decisions by the Occupational Safety and Health Review Commission and the courts for additional guidance on OSHA compliance requirements. Please note that states with OSHA-approved state plans may have additional requirements for chemical safety data sheets, outside of those outlined above. For more information on those standards, please visit: http://www.osha.gov/dcsp/osp/statestandards.html.

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For assistance, contact us. We can help. It's confidential.

U.S. Department of Labor
www.osha.gov (800) 321-OSHA (6742)

DSG BR-3514 2/2012

OSHA FactSheet

Procedures for Atmospheric Testing in Confined Spaces[1]

Atmospheric testing is required for two distinct purposes: evaluation of the hazards of the permit space and verification that acceptable conditions exist for entry into that space.

A confined space is one that is large enough to enter and perform assigned work in; it has limited or restricted ways to enter or exit the space; and it was not designed to be occupied continuously by a worker.

Evaluation testing

The atmosphere within a confined space must be tested using equipment that is designed to detect the chemicals that may be present at levels that are well below the defined exposure limits. Evaluation testing is done to:

- determine what chemical hazards are or may become present in the space's atmosphere, and
- identify what steps must be followed and what conditions must be met to ensure that atmospheric conditions are safe for a worker to enter the space.

The testing results and the decisions about what steps must be followed before entry must be evaluated by, or reviewed by, a technically qualified professional like an OSHA consultation service, a certified industrial hygienist, a registered safety engineer, or a certified safety professional. The technically qualified professional must consider all of the serious hazards in his/her evaluation or review.

A permit space is a confined space that has one or more of the following features: it has or may contain a hazardous atmosphere; it contains a material that can engulf a person who enters; it has an inside design that could trap or asphyxiate a person who enters (inwardly converging walls, or a floor that slopes downward to a smaller section); or it has any other serious safety or health hazards.

Verification Testing

Before a permit space that may have a hazardous atmosphere can be entered, the atmosphere must be tested using the steps identified on the permit (developed during evaluation testing). Verification testing is done to make sure that the chemical hazards that may be present are below the levels necessary for safe entry, and that they meet the conditions identified on the permit. Test the atmosphere in the following order: (1) for oxygen, (2) for combustible gases, and then (3) for toxic gases and vapors.[2] The testing results -- the actual test concentrations -- must be recorded on the permit near the levels identified for safe entry.

Duration of Testing

For each test required on the permit, you must allow enough time for the air from the space to be drawn into the equipment and for the sensor (or other detection device) to react to the chemical if it is present. This is considered the "minimum response time" and it will be noted by the manufacturer in the operator's manual. Be aware that you will need to add time to this "minimum response time" if you have attached hosing or a probe extension to the inlet. The additional time is needed to allow the air from the different depths of the space to be pulled into the equipment inlet.

Testing Conditions in Spaces that May Have Layered Atmospheres

For permit spaces that are deep or have areas leading away from the entry point, the atmosphere may be layered or may be different in remote areas. For these spaces, testing must be done in the area surrounding the worker, which is considered four (4) feet in the direction of travel and to each side. If a sample probe is used to do the testing, then the worker must move slowly enough so that testing is completed, keeping the equipment "response time" in mind, before he/she moves into the new area.

Retesting the Space During Entry or Before Re-Entry

Test the permit space routinely to make sure that the atmospheric conditions continue to be safe for entry.[3]

[1] Title 29 Code of Federal Regulations 1910.146, Appendix B.
[2] 29 CFR 1910.146(c)(5)(ii)(C) and (d)(5)(iii).
[3] 29 CFR 1910.146(c)(5)(ii)(F) and (d)(5)(ii).

This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.

For more complete information:

OSHA Occupational Safety and Health Administration

U.S. Department of Labor
www.osha.gov
(800) 321-OSHA

DSTM 9/2005

OSHA® FactSheet

Confined Spaces in Construction: Crawl Spaces and Attics

Confined spaces can present conditions that are immediately dangerous to workers if not properly identified, evaluated, tested, and controlled. This fact sheet highlights many of the confined space hazards associated with crawl spaces and attics and how employers can protect their workers in these environments.

OSHA has developed a new construction standard for Confined Spaces (29 CFR 1926 Subpart AA) — any space that meets the following three criteria:

- Is large enough for a worker to enter it;
- Has limited means of entry or exit; and
- Is not designed for continuous occupancy.

A space may also be a **permit-required** confined space if it has a hazardous atmosphere, the potential for engulfment or suffocation, a layout that might trap a worker through converging walls or a sloped floor, or any other serious safety or health hazard.

Fatal Incidents

Confined space hazards in crawl spaces and attics have led to worker deaths. Several tragic incidents in crawl spaces and attics have included:

- Two workers died while applying primer to floor joists in a crawl space. They were burned when an incandescent work lamp ignited vapors from the primer.
- A flash fire killed a worker who was spraying foam insulation in an enclosed attic. The fire was caused by poor ventilation.

Training

The new Confined Spaces standard requires employers to ensure that their workers know about the existence, location, and dangers posed by each permit-required confined space, and that they may not enter such spaces without authorization.

Employers must train workers involved in permit-required confined space operations so that they can perform their duties safely and understand the hazards in permit spaces and the methods used to isolate, control or protect workers from these hazards. Workers not authorized to perform entry rescues must be trained on the dangers of attempting such measures.

Safe Entry Requirements

The new Confined Spaces standard includes several requirements for safe entry.

Preparation: Before workers can enter a confined space, employers must provide pre-entry planning. This includes:

- Having a competent person evaluate the work site for the presence of confined spaces, including permit-required confined spaces.
- Once the space is classified as a permit-required confined space, identifying the means of entry and exit, proper ventilation methods, and elimination or control of all potential hazards in the space.
- Ensuring that the air in a confined space is tested, before workers enter, for oxygen levels, flammable and toxic substances, and stratified atmospheres.
- If a permit is required for the space, removing or controlling hazards in the space and determining rescue procedures and necessary equipment.
- If the air in a space is not safe for workers, ventilating or using whatever controls or protections are necessary so that employees can safely work in the space.

Ongoing practices: After pre-entry planning, employers must ensure that the space is monitored for hazards, especially atmospheric hazards. Effective communication is important

because there can be multiple contractors operating on a site, each with its own workers needing to enter the confined space. Attendants outside confined spaces must also make sure that unauthorized workers do not enter them. Rescue attempts by untrained personnel can lead to multiple deaths.

Crawl Spaces and Attics as Confined Spaces

Crawl spaces and attics can be both confined spaces and permit-required confined spaces under the new standard. For instance, working in an attic and applying a large amount of spray foam (or another chemical) in a short period of time can expose a worker to low oxygen levels or a hazardous atmosphere.

