

Industrial Safety & Hygiene News

# ISHN

## INSIDE this eBook:

- ▶ Information requirements
- ▶ Now is the time to prepare
- ▶ Hard lessons learned
- ▶ OSHA answers key questions



# OSHA's CONSTRUCTION CONFINED SPACE STANDARD

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# introduction

**M**ajor new OSHA standards that cover millions of workers come few and far between. But in May, 2015, the agency published its long-awaited final rule on safety requirements for confined spaces in the construction industry (Subpart AA, 1926.1200). In July, OSHA announced a 60-day temporary enforcement policy for the new rules. The agency is postponing full enforcement of the new standard to Oct. 2, 2015, in response to requests for additional time to train and acquire the equipment necessary to comply with the new standard.

There's a decades-long backstory to this new standard. In 1993, OSHA issued a rule to protect employees who enter confined spaces while engaged in general industry work (29 CFR 1910.146). This standard did not extend to cover employees entering confined spaces while engaged in construction work due to unique characteristics of construction worksites. Negotiations with the United Steel Workers of America led to a settlement agreement regarding the general industry standard, and OSHA agreed to issue a proposed rule to protect construction workers in confined spaces. The proposed rule was published in November 2007. Almost eight years later we have the final rule.

The confined spaces in construction rule differs from the general industry version in important ways, which are explained throughout this eBook. Construction confined spaces include pits (but not excavations and trenches already regulated), piping, sewers, crawl spaces and attics, manholes, tanks, tunnels, and lift stations. In general, a confined space: 1) has a limited means of entry and/or exit; 2) is large enough for a worker to enter it; and 3) is not intended for regular/continuous occupancy.

Contractors that set up permit-required confined space programs should only need to make a few changes to be in compliance. However, for companies that have not created a permit-required confined space entry training program, now is the time to get started.

I'm sure you'll find this eBook to be a valuable asset in reviewing OSHA's new standard and understanding the differences between how OSHA regulates confined spaces in general industry versus construction.

Dave Johnson  
*ISHN* Editor



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# Take it from the top

## OSHA chief Dr. David Michaels explains the construction confined space rule

By DAVE JOHNSON, *ISHN* Editor

**W**hen OSHA announced the release of the final rule on May 1, 2015, agency administrator Dr. David Michaels offered these prepared remarks in a press teleconference held that day:

“Confined spaces, such as sewers, manholes, crawl spaces, and tanks, are not intended for continuous occupancy. They can be very difficult to exit and they can be deadly.

“This new rule will afford construction workers the same level of protections as workers in other industries who work in confined spaces.

“We estimate that every year, this rule will prevent 780 serious injuries and save the lives of five construction workers. If this new rule had been in place and followed, it could have saved the lives of two workers killed in Georgetown, Idaho last year.

“Bo Taylor was applying an aerosol sealant in a manhole when he was overcome by fumes and fell into three feet of water at the bottom of the manhole. Trent Sorenson, Bo’s uncle and the site superintendent, went into the manhole to rescue his nephew, and was also overcome by the fumes.

“Trent’s son, Tyler, left to call for help. A volunteer arrived and attempted rescue using his own self-contained



breathing apparatus, but the mask leaked and the volunteer had to stop the rescue attempt. EMTs arrived approximately 45 minutes after Bo lost consciousness. Neither of the two men survived.

“With proper planning, ventilation, rescue training, proper equipment and prior engagement with local emergency services, Bo Taylor and Trent Sorenson could be alive today.

## Take it from the top *continued*

“We know that from this day forward, workers’ lives will now be saved and serious injuries prevented by this new rule.

“This rule will provide construction workers with protections already afforded to workers in manufacturing and general industry, with some differences tailored to the construction industry.

“Confined spaces, such as sewers, manholes, crawl spaces, and tanks, are not intended for continuous occupancy. They can be very difficult to exit and they can be deadly.”

“Unlike most general industry worksites, construction sites are continually evolving, with the number and characteristics of confined spaces changing as work progresses. This rule emphasizes training, continuous worksite evaluation, and communication requirements to further protect workers’ safety and health.

### Key differences

“Here are a few of the requirements in the new rule that differ from those in the existing general industry rule:

- “A **‘competent person’** must conduct the initial jobsite evaluation in the final rule. The OSHA standard that applies to manufacturing and general industry standard does not specify who has to conduct the evaluation. The competent person approach is common in construction industry rules.
- **“Information exchange** requirements in the final rule inform employers what discussions must be conducted, and when, during confined space entry.
- “Air contaminant and engulfment hazard **monitoring must be done continuously**, as the technology is readily available for most hazards. For substances where continuous monitoring technology is not available, periodic monitoring is required.
- “The construction rule explicitly requires employers to **coordinate emergency services before workers enter the confined space.**
- “During ‘controlled atmosphere’ entry, **employers may isolate physical hazards rather than eliminate all of them** (such as using lockout-tagout, blocking off access to struck-by hazards, etc.). This is not inconsistent with interpretations issued for the General Industry rule, but is clarified in the final rule for construction.

“The final rule will be officially published in the Federal Register on Monday May 4th.”



