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EXCAVATION SAFETY News

www.trenchsafety.com

When your project involves confined spaces…

STOP! Answer This Question First

One of the most important steps in safe confined space entry is to stop and always ask this question: *Is it absolutely, positively necessary to enter the space?*

Put another way, is there a way the job can be completed from outside the space, so our people won't be exposed to the potential hazards?

Safety Training Classes Available

TrenchSafety and Supply offers invaluable safety training on Confined Spaces and other topics throughout the year. See page 8 for the schedule of classes.

Proper Use of Ventilation In Confined Spaces

Editor's Note: *Make sure that you read and follow all governmental regulations and manufacturers' instructions regarding the proper use of all safety and construction equipment on all your job sites.*

Background

OSHA's 1910.146 defines a confined space as:

1. A space large enough and so configured that a person can bodily enter and perform assigned work; and
2. Which has limited or restricted means for entry or exit; and
3. Which is not designed for continuous employee occupancy.

Examples specifically cited in the standards include — but are ***not*** limited to — storage tanks, process vessels, bins, boilers, ventilation or exhaust ducts, sewers, underground utility vaults, tunnels, pipelines, and open-top spaces more than four feet deep, such as pits, tubs, vaults, and vessels.

Depending upon the manufacturer, electric blowers similar to this one are available in 12-volt DC, and 110-volt and 220-volt AC. One advantage of electric blowers: Carbon monoxide from a gasoline engine used to run the blower is not normally an issue.

Essential elements of a Confined Space Entry Plan include:

- Training
- Hazard identification and elimination
- Ventilation
- Atmospheric gas monitor(s)
- Emergency plan
- Documentation

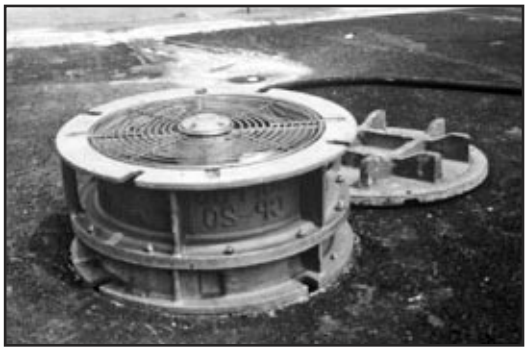
See "Proper Ventilation" on page 2…

"Proper Ventilation" from page 1

This issue of **Excavation Safety News** will focus on the basics of proper use of ventilation equipment during confined space entry.

The Problem

The atmosphere inside of a confined space can be significantly different from the air outside the space. Because of a lack of ventilation, air may not

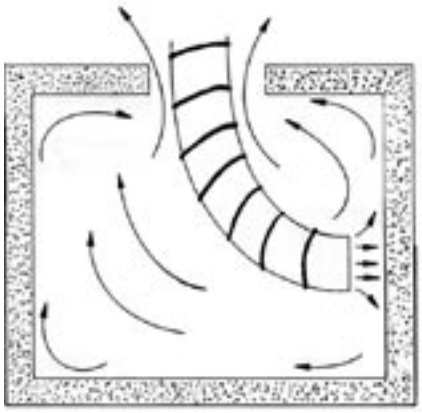


An air compressor powers this ventilator on a FedEx job site in Memphis.

circulate properly inside the space. Deadly gases may be created or trapped inside the space, or there might not be sufficient oxygen. In other cases, there might be too much oxygen.

The Solution

Continuous forced ventilation, used with an atmospheric gas monitor, is frequently the best method of dealing with "bad" air, or potentially bad air, in a confined space.



This drawing, from General Equipment Company, illustrates a good position of the duct inside a confined space. Such positioning insures good dispersion of the fresh airflow inside the space. It is important to pay attention to corners, walls, and obstructions that might trap "bad" air.

This large volume of fresh air creates positive pressure in the confined space, which pushes contaminated air out. This air also creates atmospheric turbulence inside the space, which helps to dislodge pockets of bad air.