In addition, changes to the entry/exit, the ease of exit, and air flow could create a confined space or cause the space to become permit-required.

Hazards in Crawl Spaces and Attics

Crawl spaces can present many confined space hazards, including:

- Atmospheric hazards (e.g., flammable vapors, low oxygen levels)
- Electrocution (e.g., using electrical equipment in wet conditions, unprotected energized wires)
- Standing water
- Poor lighting
- Structural collapse
- Asbestos insulation

Working in attics can also present confined space hazards, such as:

- Atmospheric hazards (e.g., poor ventilation)
- Heat stress
- Mechanical hazards (e.g., attic ventilators, whole house fans)
- Electrical hazards (e.g., damaged or frayed wires, open electrical boxes)
- Slip, trip and fall hazards
- Asbestos insulation

Personal protective equipment: Employers should assess the work site to determine what personal protective equipment (PPE) is needed to protect workers. Employers should provide workers with the required PPE and proper training on its use and about any related hazards before the work starts.

How to Contact OSHA

For questions or to get information or advice, to find out how to contact OSHA's free on-site consultation program, order publications, report a fatality or severe injury, or to file a confidential complaint, visit www.osha.gov or call 1-800-321-OSHA (6742).

Additional Information

OSHA's Confined Spaces in Construction Standard (29 CFR 1926 Subpart AA)

Confined Spaces: OSHA Construction Industry Topics by Standard

OSHA Fact Sheet: Procedures for Atmospheric Testing in Confined Spaces

Confined Spaces: NIOSH Workplace Safety and Health Topics Page

State Plan Guidance: States with OSHA-approved state plans may have additional requirements for confined space safety.

Help for Small and Medium-Sized Employers: OSHA's On-site Consultation Program offers free and confidential advice to businesses nationwide.

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U.S. Department of Labor

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OSHA® FactSheet

Confined Spaces in Construction: Pits

Confined spaces can present conditions that are immediately dangerous to workers if not properly identified, evaluated, tested, and controlled. This fact sheet highlights many of the confined space hazards associated with pits and how employers can protect their workers in these environments.

OSHA has developed a new construction standard for Confined Spaces (29 CFR 1926 Subpart AA)— any space that meets the following three criteria:

- Is large enough for a worker to enter it;
- Has limited means of entry or exit; and
- Is not designed for continuous occupancy.

A space may also be a **permit-required confined space** if it has a hazardous atmosphere, the potential for engulfment or suffocation, a layout that might trap a worker through converging walls or a sloped floor, or any other serious safety or health hazard.

Fatal Incidents

Confined space hazards in pits have led to worker deaths. Several tragic incidents included:

- Two workers suffocated while attempting to close gate valves in a valve pit.
- A worker lost consciousness, fell, and was killed while climbing down a ladder into an unventilated underground valve vault to turn on water valves.
- While replacing a steam-operated vertical pump, an equipment repair technician died from burns and suffocation after falling into an industrial waste pit.

Training

The new Confined Spaces standard requires employers to ensure that their workers know about the existence, location, and dangers posed by each permit-required confined space, and that they may not enter such spaces without authorization.

Employers must train workers involved in permit-required confined space operations so that they can perform their duties safely and understand the hazards in permit spaces and the methods used to isolate, control or protect workers from these hazards. Workers not authorized to perform entry rescues must be trained on the dangers of attempting such rescues.

Safe Entry Requirements

The new Confined Spaces standard includes several requirements for safe entry.

Preparation: Before workers can enter a confined space, employers must provide pre-entry planning. This includes:

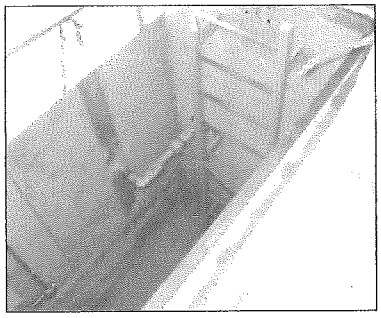
- Having a competent person evaluate the work site for the presence of confined spaces, including permit-required confined spaces.
- Once the space is classified as a permit-required confined space, identifying the means of entry and exit, proper ventilation methods, and elimination or control of all potential hazards in the space.
- Ensuring that the air in a confined space is tested, before workers enter, for oxygen levels, flammable and toxic substances, and stratified atmospheres.
- If a permit is required for the space, removing or controlling hazards in the space and determining rescue procedures and necessary equipment.
- If the air in a space is not safe for workers, ventilating or using whatever controls or protections are necessary so that employees can safely work in the space.

Ongoing practices: After pre-entry planning, employers must ensure that the space is monitored for hazards, especially atmospheric hazards. Effective communication is important because there can be multiple contractors operating on a site, each with its own workers

needing to enter the confined space. Attendants outside confined spaces must make sure that unauthorized workers do not enter them. Rescue attempts by untrained personnel can lead to multiple deaths.

Confined Spaces in Pits

Even though a pit is typically open on top and over 4 feet deep, it can still be a confined space or permit-required confined space. Additionally, pits can be completely underground or below grade, such as a utility vault within a sewer system or a pit within a pit in a wastewater treatment plant.



Pits are found in many environments. Examples include sump pits, valve pits or vaults (e.g., wastewater treatment plants, municipal water systems), electrical pits/vaults, steam pits/vaults, vehicle service/garage pits, elevator pits, dock leveler pits, industrial chemical waste pits, and many more. Many of these spaces qualify as permit-required confined spaces.

Employers must take all necessary steps to keep workers safe in confined spaces, including following the OSHA Construction Confined Spaces standard. This standard applies to both new construction in a pit and alterations and/or upgrades. Among the pit-related tasks covered by the standard are:

- Opening or closing valves during renovation work.
- Installing or upgrading pump equipment, cables, or junction boxes.

Construction work can create confined spaces, even if there are none at the start of a project. Changes to the entry/exit, the ease of exit, and air flow could produce a confined space or cause one to become permit-required.

Personal protective equipment: Employers should assess the worksite to determine what personal protective equipment (PPE) is needed to protect workers. Employers should provide workers with the required PPE and proper training on its use and about any related hazards before the work starts.

How to Contact OSHA

For questions or to get information or advice, to find out how to contact OSHA's free on-site consultation program, order publications, report a fatality or severe injury, or to file a confidential complaint, visit www.osha.gov or call 1-800-321-OSHA (6742).

Additional Information

OSHA's Confined Spaces in Construction Standard (29 CFR 1926 Subpart AA)

Confined Spaces: OSHA Construction Industry Topics by Standard

OSHA Fact Sheet: Procedures for Atmospheric Testing in Confined Spaces

Confined Spaces: NIOSH Workplace Safety and Health Topics Page

State Plan Guidance: States with OSHA-approved state plans may have additional requirements for confined space safety.

