



Safety in Confined Spaces: What You Need to Know

[On average, industrial accidents in confined spaces claim 100 lives each year. Due to the nature of the processing industry, many situations arise in which tanks or other storage vessels must be entered for routine servicing or inspection, making safety in such spaces a critical concern. The following article, excerpted from OSHA document 3138-01R, from the U.S. Department of Labor Occupational Safety and Health Administration illustrates the variety of issues that must be considered in connection with worker safety in confined spaces.]

Many workplaces contain spaces that are considered to be “confined” because their configurations hinder the activities of employees who must enter into, work in or exit from them. In many instances, employees who work in confined spaces also face increased risk of exposure to serious physical injury from hazards such as entrapment, engulfment and hazardous atmospheric conditions. Confinement itself may pose entrapment hazards and work in confined spaces may keep employees closer to hazards such as machinery components than they would be otherwise. For example, confinement, limited access and restricted airflow can result in hazardous conditions that would not normally arise in an open workplace.

The terms “permit-required confined space” and “permit space” refer to spaces that meet OSHA’s definition of a “confined space” and contain health or safety hazards. For this reason, OSHA requires workers to have a permit to enter these spaces. Throughout this publication, the term “permit space” will be used to describe a “permit-required confined space.”

Definitions

By definition, a **confined space**:

- Is large enough for an employee to enter fully and perform assigned work;
- Is not designed for continuous occupancy by the employee; and
- Has a limited or restricted means of entry or exit.

These spaces may include underground vaults, tanks, storage bins, pits and diked areas, vessels, silos and other similar areas.

By definition, a **permit-required confined space** has one or more of these characteristics:

- Contains or has the potential to contain a hazardous atmosphere;
- Contains a material with the potential to engulf someone who enters the space;
- Has an internal configuration that might cause an entrant to be trapped or asphyxiated by inwardly

converging walls or by a floor that slopes downward and tapers to a smaller cross section; and/or

- Contains any other recognized serious safety or health hazards.

OSHA’s Confined Space Standard

OSHA’s standard for confined spaces (29 CFR 1910.146) contains the requirements for practices and procedures to protect employees in general industry from the hazards of entering permit spaces.

Employers in general industry must evaluate their workplaces to determine if spaces are permit spaces. If a workplace contains permit spaces, the employer must inform exposed employees of their existence, location and the hazards they pose. This can be done by posting danger signs such as “DANGER -- PERMIT-REQUIRED CONFINED SPACE -- AUTHORIZED ENTRANTS ONLY” or using an equally effective means.

If employees are not to enter and work in permit spaces, employers must take effective measures to prevent them from entering these spaces. If employees are expected to enter permit spaces, the employer must develop a written permit space program and make it available to employees or their representatives.

Alternative to a Full Permit Entry

Under certain conditions described in the standard, the employer may use alternate procedures for worker entry into a permit space. For example, if an employer can demonstrate with monitoring and inspection data that the only hazard is an actual or potential hazardous atmosphere that can be made safe for entry using continuous forced air ventilation, the employer may be exempted from some requirements, such as permits and attendants. However, even in these circumstances, the employer must test the internal atmosphere of the space for oxygen content, flammable gases and vapors, and the potential for toxic air contaminants before any employee enters it. The employer must also provide continuous ventilation and verify that the required measurements are performed before entry.

Written Programs

Any employer who allows employee entry into a permit space must develop and implement a written program for the space. Among other things, the OSHA standard requires the employer’s written program to:

- Implement necessary measures to prevent unauthorized entry;
- Identify and evaluate permit space hazards before allowing employee entry;

- Test atmospheric conditions in the permit space before entry operations and monitor the space during entry;
- Perform appropriate testing for the following atmospheric hazards in this sequence: oxygen, combustible gases or vapors, and toxic gases or vapors;
- Establish and implement the means, procedures and practices to eliminate or control hazards necessary for safe permit space entry operations;
- Identify employee job duties;
- Provide and maintain, at no cost to the employee, personal protective equipment and any other equipment necessary for safe entry and require employees to use it;
- Ensure that at least one attendant is stationed outside the permit space for the duration of entry operations;
- Coordinate entry operations when employees of more than one employer are working in the permit space;
- Implement appropriate procedures for summoning rescue and emergency services, and preventing unauthorized personnel from attempting rescue;
- Establish, in writing, and implement a system for the preparation, issue, use and cancellation of entry permits;
- Review established entry operations annually and revise the permit space entry program as necessary; and
- Implement the procedures that any attendant who is required to monitor multiple spaces will follow during an emergency in one or more of those spaces.