See "Proper Ventilation" on next page…

This contractor continuously ventilated this confined space during a water line inspection in North Little Rock, Ark., and the people who entered the space each carried an atmospheric gas monitor. A retrieval system, using anklets and lifelines, was also set up so that the workers could be pulled to safety in the event of an emergency.

Excavation Safety News

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This newsletter provides a brief overview of safety regulations and systems. It is not intended to provide specific legal or engineering advice. Please refer to OSHA CFR29, Part 1926, Subpart P, "Excavation and Trenches," and to other governmental regulations, and to manufacturers' instructions for specific information.

Construction techniques and equipment usage must be in accordance with all governmental regulations and manufacturers' instruction. All orders placed with TrenchSafety are subject to the terms, conditions, and warranty limitations contained in TrenchSafety's Rental and Sales Agreements.

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"Proper Ventilation" from page 2

Applying positive pressure helps minimize the chances of bad air seeping back into the space. It also reduces problems associated with drawing flammable gases back across the motor of the ventilator.

In a few cases, a combination of forced air and exhaust ventilation, or "suction", might be desirable. For example, exhaust ventilation might be set up in a welding area, to capture fumes at their source. In other situations, a series of ventilators may be required to move air a long distance or ventilate a large area.

Factors to Consider

1. ***What is the size of the confined space and capacity (airflow) of the ventilation blower?***
   Although OSHA does not define the number of times the atmosphere must turn over, many safety professionals recommend recirculating the atmosphere at least six times before entry, and at least six times per hour thereafter. Note, however, that some state and local laws will require a higher turn over rate.

This ventilator, in Southern Calif., is powered by a large gasoline engine, and will generate almost 20,000 cubic feet per minute of airflow.

The placard on this General Equipment gas-powered ventilator shows that this blower will generate 1178 cubic feet per minute of airflow, in the manufacturer's standard 8" diameter by 25' long duct, and one 90-degree bend. The airflow drops to 1,065 cubic feet per minute with two 90-degree bends.

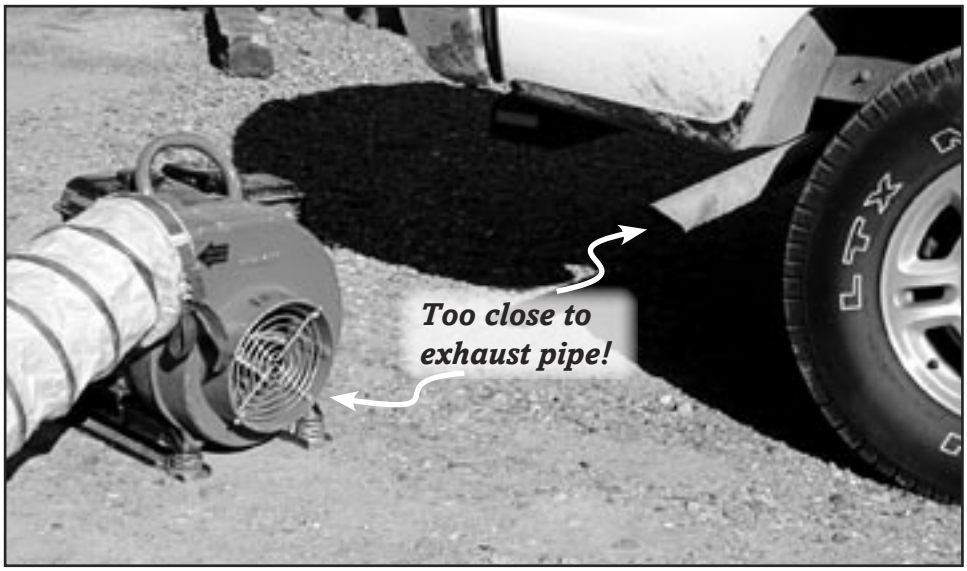
For example, assume that a space has a volume of 3,000 cubic feet. Also assume that the ventilation equipment produces 1,000 cubic feet of airflow every minute (CFM). In this example, it will take three minutes to turn the atmosphere one time (3,000 cubic feet divided by 1,000 CFM of airflow). It will take 18 minutes to turn the atmosphere six times (three minutes per turn times six turns).