Help for Small and Medium-Sized Employers: OSHA's On-site Consultation Program offers free and confidential advice to businesses nationwide.

OSHA® FactSheet

Confined Spaces in Construction: Sewer Systems

Confined spaces can present conditions that are immediately dangerous to workers if such conditions are not properly identified, evaluated, tested, and controlled. This fact sheet highlights many of the confined space hazards associated with sewer systems and how employers can protect workers in these environments.

OSHA has developed a new construction standard for Confined Spaces (29 CFR 1926 Subpart AA)—any space that meets the following three criteria:

- Is large enough for a worker to enter it;
- Has limited means of entry or exit; and
- Is not designed for continuous occupancy.

A space may also be a **permit-required** confined space if it has a hazardous atmosphere, the potential for engulfment or suffocation, a layout that might trap a worker through converging walls or a sloped floor, or any other serious safety or health hazard.

Fatal Incidents

Confined space hazards in sewer systems have led to worker deaths. Several tragic incidents in sewers have included:

- A worker who lost consciousness and died when he climbed into a sewer vault to retrieve a tool. His co-worker also died when he attempted a rescue.
- While repairing a natural gas leak, a worker entered a drainage pipe to retrieve survey equipment. The natural gas ignited, killing the worker.

Training

The new Confined Spaces standard requires employers to ensure that their workers know about the existence, location, and dangers posed by each permit-required confined space, and that they may not enter such spaces without authorization.

Employers must train workers involved in permit-required confined space operations so that they can perform their duties safely and understand the hazards in permit spaces and the methods used to isolate, control or protect workers. Workers not authorized to perform entry rescues must be trained on the dangers of attempting such rescues.

Safe Entry Requirements

The new Confined Spaces standard includes several requirements for safe entry.

Preparation: Before workers can enter a confined space, employers must provide pre-entry planning. This includes:

- Having a competent person evaluate the work site for the presence of confined spaces, including permit-required confined spaces.
- Once the space is classified as a permit-required confined space, identifying the means of entry and exit, proper ventilation methods, and elimination or control of all potential hazards in the space.
- Ensuring that the air in a confined space is tested, before workers enter, for oxygen levels, flammable and toxic substances, and stratified atmospheres.
- If a permit is required for the space, removing or controlling hazards in the space and determining rescue procedures and necessary equipment.
- If the air in a space is not safe for workers, ventilating or using whatever controls or protections are necessary so that employees can safely work in the space.

Ongoing practices: After pre-entry planning, employers must ensure that the space is monitored for hazards, especially atmospheric hazards. Effective communication is important because there can be multiple contractors operating on a site, each with its own workers needing to enter the confined space. Attendants outside confined spaces must make sure that unauthorized workers do not enter them. Rescue attempts by untrained personnel can lead to multiple deaths.

Confined Spaces in Sewer Systems

Types of sewer systems include sanitary (domestic sewage), storm (runoff), and combined (domestic sewage and runoff). Sewer systems are extensive

and include many different components that are considered confined spaces, including pipelines, manholes, wet wells, dry well vaults, and lift/pump stations. Therefore, employers conducting work in sewer systems will likely have workers who will encounter confined spaces.

Sewer systems also consist of wastewater treatment plants, where confined spaces include digestion and sedimentation tanks, floating covers over tanks, sodium hypochlorite tanks, and wastewater holding tanks, among others. Many of these components may also qualify as permit-required confined spaces.

Employers must take all necessary steps to keep workers safe in confined spaces, including following the OSHA Construction Confined Spaces standard. This standard applies to both new construction within an existing sewer and alterations and/or upgrades. For example:

- Installing or upgrading a manhole.
- Altering or upgrading sewer lines.
- Making nonstructural upgrades to joints, pipes, or manholes.
- Demolition work.
- Installing new or upgraded pump equipment, cables, wires, or junction boxes.

Construction work can create confined spaces, even if there are none at the start of a project. Changes to the entry/exit, the ease of exit, and air flow could produce a confined space or cause one to become confined or permit-required.

Hazards Associated with Sewer Systems

Sewer systems can present a host of confined space hazards, including:

- Atmospheric hazards (low oxygen, toxic or flammable gases).
- Chemicals in piping and from roadway runoff (may harm lungs, skin, or eyes).
- Engulfment and drowning.
- Electrocution (e.g., using electrical equipment in wet working conditions).
- Slips, trips, and falls.
- Falling objects.
- High noise levels, low visibility, limits to communication, and long distances to exits.

Personal protective equipment: Employers should assess the work site to determine what personal protective equipment (PPE) is needed to protect workers. Employers should provide workers with the required PPE and proper training on its use and about any related hazards before the work starts.

How to Contact OSHA

For questions or to get information or advice, to find out how to contact OSHA's free on-site consultation program, order publications, report a fatality or severe injury, or to file a confidential complaint, visit www.osha.gov or call 1-800-321-OSHA (6742).

Additional Information

OSHA's Confined Spaces in Construction standard (29 CFR 1926 Subpart AA)

Confined Spaces: OSHA Construction Industry Topics by Standard

OSHA Fact Sheet: Procedures for Atmospheric Testing in Confined Spaces

Confined Spaces: NIOSH Workplace Safety and Health Topics Page

State Plan Guidance: States with OSHA-approved state plans may have additional requirements for confined space safety.

Help for Small and Medium-Sized Employers: OSHA's On-site Consultation Program offers free and confidential advice to businesses nationwide.

This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory-impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: 1-877-889-5627.

For assistance, contact us. We can help. It's confidential.

OSHA® Occupational Safety and Health Administration

www.osha.gov (800) 321-OSHA (6742)

U.S. Department of Labor

DOC FS-3789 05/2015

OSHA® FactSheet

Controlling Hazardous Fume and Gases during Welding

Welding joins materials together by melting a metal work piece along with a filler metal to form a strong joint. The welding process produces visible smoke that contains harmful metal fume and gas by-products. This fact sheet discusses welding operations, applicable OSHA standards, and suggestions for protecting welders and coworkers from exposures to the many hazardous substances in welding fume.

Types of welding

Welding is classified into two groups: fusion (heat alone) or pressure (heat and pressure) welding. There are three types of fusion welding: electric arc, gas and thermit. Electric arc welding is the most widely used type of fusion welding. It employs an electric arc to melt the base and filler metals. Arc welding types in order of decreasing fume production include:

Flux Core Arc Welding (FCAW) filler metal electrode; flux shield

Shielded Metal Arc (SMAW) electrode provides both flux and filler material

Gas Metal Arc (GMAW or MIG) widely used; consumable electrode for filler metal, external gas shield

Tungsten Inert Gas (GTAW or TIG) superior finish; non-consumable electrode; externally-supplied inert gas shield

Gas or oxy-fuel welding uses a flame from burning a gas (usually acetylene) to melt metal at a joint to be welded, and is a common method for welding iron, steel, cast iron, and copper. Thermit welding uses a chemical reaction to produce intense heat instead of using gas fuel or electric current. Pressure welding uses heat along with impact-type pressure to join the pieces.