## Take it from the top *continued*

NOTE: OSHA in July announced a 60-day temporary enforcement policy for the new rules. The agency is postponing full enforcement of the new standard to Oct.

“Unlike most general industry worksites, construction sites are continually evolving, with the number and characteristics of confined spaces changing as work progresses.”

2, 2015, in response to requests for additional time to train and acquire the equipment necessary to comply with the new standard. During this 60-day temporary

enforcement period, OSHA will not issue citations to employers who make good-faith efforts to comply with the new standard. Employers must be in compliance with either the training requirements of the new standard or the previous standard. Employers who fail to train their employees consistent with either of these two standards will be cited.

“To help employers, workers and others understand the new requirements, we have developed a new Website that contains compliance assistance materials such as frequently asked questions and educational fact sheets. We will continue to add additional outreach documents as they become available.”

Note: For more information, visit the OSHA compliance assistance Website at [www.osha.gov/confinedspaces/index.html](http://www.osha.gov/confinedspaces/index.html).

# Questions & Answers

## Highlights of OSHA's press teleconference on the construction confined space standard

**O**n May 1, 2015, OSHA held a press teleconference with OSHA chief Dr. David Michaels and Director of the Directorate of Construction, Jim Maddux, answering questions regarding the new standard. Let's review some of the key points raised:

### Deleting a definition

**Question: What is the difference between a hazardous enclosed space already covered by an OSHA standard versus the construction confined spaces standard?**

**Jim Maddux:** The term hazardous enclosed space was a term used in the proposed rule that OSHA issued in 2008. Much of the commentary that we received urged us to go back and do something more similar to the general industry confined space rule. We have done that, and the term hazardous enclosed space is no longer used in the final rule.

### Rescue requirements

**Question: Is it correct to say that rescue plans must be made and coordinated in advance, but a rescue crew does not have to be at the actual site of the confined space?**

**Jim Maddux:** Yes, that's correct. The employer is required to either have their own rescue service or to



make arrangements for rescue service before an entry is attempted. But the rescue service does not have to be onsite all the time. As long as that service is available, that's the important thing.

### Isolating physical hazards

**Question: Please elaborate on the difference between the general industry standard and this new one with respect to isolating physical hazards.**

**Dr. David Michaels:** Yes, that's a distinction that has actually been an interpretation of the non-construction standard for many years. The plain language of the general industry standard says that you have to eliminate the hazards. In some cases eliminating the hazards is actually more of a problem than simply isolating them. For example, if there's a tripping hazard, it may actually be easier to just put

## Questions & Answers *continued*

in a ramp or a cover over the tripping hazard than to cut it out and reinstall it after the confined space entry is complete.

### Compliance assistance

**Question: You mentioned there will be a Website available with information on this standard. Is OSHA also planning any other type of outreach efforts?**

**Jim Maddux:** Yes. We have a number of guidance products that we're continuing to develop. The web page now has our introductory set of FAQs and a few fact sheets. We have a few more fact sheets that we're considering for the rule.

We'll continue to do more FAQs as people ask for them. And we'll be producing a small entity compliance guide. We've also been approached by the Associated General Contractors and a couple of other organizations who would like to sponsor webinars. We plan to do that.

### Compliance deadline

**Question: This rule takes effect in 90 days. Within the rule, are there any extensions that would be worth noting or does everything take effect at the same time?**

**Dr. David Michaels:** That's correct. In this case, all the provisions take effect August 3, 2015.

*NOTE: OSHA in July announced a 60-day temporary enforcement policy for the new rules. The agency is postponing full enforcement of the new standard to Oct. 2,*

*2015, in response to requests for additional time to train and acquire the equipment necessary to comply with the new standard. During this 60-day temporary enforcement period, OSHA will not issue citations to employers who make good-faith efforts to comply with the new standard. Employers must be in compliance with either the training requirements of the new standard or the previous standard. Employers who fail to train their employees consistent with either of these two standards will be cited.*

### Who's responsible?

**Question: Regarding the requirement for rescue plans, who is responsible for having those plans in place and engaging with the rescue service in the case of a jobsite where there are contractors and multiple subcontractors? Is it the primary company, or which one in the layer of contractors would be responsible for that?**

**Jim Maddux:** All of them are responsible for meeting that requirement if they have employees that are entering the space. If one of the employers arranges for that service then the other employers can rely on that same service.

**Dr. David Michaels:** One of the basic principles that this rule is based on is that there must be shared information and active communication between all the employers involved. Without that, workers are put at risk.



# Five key differences

## Contrasting confined spaces in construction from general industry

By MIKE PLATEK

**A**re practices and procedures regarding confined spaces in the construction industry different than those in general industry? They shouldn't be, but with a different OSHA standard and at different knowledge levels, they are.

### History of hazards

A brief history lesson is in order first before we explore the differences. Confined spaces have always been described with the following three points: A space large enough and so configured that:

- an employee can bodily enter and perform assigned work;
- it has limited or restricted means for entry or exit;
- it is not designed for continuous employee occupancy.