2. ***Will the exhausted gases be hazardous?***
   Assume that they are. Locate the exhaust outlets so that contaminants will not be drawn back into the confined space, and where air currents will disperse the exhaust gases quickly, without endangering other people. If the exhaust could be flammable, remove all ignition sources from the area.

   Note: Special precautions will be necessary in flammable atmospheres. Air flowing through a ventilation duct creates static electricity, which can produce a spark. In a flammable atmosphere, such a spark can serve as an ignition source, resulting in a fire or explosion. Explosion proof ventilation blowers may be required. In addition, proper grounding will be necessary to dissipate built-up static electricity. Consult the manufacturer of the ventilation equipment for specific instructions in these situations.

See "Proper Ventilation" on next page…

"Proper Ventilation" from page 3



It is important to position the intake of the blower where there is a good supply of fresh air. In this particular example, the blower will pump "bad air" from this truck's exhaust directly into the confined space.

3. What is the source of make-up air?

Position the ventilation blowers so there is a good supply of fresh air to pump into the space. Frequently, the best location for the intake is upwind of the opening to the confined space.

4. What about the duct?

The biggest factor that limits or restricts the performance of any ventilator is the duct.

Most portable air ventilation blowers utilize 8" diameter flexible ducts. These ducts are usually available in standard lengths of 15 feet or 25 feet. Duct couplers are also available when longer lengths are required.

> Minimize the number of bends — Air movement against the inner wall of the duct creates friction. Every bend, whether gradual or sharp, creates additional friction, which reduces airflow delivery efficiency.

Keep ducts as short as possible — Because of the effects of friction, airflow delivery is directly proportional to duct length. Longer ducts result in lower airflow delivery. Duct runs longer than 25 feet dramatically increase the size of ventilator required to produce the same airflow as a smaller ventilator with less than 25 feet of duct.

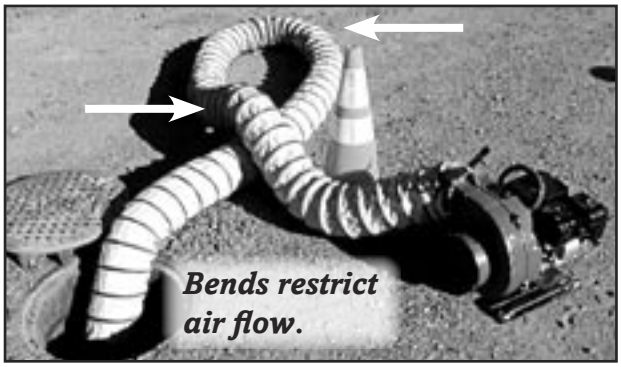
> Maintain the duct in good condition — Rips or tears in ducts will create blockage or leakage, resulting in lower airflow delivery. Also, a partially crushed duct will create friction that reduces airflow delivery. Likewise, dirt or grease inside a duct will reduce airflow delivery.

Suggestion: To maximize airflow delivery and service life, store ducts in a container or rack when not in use.

> Position ducts to maximize air circulation — One effective method is to position the end of a duct on a cable rack or other support

See "Proper Ventilation" on next page…

It is important to keep the ventilation duct as straight and as short as possible. The duct also needs to be in good condition.



This is a good illustration of how NOT to set up a blower. Each of the bends in the duct restrict the airflow.

"Proper Ventilation" from page 4

midway up a sidewall, with the duct pointed toward an end wall. This method will help to provide more even airflow distribution and more effectively ventilate corners where harmful gases or vapors might accumulate.