Oxy-fuel and plasma cutting, along with brazing, are related to welding as they all involve the melting of metal and the generation of airborne metal fume. Brazing is a metal-joining process where only the filler metal is melted.

Welder using local exhaust ventilation to remove fume from breathing zone. (Photo courtesy of the Lincoln Electric Company).

What is in welding fume?

Metals

Aluminum, Antimony, Arsenic, Beryllium, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Molybdenum, Nickel, Silver, Tin, Titanium, Vanadium, Zinc.

Gases

- **Shielding**—Argon, Helium, Nitrogen, Carbon Dioxide.
- **Process**—Nitric Oxide, Nitrogen Dioxide, Carbon Monoxide, Ozone, Phosgene, Hydrogen Fluoride, Carbon Dioxide.

Factors that affect worker exposure to welding fume

- Type of welding process
- Base metal and filler metals used
- Welding rod composition
- Location (outside, enclosed space)
- Welder work practices
- Air movement
- Use of ventilation controls

Health effects of breathing welding fume

- Acute exposure to welding fume and gases can result in eye, nose and throat irritation, dizziness and nausea. Workers in the area who experience these symptoms should leave the area immediately, seek fresh air and obtain medical attention.
- Prolonged exposure to welding fume may cause lung damage and various types of cancer, including lung, larynx and urinary tract.
- Health effects from certain fumes may include metal fume fever, stomach ulcers, kidney damage and nervous system damage. Prolonged exposure to manganese fume can cause Parkinson's–like symptoms.
- Gases such as helium, argon, and carbon dioxide displace oxygen in the air and can lead to suffocation, particularly when welding in confined or enclosed spaces. Carbon monoxide gas can form, posing a serious asphyxiation hazard.

Welding and Hexavalent Chromium

- Chromium is a component in stainless steel, nonferrous alloys, chromate coatings and some welding consumables.
- Chromium is converted to its hexavalent state, Cr(VI), during the welding process.
- Cr(VI) fume is highly toxic and can damage the eyes, skin, nose, throat, and lungs and cause cancer.
- OSHA regulates worker exposure to Cr(VI) under its Chromium (VI) standard, 29 CFR 1910.1026 and 1926.1126.
- OSHA's Permissible Exposure Limit (PEL) for Cr(VI) is 5 µg/m3 as an 8-hour time-weighted average.

Reducing exposure to welding fume

- Welders should understand the hazards of the materials they are working with. OSHA's Hazard Communication standard requires employers to provide information and training for workers on hazardous materials in the workplace.
- Welding surfaces should be cleaned of any coating that could potentially create toxic exposure, such as solvent residue and paint.
- Workers should position themselves to avoid breathing welding fume and gases. For example, workers should stay upwind when welding in open or outdoor environments.
- General ventilation, the natural or forced movement of fresh air, can reduce fume and gas levels in the work area. Welding outdoors or in open work spaces does not guarantee adequate ventilation. In work areas without ventilation and exhaust systems, welders should use natural drafts along with proper positioning to keep fume and gases away from themselves and other workers.
- Local exhaust ventilation systems can be used to remove fume and gases from the welder's breathing zone. Keep fume hoods, fume extractor guns and vacuum nozzles close to the plume source to remove the maximum amount of fume and gases. Portable or flexible exhaust systems can be positioned so that fume and gases are drawn away from the welder. Keep exhaust ports away from other workers.
- Consider substituting a lower fume-generating or less toxic welding type or consumable.
- Do not weld in confined spaces without ventilation. Refer to applicable OSHA regulations (see list below).
- Respiratory protection may be required if work practices and ventilation do not reduce exposures to safe levels.

Some OSHA standards applicable to welding:

- **Welding, Cutting & Brazing**—29 CFR 1910 Subpart Q
- **Welding & Cutting**—29 CFR 1926 Subpart J
- **Welding, Cutting & Heating**—29 CFR 1915 Subpart D
- **Permit-required confined spaces**—29 CFR 1910.146
- **Confined & Enclosed Spaces & Other Dangerous Atmospheres in Shipyard Employment**—29 CFR 1915 Subpart B
- **Hazard Communication**—29 CFR 1910.1200
- **Respiratory Protection**—29 CFR 1910.134
- **Air Contaminants**—29 CFR 1910.1000 **(general industry)**, 29 CFR 1915.1000 **(shipyards)**, 29 CFR 1926.55 **(construction)**

More Information

For more information on hexavalent chromium exposure, visit OSHA's website at www.osha.gov.

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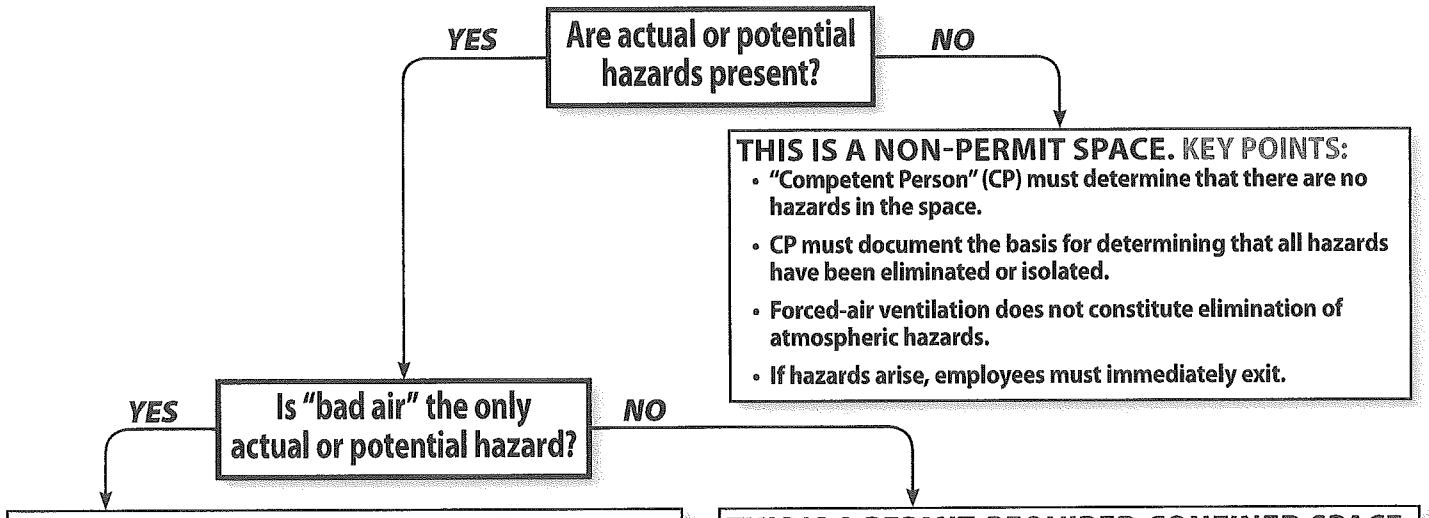
U.S. Department of Labor
www.osha.gov (800) 321-OSHA (6742)