Although it seemed that people knew that confined spaces were dangerous, OSHA did some research and found that workers were still getting injured and killed in them. So, in January 1993, OSHA issued the general industry confined space rule (29 CFR 1910.146), and then a similar rule for the shipyard industry (29 CFR 1915.7) in 1994. The general industry standard requires employers to classify hazardous confined spaces as "permit-required confined spaces" and



to implement procedures to ensure safety for the employees who enter them.

In late 1993, the United Steel Workers of America had concerns with the newly delivered general industry standard and, after litigation, OSHA agreed in a settlement to issue a proposed rule to extend confined space protection to construction employees. On February 18, 1994, OSHA submitted a draft proposed standard for confined spaces

## Five key differences *continued*

in construction to the Advisory Committee for Construction Safety and Health (ACCSH) for comment.

The ACCSH found that the confined spaces encountered or created in construction were not usually identified or classified prior to the beginning of a project. OSHA used this advice from the Committee, along with fatality and injury data and their own enforcement experience, to ultimately determine that the general rule does not adequately protect construction workers in confined spaces from atmospheric, mechanical, and other hazards. The wheels of government started turning and, in November 2007, the “proposed rule” (CFR 1926 Confined Spaces in Construction) was issued for public opinion.

Today, OSHA stipulates that a confined space that is subject to hazards must be classified. These classifications determine what accident prevention and protection requirements apply to that space. The four classifications are: Continuous System-Permit-Required Confined Space (CS-PRCS), Permit-Required Confined Space (PRCS), Controlled-Atmosphere Confined Space (CACS) and Isolated-Hazard Confined Space (IHCS).

### Down to the differences

There are five key differences between the general industry and construction standards.

They are:

#### 1) Organization of the Standard

General Rule (GR) – Begins with requirements for

entering a PRCS, and specifies the four criteria that make for a PRCS.

Construction Standard (CS) – Proposes a step-by-step approach, explaining how to classify a space, determine its hazards, and how to safely enter.

#### 2) Information Exchange

GR – Requires the host employer to coordinate entry operations with both the contractor and his own employees when working in or around the permit space.

CS – Requires the controlling contractor to coordinate with all contractors that have employees in a confined space, regardless of whether or not the controlling contractor has employees in that space.

#### 3) Confined Space with Hazards Isolated

GR – Does not address working in confined spaces in which the hazard has been isolated.

CS – Allows employers to establish an IHCS by isolating or eliminating physical and atmospheric hazards in the confined space. There are guidelines for lockout-tagout. The standard is 29 CFR 1910.147.

#### 4) Controlled-Atmosphere Permit-Required Confined Space

GR – Specifies monitoring required as necessary.

CS – Requires continuous monitoring unless the employer can demonstrate that periodic monitoring is sufficient. Note that continuous monitoring of the

## Five key differences *continued*

atmosphere is the only sure way of knowing you will be safe at all times. However, conditions can change, and any work being performed may also cause the atmosphere to change.

### 5) Permit-Required Confined Spaces

GR – No definitive requirements for entry supervisors to monitor PRCS conditions during entry.

The controlling contractor is required to coordinate with all contractors who have employees in confined spaces.

CS – Requires for the entry supervisor to monitor PRCS conditions during entry.

GR – Requires a written PRCS plan.

CS – No plan is required when the employer maintains a copy of the standard at the worksite.

GR – No early-warning requirements for any up-stream hazards.

CS – Requires early-warning requirements for up-stream hazards in sewer-type spaces.

OSHA placed more importance in this area because many construction workers in sewer systems are unfamiliar with the hazards associated with these worksites.

### Training & other areas to address

One issue that OSHA addresses well is rescue, and the procedures surrounding it regarding work in confined spaces. OSHA lays out a set of guidelines that include procedures, equipment, and training that will ensure safety for both the rescuer and victim. If you are new to confined space rescue, the preamble of 29 CFR 1926 describes the necessary training requirements and the equipment necessary to carry out a successful rescue.

Recognizing the importance of training, OSHA defines the areas in which a proper training exercise should be conducted. A “Simulated Permit-Required Confined Space” is a confined space, or mock-up of one, that is designed to prevent injuries or death from occurring during rescue training drills.

Other areas to evaluate in order to make your confined spaces on construction sites safe are lockout-tagout recommendations and trenching and shoring. These, if addressed correctly, will ensure worker safety.

Are practices and procedures in confined spaces between industry and construction different? You’d better believe it, and prepare accordingly. Good luck.

**Mike Platek is a training specialist for Industrial Scientific Corporation. With 25 years of experience, Mike has worked with many industries, offering training in instrumentation, confined spaces, and fixed system setup. Mike can be reached at [slsmjp@indsci.com](mailto:slsmjp@indsci.com)**





# Contractors need to know

## Now is the time to get into compliance

**W**hen OSHA proposed a very different confined space standard for construction on November 28, 2007, the construction industry was not happy. Many organizations suggested that OSHA utilize the general industry rule with minor changes to address construction issues because the industry had become accustomed to using the general industry requirements. Creating a completely different rule would cause confusion within the industry, especially for contractors who work both inside and outside the fence.