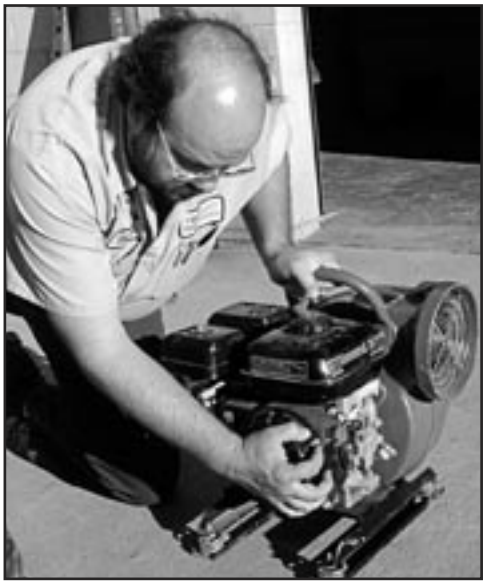
5. ***What kind of power source is available?*** Sometimes there are few choices on a job site. Fortunately, blowers are available that are powered by gasoline, pneumatic, and electrical (12 volt DC, and 110 volt AC or 220 volt AC) motors.

The CRUCIAL Final Step

PRIOR TO ENTRY, IT IS ABSOLUTELY CRITICAL TO CHECK THE ATMOSPHERE with a properly calibrated atmospheric gas monitor, operated by a properly trained employee. Under no conditions should workers ever enter a confined space if the air has not been tested and determined safe! And IF AN MONITOR ALARM SOUNDS AT ANY TIME, ALL PERSONNEL MUST IMMEDIATELY EXIT THE SPACE!

At a minimum, in construction and utility work, you should use a gas monitor to check the level of oxygen (it can be too high or too low). You should also check for the presence of flammable gases (natural gas and methane) and for the presence of toxic gases (hydrogen sulfide and carbon monoxide). If other gases are present, or might be present, an additional monitor may be necessary to check for those gases, as well.

The OSHA standards say that the air should be checked "as often as necessary." Most safety professionals recommend continuously monitoring the air when workers are inside of a confined space. This is particularly true when doing sewer-related work: The atmosphere can change very quickly and unpredictably because of factors beyond the control of the employer.



It is critical to check the atmosphere in every confined space, even after ventilation, to make certain it is safe.

Summary

Used in conjunction with training, hazard identification and elimination, atmospheric gas monitors, an emergency plan, and documentation, the right ventilation equipment is an important element of every confined space entry plan.

TrenchSafety has the knowledge and the equipment and supplies, and we offer training classes for you and your personnel covering the "ins and outs" of confined space entry. Give us a call at **(901) 346-5800** or **(501) 955-3800**, or check our web site at ***www.trenchsafety.com***

It's important to inspect all ventilation equipment before operation to make certain that it is in good condition and working properly.

For an in-depth look at confined spaces, download the January 2005 issue of this newsletter. Simply point your web browser to: ***www.trenchsafety.com/usefulinfo/ExcavationSafety.asp*** *and click on the link to the FREE January '05 issue.*

Test Your Confined Space Knowledge

Question #1

A Mid-South contractor complained that he ventilated a sanitary sewer manhole all morning and the air still checked "bad." The ventilation blower was set-up to suck the bad air out of the manhole. What was the contractor's problem?

*In most instances, the preferred method for ventilating a space is to force large volumes of fresh air **into** the space. In this situation, the contractor was drawing bad air from the entire sewer system. By setting up his equipment to force air **into** the space, the manhole was safe to enter in just a few minutes time.*

Question #2

Another contractor complained that the longer he ventilated a space, the more carbon monoxide he measured. The contractor was using a gas-powered ventilation blower. What might have been the problem?

The contractor was pumping the exhaust from the gas-powered blower, which contained carbon monoxide, into the space. He eliminated the problem by repositioning the blower so that it drew fresh air.

Question #3

A contractor was repairing a water line in a water treatment plant. The facility's Safety Director questioned the contractor's gas monitor because it appeared to be out calibration. The Safety Director was also concerned about the whether the monitor would respond to chlorine gas, which was potentially present in the plant. What would OSHA say?