DSG FS-3647 03/2013

TYPES of CONFINED SPACES in *CONSTRUCTION*

from OSHA's Subpart AA, Confined Spaces in Construction, Sections 1926.1201-1213 (Issued by OSHA May 1, 2015)



IT MAY BE POSSIBLE TO ENTER UNDER "ALTERNATE PROCEDURES." KEY POINTS:

- "Competent Person" must identify all confined spaces and all permit spaces (including spaces entered under "Alternate Procedures") at start of the job. CP must communicate the existence, location, and danger of each permit space to all employees and Controlling Contractor.
- If the the only hazard is actual or a potentially hazardous atmosphere, employer does not have to comply with:
  - > a permit-required confined space program,
  - > the permitting process,
  - > entry permits,
  - > duties of Authorized Entrants, Attendants, Entry Supervisors, or rescue and emergency services.
- All physical hazards are eliminated or isolated.
- Continuous forced-air ventilation alone must be sufficient to maintain permit space as safe.
- If ventilation stops working, Authorized Entrants must be able to exit the space safely.
- Monitoring and inspection data required.
- Any condition making it unsafe to remove the entrance cover must be eliminated before entry.
- Openings shall be guarded. Workers must be protected from foreign objects entering the space.
- Atmosphere in the space must be tested before employees enter the space.
- No hazardous atmosphere is permitted within the space, while employees are inside.
- Atmosphere must be continuously monitored.
- If a hazard is detected, employees must immediately leave the space. Space must be re-evaluated to determine how the hazard developed. Employer must implement measure(s) to protect employees before subsequent entry.
- There must be a safe method for entering and exiting the space.
- Written certification must be made that the space is safe for entry, and that all pre-entry measures have been taken.

THIS IS A PERMIT-REQUIRED CONFINED SPACE. KEY POINTS:

- "Competent Person" must identify all confined spaces and all permit spaces at start of the job. CP must communicate the existence, location, and danger of each permit space to all employees and Controlling Contractor.
- There are communications and coordination requirements between Host Employer, Controlling Contractor, and Entry Employer(s).
- There must be a written program.
- There must be a permitting process.
- There must be a Permit.
- Training is required for Competent Person, Entry Supervisor, Attendant(s), Authorized Entrant(s), and rescue personnel.
- All actual or potential hazards must be identified, and eliminated, isolated, or controlled.
- There must be an emergency rescue plan.

CONFINED SPACE ENTRY PERMIT

Confined Space Location/Description/ID Number **Date:**

Purpose of Entry

Time In: _____ **Permit Canceled Time:** _____
Time Out: _____ **Reason Permit Canceled:** _____

Supervisor: _____

Rescue and Emergency Services-

Hazards of Confined Space	Yes	No	Special Requirements	Yes	No
Oxygen deficiency			Hot Work Permit Required		
Combustible gas/vapor			Lockout/Tagout		
Combustible dust			Lines broken, capped, or blanked		
Carbon Monoxide			Purge-flush and vent		
Hydrogen Sulfide			Secure Area-Post and Flag		
Toxic gas/vapor			Ventilation		
Toxic fumes			Other- List:		
Skin- chemical hazards			**Special Equipment**		
Electrical hazard			Breathing apparatus- respirator		
Mechanical hazard			Escape harness required		
Engulfment hazard			Tripod emergency escape unit		
Entrapment hazard			Lifelines		
Thermal hazard			Lighting (explosive proof/low voltage)		
Slip or fall hazard			PPE- goggles, gloves, clothing, etc.		
			Fire Extinguisher		

Communication Procedures:

DO NOT ENTER IF PERMISSABLE ENTRY LEVELS ARE EXCEEDED		**Test Start and Stop Time:** **Start**	**Stop**
	Permissable Entry Level		
% of Oxygen	19.5 % to 23.5 %		
% of LEL	Less than 10%		
Carbon Monoxide	35 PPM (8 hr.)		
Hydrogen Sulfide	10 PPM (8 hr.)		
Other			

Name(s) or Person(s) testing: _____

Test Instrument(s) used- Include Name, Model, Serial Number and Date Last Calibrated:

CFM-Ventilation	Size-Cubic Feet	Pre Entry Time	❑ Central Notified Before Entrance	Time Notified:
			❑ Central Notified After Entrance	Time Notified:

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:

Entry Procedure Checklist: Complete the following steps before, during, and after a confined space entry:

Step 1
Obtain a Permit-Confined Space Entry Form from Program Coordinator.
Step 2
Notify Supervisor before the **Confined Space Entry**
Step 3
Verify Confined Space Meter has been calibrated and is in working order
Step 4
Complete the top portion of the Permit-Confined Space Entry Form
Step 5
Ensure all rescue equipment (e.g. tripod, body-belt, lanyard) is in place prior to entry
Step 6
Monitor the confined space with the MSA 4-Gas Detector prior to entry. The entrant and attendant should sign the permit authorization section on the bottom of the permit to ensure all actions and conditions necessary for safe entry have been performed.
Step 7
Employee entering the confined space should wear the 4-Gas Detector after the pre-atmosphere test. The employee should also have a full body harness and lanyard attached to the rescue tripod. Employee shall have a radio and any other necessary personal protective equipment.
Step 8
Employee can enter the confined once Step 7 is completed. The entrant and attendant should complete the Hazards of Confined Spaces and Special Requirements Section of the Permit-Confined Space Entry Form once the employee is within the confined space. The entrant should also gather the % Oxygen, % Explosive Gases, Carbon Monoxide, and Hydrogen Sulfide readings and communicate them to the attendant to place on the Permit Form.
Step 9
The attendant should maintain constant communication with the entrant until the entrant has exited the confined space.
Step 10
The attendant should contact Supervisor once the entrant has exited the confined space.
Step 11
The Permit-Confined Space Entry Form should be given to program coordinator, to file in the Confined Space Records.