OSHA took all the comments into consideration and created a final rule for confined space entry in construction that is very similar to the general industry Permit-Required Confined Space standard. Contractors that set up permit-required confined space programs should only need to make a few changes to be in compliance. However, for companies that have not created a permit-required confined space entry training program, now is the time to get started.

### Final requirements

After announcing a temporary delay, October 2, 2015 is the date that OSHA will start enforcing the new rules. The rule requires every construction employer that has employees who may enter into a confined space to have a



written permit-required confined space program that meets the requirements of the standard. The program must be designed to control and protect employees on the jobsite from permit-space hazards and to regulate entry into permit-regulated confined spaces.

## Contractors need to know *continued*

### Confined spaces

A confined space is one 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.

The standard does not apply to construction work that is covered by Subpart P: Excavations. This does not

OSHA's new rule requires every construction employer that has employees who may enter into a confined space to have a written permit-required confined space program that meets the requirements of the standard.

mean that manholes, pipes, vaults, and other confined spaces placed in trenches or excavations are not covered, but it does mean that excavations and trenches are not confined spaces. In addition, construction work covered by Subpart S: Underground Construction, Caissons, Cofferdams, and Compressed Air, which applies to tunneling, is not covered.

Similar to the general industry standard, OSHA has defined three types of confined spaces. All confined spaces start out as permit-required but may be reclassified where applicable. The following is a brief overview of the of confined space classifications:

- **Permit-Required Confined Space (PRCS)** 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 that slopes downward and tapers to a smaller cross-section; or
  4. Contains any other recognized serious safety and health hazard.

OSHA has determined that active sewers are permit-required unless isolated from a potential hazardous atmosphere. Early warning systems will also be required to alert attendants and entrants that an engulfment hazard may be developing. In addition, new lines not connected to an active sewer may be downgraded if they meet the conditions set forth in the following two types of confined spaces.



## Contractors need to know *continued*

- **Alternate Procedure Permit Confined Space**

means a permit-required confined space that may be reclassified by a competent person if the following conditions are met:

- 1) All physical hazards such as electrical, mechanical, chemical, etc. are eliminated or isolated through engineering controls (e.g., lockout-tagout).
- 2) Continuous forced-air ventilation alone is sufficient to maintain the atmosphere in the space safe for entry, and if the ventilation stops working, workers in the space can vacate the space safely.
- 3) Employer maintains monitoring and inspection data, which supports 1 and 2.
- 4) If it is necessary to enter the space to obtain the data and eliminate/isolate the hazards, the entry is performed as required for a permit-required confined space.
- 5) Determinations and supporting data are documented and made available to each employee who enters the space, or to the employees' authorized representative.
- 6) Entry into this type of permit space includes the following:
  - Removal of entrance cover is made safe.
  - Opening to vertical spaces is guarded by railing, temporary cover, or barrier to protect an accidental fall into the space or objects from entering the space.
  - The internal atmosphere is tested before entry and continuously monitored when possible with a direct-reading gas monitor.
  - No hazardous atmosphere is permitted while workers are in the space.
  - Continuous forced-air ventilation is used while workers are in the space.
  - Safe method of entering and exiting the space is provided.
  - Employer's competent person must certify in writing that the space is safe to enter.
  - If a hazard is detected during entry, employees must leave the space, the cause of the hazard must be determined by a competent person, and measures must be taken to protect employees before re-entry begins—which may require changing the classification of the space to a permit-required confined space.
  - All data and other information is made available to affected employees or their authorized representative.

## Contractors need to know *continued*

- **Non-Permit Confined Space** means a permit-required confined space may only be reclassified as a non-permit space if the competent person determines that the following conditions have been met:

- 1) The space poses no actual or potential atmospheric hazards and all hazards within the space are eliminated or isolated.

The Confined Space in Construction Standard 1926.1200 to 1213 has been 20 years in the making. We knew it was coming, we just didn't know when.

- 2) Hazards are eliminated or isolated without entry into the space.
- 3) Employer's competent person must document the basis for the determination that all hazards have been eliminated or isolated and certify in writing that the space is safe to enter.
- 4) Certification is made available to all entrants or their authorized representative.
- 5) If a hazard is detected during entry, employees must leave the space and the space must be reevaluated and reclassified by the competent person.

*Note: Control of the atmospheric hazards within the space through forced-air ventilation does not constitute elimination or isolation of the hazards.*

### General industry verses construction

Some of the aspects of the construction industry standard that are not included in the general industry standard include requirements for having a competent person evaluate all confined spaces before work begins and having a qualified person as an entry supervisor.

The standard includes information exchange requirements for host employers, controlling contractors, and entry employers to ensure that multiple employers on a jobsite share important confined space safety information.

Additionally, requirements have been added for providing and posting warnings for workers at jobsites with confined spaces.

OSHA also adjusted the construction rule to account for advances in technology and equipment that allow for continuous monitoring of atmospheric hazards and early-warning systems to prevent engulfment.

OSHA has also determined that construction employers who are in compliance with this new standard will also be considered to be in compliance with the general industry standard when need be.