OSHA requires that atmospheric gas monitors be maintained and calibrated according to the manufacturer's instruction. Most manufacturers will say that their monitors need to be calibrated at least monthly.

The OSHA standards refer to checking for too much oxygen, too little oxygen, flammable gases (typically methane or natural gas) and toxic gases (typically carbon monoxide and hydrogen sulfide) in confined spaces. In addition, the standards say that employers need to check for any other specific gases that might be present. In this case, the contractor needed a monitor that would also respond to chlorine since chlorine was a known potential hazard.

Simply Too Good to Pass Up

Every once in a while we come across a construction-related photo that seemingly defies explanation. This one falls into that category. While it's not related to the potential dangers of confined spaces and hazardous atmospheres, it sure makes you want to know the story, doesn't it?

By the way, the fellow down in the excavation is taking a real risk — no shoring, shielding, or other protective system is in place to protect him during the rescue.

TrenchSafety Solutions...

TrenchSafety regularly supplies area contractors and utilities with solutions to a wide variety of job-site challenges. Here are some recent examples.

Visit our web site — ***www.trenchsafety.com*** — to see additional examples of solutions to your job-site challenges.

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Get your staff trained during the "Fall & Winter Slowdown"...

Safety Training Classes Now Available

More than 10,000 people have attended TrenchSafety's invaluable training programs throughout the Mid-South.

Check the schedule of classes at right.

"Confined Space" Training

OSHA mandates that employers provide a safe workplace for their employees. This course is designed to improve awareness of confined space hazards, and provide managers and supervisors with the basic information to establish a confined-space safety program.

The one-day classes begin promptly at 8:30 a.m., and ends at 3 p.m. The cost is $95 per person, and includes lunch, an instructional workbook, and a wallet card and certificate signifying completion of the course.

"Competent Person" Training

OSHA requires that a "Competent Person" be present on your construction or maintenance job site whenever workers are exposed in an excavation. Make sure you have the properly trained personnel on each of your crews.

This one-day classes run from 8:30 a.m. to 4:30 p.m. Cost is $95 per person, and includes lunch, an instructional workbook, and a wallet card and certificate indicating successful completion of the class.

"Motorgrader Control" & "Asphalt-Paver Control" Training

TrenchSafety now offers classes on the safe and efficient use of laser-controlled motorgraders and asphalt pavers.

Each topic, based on classes created by Topcon Laser Systems, is covered in four hours of classroom instruction, plus two hours of "hands-on" use of the machines.

Contact TrenchSafety for the schedule of upcoming "Motorgrader Control" and "Asphalt Paver Control" Training classes.

"Confined Space" Training

2006

- Tuesday, Nov. 21 - Memphis, TN

2007

- Tuesday, Jan. 23 - North Little Rock, AR
- Tuesday, Mar. 20 - Memphis, TN

"Competent Person" Training

2006

- Tuesday, Nov. 7 - Memphis, TN
- Tuesday, Nov. 14 - North Little Rock, AR
- Tuesday, Dec. 5 - Memphis, TN
- Tuesday, Dec. 12 - North Little Rock, AR
- Thursday, Dec. 14 - Fayetteville, AR

2007

- Tuesday, Jan. 9 - Memphis, TN
- Tuesday, Jan. 16 - North Little Rock, AR
- Thursday, Jan. 18 - Jackson, TN
- Tuesday, Feb. 6 - Memphis, TN
- Thursday, Feb. 8 - Jackson MS
- Tuesday, Feb. 13 - North Little Rock, AR
- Tuesday, Feb. 20 - Ft. Smith, AR
- Tuesday, Mar. 6 - Memphis, TN
- Tuesday, Mar. 13 - North Little Rock, AR
- Tuesday, Apr. 3 - Memphis, TN
- Tuesday, Apr. 10 - North Little Rock, AR

Space is limited! Contact us **today** to register and reserve classes for your staff.

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