Notes

Subpart AA 1926:1200

1926.1200 Reserved
1929.1201 Scope
1926.1202 Definitions
1926.1203 General Requirements
1926.1204 Permit-Required Confined Space Program (PRCS)
1926.1205 Permitting Process
1926.1206 Entry Permit
1926.1207 Training
1926.1208 Duties of Authorized Entrants
1926.1209 Duties of Authorized Attendants
1226.1210 Duties of Entry Supervisors
1926.1211 Rescue and Emergency Services
1926.1212 Employee Participation
1926.1213 Provision of Documents to Secretary

18

1926 :1200 Subpart AA

This Standard Employs Two Important Leadership Team Members:

Competent Person

Qualified Person

19

What is a Competent person?

1926:1202 Definitions

Competent person means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them.

20

What is a QUALIFIED person?

One who:

By possession 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, the work, or the project.

21

1926 :1200 Subpart AA

(a) This standard sets forth requirements for practices and procedures to protect employees engaged in construction activities at a worksite with one or more confined spaces, subject to the exceptions in paragraph (b) of this section.

(b)Exceptions. This standard does not apply to:

(1)Construction work regulated by 1926 subpart P--- Excavations

(2)Construction work regulated by 1926 subpart S--- Underground Construction, Caissons, Cofferdams, and Compressed air.

(3)Construction work regulated by 1926 subpart Y---Diving

(c)Where this standard applies and there is a provision that addresses a confined space hazard in another applicable OSHA standard, the employer must comply with both that requirement and the application provisions of this standard.

22

1926 :1200 Subpart AA

(a) This standard sets forth requirements for practices and procedures to protect employees engaged in construction activities at a worksite with one or more confined spaces, subject to the exceptions in paragraph (b) of this section.

(b)Exceptions.

(c) Where this standard applies and there is a provision that addresses a confined space hazard in another applicable OSHA standard, the employer must comply with both that requirement and the application provisions of this standard.

23

Key Definitions

All of the definitions are given in tab two of the manual

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What is Control?

1926:1202 Definitions

Control means the action taken to reduce the level of any hazard inside a confined space using engineering methods (for example, by ventilation), and then using these methods to maintain the reduced hazard level. Control also refers to the engineering methods used for this purpose. Personal protective equipment is not a control.

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What is an Engulfment?

1926:1202 Definitions

Engulfment means the surrounding and effective capture of a person by a liquid or finely divided (flowable) solid substance that can be aspirated to cause death by filling or plugging the respiratory system or that can exert enough force on the body to cause death by strangulation, construction, crushing or suffocation.

26

What is Entry?

1926:1202 Definitions

Entry means the action by which any part of a person passes through an opening into a permit-required confined space. Entry includes ensuring work activities in that space and is considered to have occurred as soon as any part of the entrant's body break the plane of an opening into the space, whether or not such action is intentional or any work activities are actually performed in the space.

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Who is an Entry Supervisor?

1926:1202 Definitions

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

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What Is A Hazard Atmosphere?

1926:1202 Definitions

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% of its lower flammable limit (LFL):

(2) (Airborne combustible dust at a concentration that meets or exceeds its FLF:

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What is A Hazard Atmosphere?

1926:1202 Definitions

(1) Flammable gas, vapor, or mist in excess of 10% of its lower flammable limit (LFL):

(2) (Airborne combustible dust at a concentration that meets or exceeds its LFL:

Note: This concentration may be approximated as a condition in which the combustible dust obscures vision at a distance of 5 feet (1.2 meters) or less.

(3) Atmosphere oxygen concentration below 19.5 percent or above 23.5 percent;

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What is A Hazard Atmosphere?

1926:1202 Definitions

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

Note: *An atmospheric concentration of any substance that is not capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or acute illness due to its health effects is not covered by this definition.*

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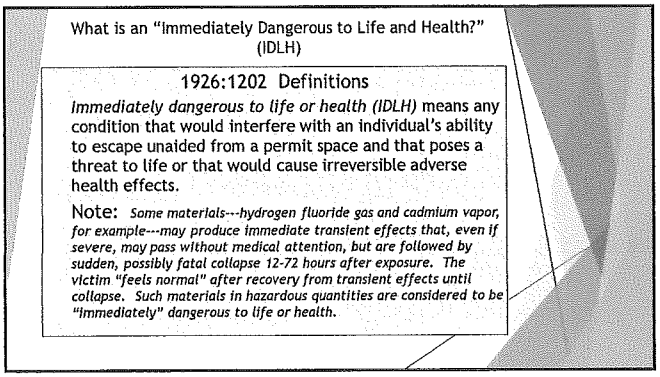
What is A Hazard Atmosphere?

1926:1202 Definitions

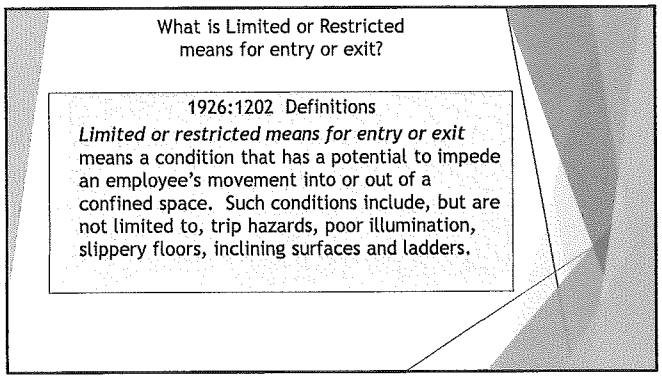
(5) Any other atmospheric condition that is immediately dangerous to life or health.

Note: *For air contaminants for which OSHA has not determined a dose or permissible exposure limit, other sources of information, such as Safety Data sheets that comply with the Hazard Communication Standard 1926.59 of this part, published information, and internal documents can provide guidance in establishing acceptable atmospheric conditions.*

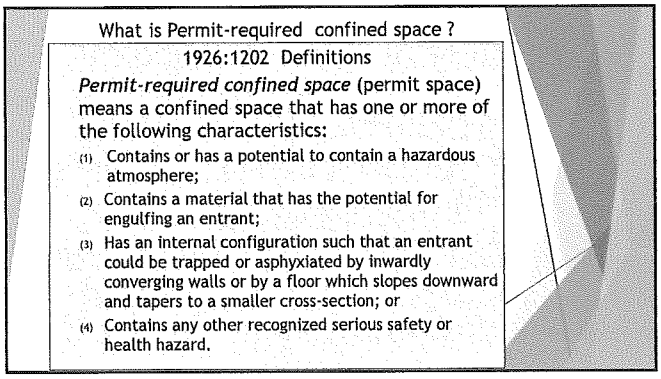
32


What is an "Immediately Dangerous to Life and Health?" (IDLH)
1926:1202 Definitions
Immediately dangerous to life or health (IDLH) means any condition that would interfere with an individual's ability to escape unaided from a permit space and that poses a threat to life or that would cause irreversible adverse health effects.
Note: Some materials---hydrogen fluoride gas and cadmium vapor, for example---may produce immediate transient effects that, even if severe, may pass without medical attention, but are followed by sudden, possibly fatal collapse 12-72 hours after exposure. The victim "feels normal" after recovery from transient effects until collapse. Such materials in hazardous quantities are considered to be "immediately" dangerous to life or health.