A rescue plan must be included in the PRCS program but OSHA has clarified the implementation of non-entry rescue

## Contractors need to know *continued*

and what must be done to ensure the availability of an entry rescue service as needed.

In addition to the Definitions and General Requirements, OSHA has included sections within the standard to address and clarify the Permit-Required Confined Space Program; Permitting Process; Entry Permit; Training; Duties of Authorized Entrants, Attendants, and Entry Supervisors; Rescue; and Employee Participation.

### Conclusion

The Confined Space in Construction Standard 1926.1200 to 1213 has been 20 years in the making. We knew it was coming, we just didn't know when. It could not have been

avoided because confined spaces present a serious hazard to construction workers that had to be addressed. Now that it has been made final and promulgated, there is no question as to what construction employers are expected to do to protect employees who must enter into and work around confined spaces.

For a copy of the new Confined Space in Construction standard, visit the OSHA Website at [https://www.osha.gov/FedReg\\_oshapdf/FED20150504.pdf](https://www.osha.gov/FedReg_oshapdf/FED20150504.pdf).

**Source:** The National Utility Contractors Association — the leading trade association working solely for the utility construction and excavation industry in the United States. [www.nuca.com](http://www.nuca.com); (703) 358-9300



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# Working in Confined Spaces under the New Construction Standard

## Selecting the Right Ventilation Equipment

**A**fter 20 years in development, OSHA published the Confined Spaces in Construction Standard, 29 CFR 1926 subpart AA, on May 1, 2015. The final rule is similar in content to the General Confined Space Industry Standard, 1910.146, and adds several provisions to address construction-specific hazards and advancements in technology, and improves enforceability of the requirements. The standard will be effective August 3, 2015 and fully enforced on October 2, 2015.

Confined spaces are some of the most dangerous and potentially life-threatening work environments in industry. Fresh-air ventilation equipment is an integral component of a total safety program, along with PPE, fall protection, gas monitoring, and a respiratory program. Proper selection and training with safety equipment can reduce potential accidents and loss of life, and lower insurance rates.

### What is a Confined Space?

Confined spaces include: manholes, crawl spaces, sewer systems, storm drains, tanks, boilers, pits, excavations, water mains, transformer vaults, HVAC ducts, silos, turbines, and elevator shafts. This is not a complete list but shows a few

examples of many areas on a construction site that can be considered a confined space.

Once a confined space has been identified, testing the atmosphere for potential hazards is necessary. A properly calibrated gas monitor must be used to determine whether oxygen levels are sufficient to allow work in the confined space and determine if the air is potentially hazardous or explosive. If the environment is hazardous, explosion-proof or intrinsically safe ventilation equipment must be used to protect workers.

### Hazardous Location Ventilation

Once it is determined there is a hazardous location or potential for a hazardous work location, it is necessary to take every precaution to guard against ignition of the hazardous atmosphere. The traditional “Combustion Triangle” is made up of three elements: 1) fuel, 2) oxygen, and 3) an ignition source. All three must be considered when developing a plan to ventilate hazardous or potentially hazardous environments. Items to consider when working with a hazardous environment:

**Power Source** – Explosion-proof electric ventilation products should be certified showing the approving agency

## Selecting the Right Ventilation Equipment *continued*

and location in which the equipment can be used safely. Blowers should have a grounding lug attached to a ground source to safely remove the buildup of static electricity. These types of certified electric blowers should have a metal frame or a conductive plastic housing to assure a good ground to the electrical source. The blower should have an aluminum non-sparking blower wheel to prevent metal and dust sparking that could ignite the hazardous area.

Intrinsically safe ventilation equipment includes pneumatic (air-driven) equipment that cannot cause a spark and does not require third-party electrical approval. Even with intrinsically safe equipment, proper grounding and non-sparking components should still be utilized.

Certified electrical blowers should have a metal frame or a conductive plastic housing to assure a good ground to the electrical source.

**Conductive Ducting** – Choose ventilation air duct made of conductive material. This type of air duct will reduce the potential buildup of static electricity on both the interior and exterior surfaces of the duct that can result from the movement of air and small dust particles during ventilation.

### Non-Hazardous Location Ventilation

If the confined space is deemed non-hazardous, standard electric ventilation equipment can be used to ventilate the area.

### Selecting an Axial Fan vs. Centrifugal Blower

All ventilators have two characteristics:

- 1) **Air flow** - Air volume delivered---measured by cubic feet per minute (CFM).
- 2) **Air pressure** - Force of air---measured by inch of water gauge (WG).

**Axial Fans** - An axial fan creates high air flow but the blade design develops lower pressure. When used with ducting, the ventilation duct creates resistance and the axial fan becomes inefficient at longer distances. Axial fans are designed with several large paddle blades that develop a large volume of air flow (CFM). They are lightweight, low cost, and best when working at short distances with minimal ducting, preferably 15- to 25-foot flexible ducting. Axial fans are available in explosion-proof certified, standard electric, and battery-powered 12 VDC models (DC powered fans do not require certification).