33


What is Limited or Restricted means for entry or exit?
1926:1202 Definitions
Limited or restricted means for entry or exit means a condition that has a potential to impede an employee's movement into or out of a confined space. Such conditions include, but are not limited to, trip hazards, poor illumination, slippery floors, inclining surfaces and ladders.

34


What is Permit-required confined space ?
1926:1202 Definitions
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;
(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.

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What is Permit-required confined space Program?

1926:1202 Definitions

Permit-required confined space program (permit space program) means the employer's overall program for controlling, and, where appropriate, for protecting employees from, permit space hazards and for regulating employee entry into permit spaces.

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What is Physical hazard?

1926:1202 Definitions

Physical hazard means an existing or potential hazard that can cause death or serious physical damage. Examples include but are not limited to: explosives (as defined by paragraph (n) of 1926.914, definition of "explosive"); mechanical, electrical, hydraulic and pneumatic energy; radiation; temperature extremes; engulfment; noise; and inwardly converging surfaces. Physical hazard also includes chemicals that can cause death or serious physical damage through skin or eye contact (rather than through inhalation).

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What is a Prohibited condition?

1926:1202 Definitions

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 provides the appropriate PPE to each employee.

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What is Serious Physical damage?

1926:1202 Definitions

Serious physical damage means an impairment or illness in which a body part is made functionally useless or is substantially reduced in efficiently. Such impairment or illness may be permanent or temporary and includes, but is not limited to, loss of consciousness disorientation, or other immediate and substantial reduction in mental efficiency. Injuries involving such impairment would usually require treatment by a physician or other licensed health-care professional.

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The Standard: 1926:1200 Subpart A

1926:1202 Definitions

Construction Confined Space

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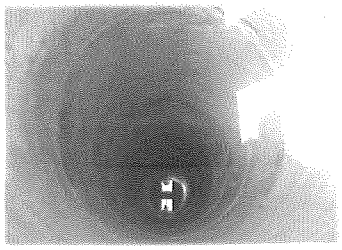
Competent Person---Front and Center

1926:1203 General Requirements

(a) Before it begins work at a worksite, each employer must ensure that a ***competent person*** identifies all confined spaces in which one or more of the employees it directs may work, and identifies each space that is a permit space, through consideration and evaluation of the elements of that space, including testing as necessary.

41

What is a confined space?



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What is a Confined Space?

A space (enclosed/confining) that has these characteristics:

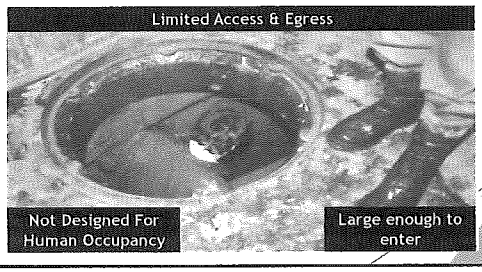
Limited or restricted means of entry and exit

Large enough for a person to enter

Not designed for continuous occupancy

43

What is a Confined Space?



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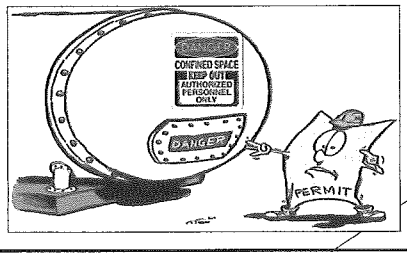
What is a Permit-Required Confined Space?



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What is a Permit-Required Confined Space?

A Permit confined space that one or more of these characteristics:

1. Contains or has potential to contain hazardous atmosphere
2. Potential for engulfment or entrapment
3. Internal configuration could trap or asphyxiate
4. Any other recognized safety or health hazard

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What is a Permit-Required Confined Space?

Atmosphere
Configuration
Engulfment
} ACE

Other---Physical Hazards

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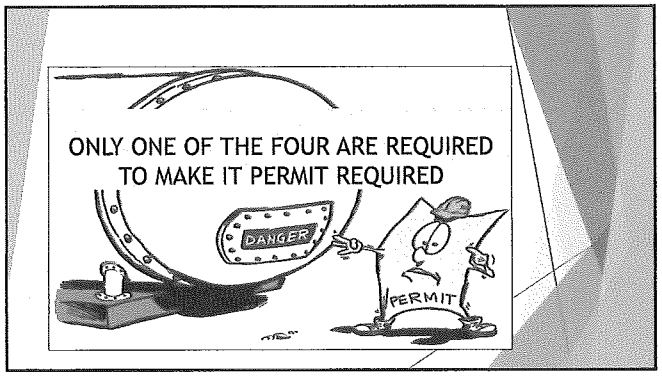

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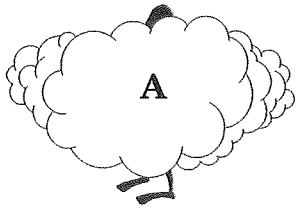

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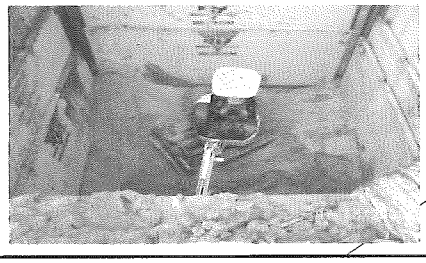

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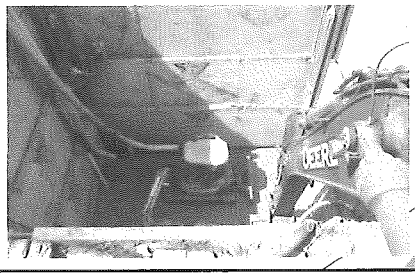
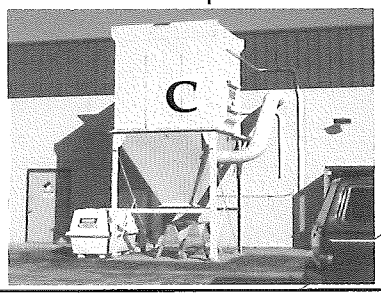
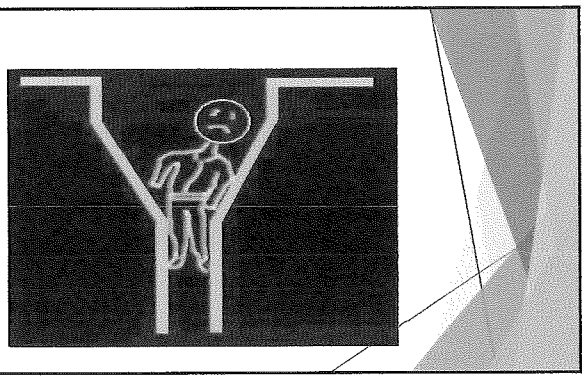


56

What is a Permit-Required Confined Space?



57



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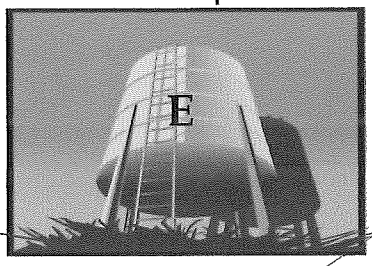

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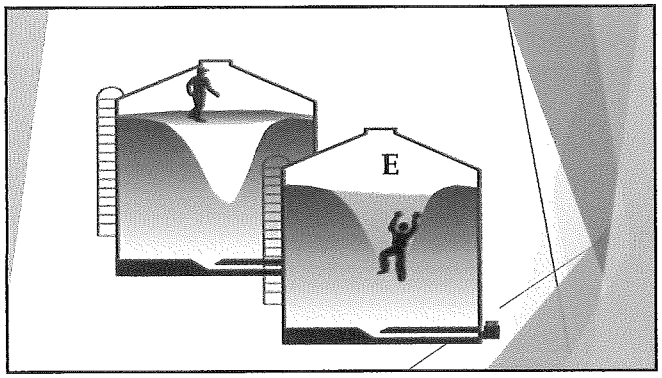

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Is there an option to Permit-Required Confined Space?

Alternative Entry is an option: 1926:1203(e)

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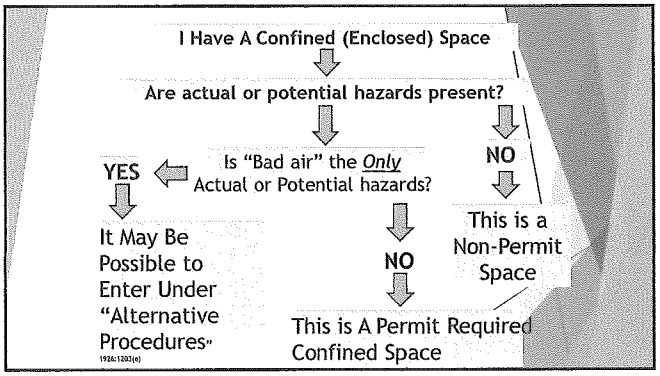
I Have A Confined (Enclosed) Space
Are actual or potential hazards present?
YES
Is "Bad air" the Only Actual or Potential hazards?
NO
It May Be Possible to Enter Under "Alternative Procedures"
NO
This is a Non-Permit Space
This is A Permit Required Confined Space
1926.1203(e)

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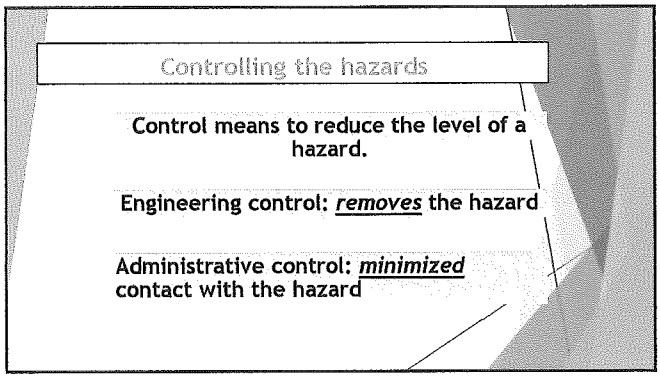
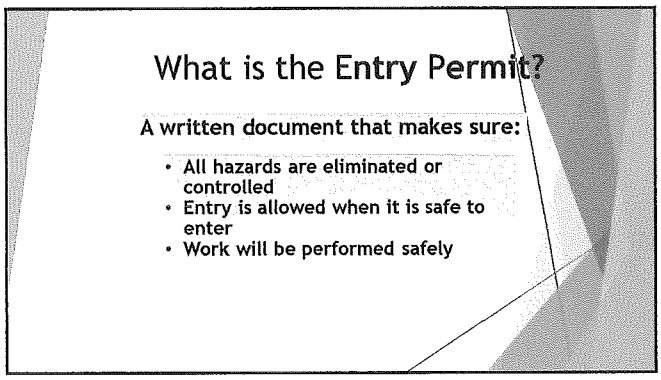

Controlling the hazards
Control means to reduce the level of a hazard.
Engineering control: removes the hazard
Administrative control: minimized contact with the hazard

80


What is the Entry Permit?
A written document that makes sure:
• All hazards are eliminated or controlled
• Entry is allowed when it is safe to enter
• Work will be performed safely

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What is a Permit confined space?

A Permit confined space that one or more of these characteristics:

1. Contains or has potential to contain hazardous atmosphere
2. Potential for engulfment or entrapment
3. Internal configuration could trap or asphyxiate
4. Any other recognized safety or health hazard

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Entry Permit is the Responsibility of the Qualified Person

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Who Is In Charge?

The Entry Employer

Any employer who decides that an employee it directs will enter a permit space.

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INFORMATION EXCHANGE

The Host Employer

↕

The Controlling Contractor

↕ ↕ ↕

The Entry Employer 1 ⟷ The Entry Employer 2 ⟷ The Entry Employer 3

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Hazardous atmospheres

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TRAINING REQUIREMENTS

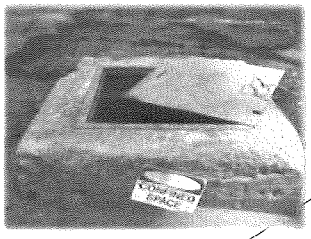
1926:1207

WHEN WHAT WHERE

HOW

165

THE ENTRY PERMIT



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Emergency Considerations

If the hazard is a hazardous atmosphere issue, either actual or potential, how can any other emergency plan other than onsite emergency rescue plan be acceptable?

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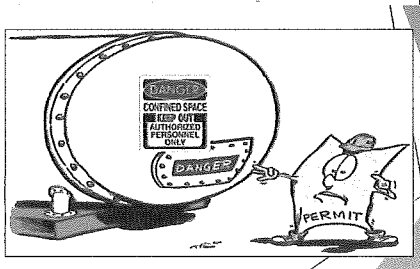
Are You Prepared?



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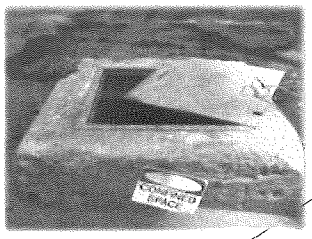
THE ENTRY PERMIT



175

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