**Inline Axial Fans** - Inline fans are used when ventilating at long distances. Simply add an inline fan to the existing ducting to increase or maintain air flow for long distances. These fans

## Selecting the Right Ventilation Equipment *continued*

can be used with either axial or centrifugal blowers to extend longer ventilation distance, and are available with explosion-proof certified or standard electric motors.

**Centrifugal Blowers** - A centrifugal blower uses a “squirrel cage” design with numerous forward curving blades on a circular wheel. The blades create significant volume (CFM) and very high air pressure. Centrifugal blowers are typically heavier and cost more than axial fans due to their larger motor, and are used to move air a long distance using long or multiple lengths of duct. Centrifugal blowers are available with explosion-proof motors, pneumatic, gasoline, and standard electric models.

### One Final Requirement: Proper Electrical Certification

In the United States, OSHA requires independent recognized certification laboratory testing of all AC electrical devices. Each fan or blower must meet recognized electrical codes and be manufactured with the proper mechanical safety devices. Remember to select equipment that's been tested, approved, and labeled by a Nationally Recognized Testing Laboratory (NRTL) like UL, ETL, or CSA, and make sure the equipment is certified to operate in your country.

If one of the NRTL testing companies has its insignia on the electrical equipment, you will know that the company

has tested and certified the electrical equipment. To the left of the insignia, a “c” signifies that the product has been tested and met Canadian standards. A “us” on the right of the testing company's insignia shows that the piece of equipment has been tested and certified to meet United States standards.

### **ALWAYS REMEMBER, OSHA REQUIRES THE EQUIPMENT USER TO BE RESPONSIBLE TO PURCHASE AND USE THE PROPER EQUIPMENT REQUIRED FOR THE WORK LOCATION.**

There is no OSHA requirement that a seller must sell certified equipment; it is the user's responsibility to purchase equipment that meets the work location's requirements.

For more information on proper ventilation techniques and ventilation products, visit [www.airsystems.com](http://www.airsystems.com), or call (800) 866-8100 to speak with our knowledgeable Customer Service Team.

Stephen Durr is the Marketing Manager at Air Systems International, Inc.

### References:

<https://www.osha.gov/confinedspaces/index.html>

[https://www.osha.gov/confinedspaces/tempenforcementpolicy\\_0715.html](https://www.osha.gov/confinedspaces/tempenforcementpolicy_0715.html)

<https://www.osha.gov/confinedspaces/faq.html>



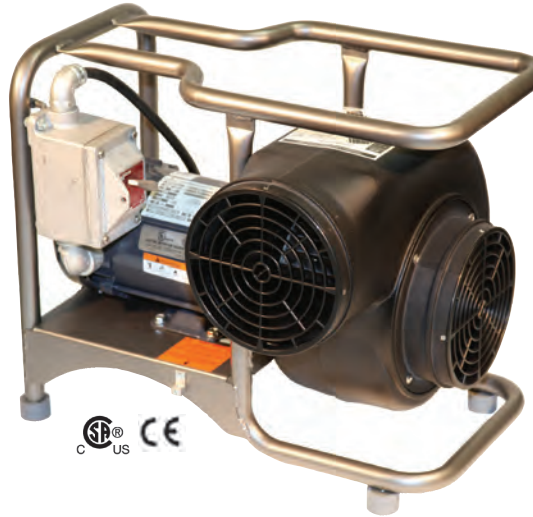
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Confined Space Ventilation Blowers and Fans Certified by a Nationally Recognized Testing Laboratory (NRTL)

8" Standard and 2 Speed  
Centrifugal Electric Blowers



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# Information collection

## Requirements of OSHA's confined spaces in construction standard

By DAVE JOHNSON, *ISHN* Editor

OSHA's Subpart AA Confined Spaces in Construction 1926.1200 contains a number of communications-related mandates. Let's review some (not all) of these provisions:

- If the workplace contains a Permit-Required Confined Space (PRCS), employers must inform employees by **posting a danger sign**, and inform the employees' authorized representatives and controlling contractor, in a manner other than posting, of the existence and location of, and the danger posed by, the PRCS.
- If an employer decides that its employees will enter a PRCS, the employer must have and implement a **written permit-space program** at the construction confined space site. The written program must be available prior to, and during, entry operations for review by employees and their authorized representatives. Entry employers must document numerous procedures, including: safe PRCS entry operations; summoning rescue and emergency services (including the development of a rescue plan for employers who have in-house rescue teams); rescuing entrants from PRCSs; providing necessary



emergency services to rescued employees; preventing unauthorized personnel from attempting a rescue; coordinating entry operations; and for concluding entry. Employers must consult with affected employees and their authorized representatives on all aspects of the PRCS program.

- Before entry under **alternate procedures**, employers must document the determinations and supporting



## Information collection *continued*

data. A job-made hoisting system is permissible if it is approved for personnel hoisting by a registered professional engineer, in writing, prior to use.

- Entry employer(s) must document and certify the basis for determining the elimination or isolation of all hazards in a PRCS when **reclassifying the space**. The certification must be made available to each employee entering the space or to that employee's authorized representative.

### Exchanging information

- The **host employer and controlling contractor must exchange PRCS information** before and after entry operations.
- The **controlling contractor must provide PRCS information to non-entry employers** before entry operations begin.
- The **controlling contractor and the entry employer(s) must exchange PRCS information** before and after entry operations.
- The **controlling contractor and entry employer(s) must each coordinate entry operations:** 1) When more than one entity performs PRCS entry at the same time; or 2) when performing permit-space entry while at the same time any activities are performed that could foreseeably result in a hazard in the PRCS.
  - Employers must provide **results of any atmospheric testing conducted** to employees or employees' authorized representative.
  - Entry employers must 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.
  - Entry employers must **review the permit-space program**, using the canceled permits retained within one year after each entry, and revise the program as necessary to protect employees participating in entry operations from permit-space hazards. Employers may perform a single annual review covering all entries performed during a 12-month period.
  - Each entry employer must document the completion of PRCS measures by **preparing an entry permit** and making it available by posting or other equally effective means to authorized entrants or their authorized representatives before entry is authorized. Employers must identify on the permit specific information such as:
    - the purpose of the entry
    - date and authorized duration of the permit
    - authorized entrants
    - means of detecting atmospheric hazards
    - attendants



## Information collection *continued*

- entry supervisors
  - hazards of the PRCS
  - measures used to isolate the PRCS and to control permit-space hazards before entry
  - acceptable entry conditions
  - results of tests and monitoring and the names or initials of the testers and an indication of when the tests were performed
  - rescue and emergency services (such as the equipment to use and the numbers to call) and
  - the means to summon those services, communication procedures, equipment, any additional permits issued previously to authorize work in the permit space, and any other information necessary, given the circumstances of the particular confined space, to ensure employee safety.
- Before entry begins, the **entry supervisor identified on the permit must sign the entry permit**, and verify, 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.
  - Entry employers must **retain each canceled entry permit for at least one year** to facilitate the review

of the permit-required confined space program. The employer must note on the permit any problems encountered during an entry operation and make appropriate revisions to the permit-space program.

### Training

- Employers must **maintain training records** containing each employee's name, the name of the trainers, and the dates of training to show completion of the 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.
- Entry employers must ensure that authorized entrants **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, and to alert the attendant whenever there is any warning sign or symptom of exposure to a dangerous situation, or the entrant detects a prohibited condition.
- Entry employers must ensure that attendants: 1) **Communicate with authorized entrants** and order them to evacuate the permit space under specified conditions; 2) summon PRCS rescue services as soon as necessary; 3) warn unauthorized persons to stay

## Information collection *continued*

away from, or to exit, PRCSS; and 4) inform authorized entrants and entry supervisors of any unauthorized PRCSS entry.

### Rescue

- Entry employers must ensure that each **entry supervisor verifies that rescue services are available**, the means for summoning them are operable, and the employer will be notified as soon as the services become unavailable. If the employer uses non-entry rescue, the employer must confirm, prior to entry, that emergency assistance will be available in the event that non-entry rescue fails.
- Employers who designate rescue and emergency services must **evaluate a prospective rescuer's ability** to respond to a rescue summons in a timely manner, considering the hazard(s) identified, and evaluate a prospective rescue service's ability to function proficiently with rescue-related tasks and equipment while rescuing entrants from the particular PRCSS identified.
- Employers who designate rescue and emergency services must **inform each rescue team or service of the hazards they may confront** when called on to perform rescue at the site.
- If an injured entrant is exposed to a substance for which the employer must keep a Safety Data Sheet or other similar written information at the worksite, the employer must **make the SDS or written information available to the medical facility treating the exposed entrant**.
- Employers must **make available to each affected employee and his/her authorized representatives all information they must develop under this standard**.
- Employers must **disclose to the Secretary of Labor or the Secretary's designee** all documents this standard requires them to retain.

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# Crawl spaces and attics

Know the hazards of these potential confined spaces

OSHA has posted a fact sheet on its Website explaining many of the confined space hazards associated with crawl spaces and attics and how employers can protect their workers in these environments.

In the agency's new construction standard for Confined Spaces (29 CFR 1926 Subpart AA), any space that meets the following three criteria is a confined space: 1) Is large enough for a worker to enter it; 2) Has limited means of entry or exit; and 3) 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.

## Crawl spaces and attics *continued*

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

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.

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 worksite 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, 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

## Crawl spaces and attics *continued*

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.





# Confined spaces in construction: Pits

## Open pits can still be confined spaces

By DAVE JOHNSON, *ISHN* Editor

**A**n OSHA fact sheet highlights many of the confined space hazards associated with pits and how employers can protect their workers in these environments.

### 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.

### Confined spaces in pits

It's important to realize that even though a pit is typically open on top and more than four feet deep, it can still be a confined space or permit-required confined space. Additionally, pits can be completely underground or below



## Confined spaces in construction: Pits *continued*

grade, such as a utility vault within a sewer system or a pit within a pit in a wastewater treatment plant.

It's important to realize that even though a pit is typically open on top and more than four feet deep, it can still be a confined space or permit-required confined space.

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.



# Sewer systems

## Workers in sewers will likely confront confined spaces

By DAVE JOHNSON, *ISHN* Editor

**C**onfined space hazards in sewer systems have led to worker deaths, according to a fact sheet posted on OSHA's Website. 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.

### 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. Employers conducting work in sewer systems will likely have workers who will encounter confined spaces.





## Sewer systems *continued*

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.

Sewer systems are extensive and include many different components that are considered 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 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.

# Hard lessons learned

OSHA describes fatal incidents and how they could have been prevented

By DAVE JOHNSON, *ISHN* Editor

**A**n employee and his crew were installing storm drainage pipes in an older neighborhood. During the installation of the drainage pipes, damage had been caused on the existing natural gas pipelines in the neighborhood. The odor of gas was present prior to the day of the installation, and the local gas company had been contacted to identify and repair the leaks.

The smell of gas was still present and noticed by the supervisor, employees and others; however, the supervisor did not contact the gas company to investigate the odor, and to locate the leak. The supervisor also did not remove the employees from the excavation where the gas odor existed, and did not test the atmosphere of the excavation to determine if there was a hazardous atmosphere or condition in the excavation.

The supervisor directed an employee to enter the 48-inch-diameter drainage pipeline to retrieve a laser surveying machine that was located approximately 90 feet within the pipeline. Natural gas that had escaped from two breaks in the gas line had accumulated within the storm drain pipeline. While the employee was in the pipeline, the natural gas within it ignited. The specific ignition source was not identified.



Even though severely burned, the employee was able to exit the storm drain pipeline, and was taken to the hospital. Six days later, he died as a result of his injuries.

## **Actions that potentially could have prevented the fatality:**

- Evaluation and Classification
- Information Exchange
- Ventilation and Hazard Isolation

## Hard lessons learned *continued*

- Early Warning System and Atmospheric Testing or Monitoring
- Attendant
- Training

### **Sewer system work**

Three employees were working on a sewer system that was newly installed and not yet in use. A section of the line had been plugged and tested for leakage.

Employee #1 entered the sewer vault, which was approximately 15 to 20 feet deep, to remove a plug.

Employee #1 collapsed into approximately six inches of unidentified liquid at the bottom of the sewer vault.

Employee #2 entered the sewer vault to assist Employee #1. Employee #2 also collapsed at the bottom of the sewer vault.

Employee #3 attempted to provide assistance to Employees #1 and #2. Employee #3 began to feel ill about halfway down and then decided to emerge from the sewer vault.

Fire/EMS Department responded to the scene. Coworkers of the employees attached a hose approximately 19 feet long to an air compressor and used it to blow air into the sewer vault. Employee #2 regained consciousness and was able to assist in rescuing Employee #1 and himself from the sewer vault.

All three employees were transported to area hospitals. Employee #1 later died at the hospital. Employees #2 and #3 were treated, hospitalized, and released in the following days.

### **Potential preventive actions:**

- Evaluation and Classification
- Information Exchange
- Permit Program

### **Four fatalities while replacing a sump pump**

The victim was in the process of assisting another company with the replacement of a sump pump in an underground lift station that collected draining and leached water from a construction debris landfill.

Three employees of the other company entered the lift station and succumbed to exposure to hydrogen sulfide gas. The victim had entered the lift station in an attempt to assist/rescue the three victims from the other company, and also succumbed to hydrogen sulfide gas.

Rescue services arrived at the scene and performed air quality monitoring, which revealed that the victim and the three victims from the other company were exposed to concentrations of up to 200 PPM of hydrogen sulfide gas.

Body retrievals were initiated at that point.

The lift station was determined to be a permit-required confined space. The other company (host employer) had not evaluated the lift station to determine that it was a permit-required space. Neither company had developed and implemented a written permit space program.



## Hard lessons learned *continued*

### Potential corrective actions:

- Evaluation and Classification
- Information Exchange
- Permit Program (3 of 4 fatalities)
- Ventilation and Hazard Isolation
- Early Warning System and Atmospheric Testing or Monitoring
- Rescue Capacity (Attempted rescue resulted in a fatality)
- Training

### Working beneath a bedroom

Employee #1, a painting contractor, was hired by the property owner to apply primer over the creosote floor joists. Employees #1 and #2 were working in a crawl space under the bedroom of the residence, applying primer to the floor joists.

The incandescent work lamp or a broken light bulb ignited the vapors from the primer. The two employees were burned and died. The other employees suffered minor burn injuries. The contributing causal factors: The air in the crawl space was not flushed or purged of flammable vapors, and no

air testing was done to determine whether dangerous air contamination or an oxygen deficiency existed.

Arson and homicide investigators were called to the scene and were investigating the cause of the deaths, which appeared to be accidental. The crawl space was located underneath one of the bedrooms and was measured between 21 to 22 inches from the foundation to the floor of the bedroom.

### Potential corrective actions:

- Evaluation and Classification
- Permit Program  
(Not Ventilation and Hazard Isolation because this was already required in the state where the accident took place)  
(Not Early Warning System and Atmospheric Testing or Monitoring because this was already required in the state where the accident took place)
- Attendant
- Training

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*We hope you learned more about the  
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