Controlling Hazards

The employer's written program should establish the means, procedures, and practices to eliminate or control hazards necessary for safe permit space entry operations. These may include:

- Specifying acceptable entry conditions;
- Isolating the permit space;
- Providing barriers;
- Verifying acceptable entry conditions; and
- Purging, making inert, flushing or ventilating the permit space.

Equipment for Safe Entry

In addition to personal protective equipment, other equipment that employees may require for safe entry into a permit space includes:

- Testing, monitoring, ventilating, communications and lighting equipment;
- Barriers and shields;
- Ladders; and
- Retrieval devices.

Detection of Hazardous Conditions

If hazardous conditions are detected during entry, employees must immediately leave the space. The employer must evaluate the space to determine the cause of the hazardous atmosphere and modify the program as necessary.

When entry to permit spaces is prohibited, the employer must take effective measures to prevent unauthorized entry. Non-permit confined spaces must be evaluated when changes

GEAPS, NGFA Develop Safety DVD

The Grain Elevator & Processing Society (GEAPS) and the National Grain & Feed Association (NGFA) are developing a new safety education DVD and training materials for employees of grain handling, feeding manufacturing and grain processing operations. The new safety DVD and training materials are expected to be available in June.

The need for the DVD was identified by the NGFA/GEAPS Safety, Health & Environmental Quality Committee, which noted that an up-to-date training video on general safety practices for the grain, feed and processing industry currently does not exist, the announcement said.

The committee also noted that fatalities and injuries resulting from events such as engulfment in grain bins are a reminder that despite the great strides made in reducing the occurrences of fires and explosions in facilities over the last 25 years, safety challenges still remain. Further, the committee believes the new DVD will help meet the challenge of training new employees given job turnover and the increasing diversity in the workplace, the announcement said.

The new 30-minute DVD, which will also be available in Spanish, will address a number of topics, including:

- Fires and explosions;
- Confined space and bin entry;
- Truck and rail safety (such as fall protection);
- Safe operation of equipment (such as proper lockout and tagout procedures);
- Ladder safety;
- Manlifts;
- Electrical safety;
- Personal protective equipment;
- Hazard communication;
- First aid;
- Emergency action plans; and
- Facility security.

Both the National Grain & Feed Foundation and GEAPS have pledged \$10,000 each in upfront investments to finance a portion of the cost of the DVD and associated training materials.

The DVD package will cost \$100 per package for one to five copies, \$80 per package for six to ten copies, and \$70 per package for more than ten copies. English and Spanish versions and supplemental training materials are also included.

For more information, or to preorder call NGFA at 202-289-0873.

occur in their use or configuration and, where appropriate, must be reclassified as permit spaces.

A space with no potential to have atmospheric hazards may be classified as a non-permit confined space only when all hazards are eliminated in accordance with the standard. If entry is required to eliminate hazards and obtain data, the employer must follow specific procedures in the standard.

Informing Contract Employees

Employers must inform any contractors whom they hire to enter permit spaces about:

- The permit spaces and permit space entry requirements;
- Any identified hazards;
- The employer's experience with the space, such as knowledge of hazardous conditions; and
- Precautions or procedures to be followed when in or near permit spaces.

When employees of more than one employer are conducting entry operations, the affected employers must coordinate entry operations to ensure that affected employees are appropriately protected from permit space hazards. The employer also must give contractors any other pertinent information regarding hazards and operations in permit spaces and be debriefed at the conclusion of entry operations.

Entry Permits

A permit, signed by the entry supervisor, must be posted at all entrances or otherwise made available to entrants before they enter a permit space. The permit must verify that pre-entry preparations outlined in the standard have been completed. The duration of entry permits must not exceed the time required to complete an assignment.

Entry permits must include:

- Name of permit space to be entered, authorized entrant(s), eligible attendants and individuals authorized to be entry supervisors;
- Test results;
- Tester's initials or signature;
- Name and signature of supervisor who authorizes entry;
- Purpose of entry and known space hazards;
- Measures to be taken to isolate permit spaces and to eliminate or control space hazards;
- Name and telephone numbers of rescue and emergency services and means to be used to contact them;
- Date and authorized duration of entry;
- Acceptable entry conditions;
- Communication procedures and equipment to maintain contact during entry;
- Additional permits, such as for hot work, that have been issued authorizing work in the permit space;
- Special equipment and procedures, including personal protective equipment and alarm systems; and
- Any other information needed to ensure employee safety.

Cancelled Entry Permits

The entry supervisor must cancel entry permits when an assignment is completed or when new conditions exist. New conditions

must be noted on the canceled permit and used in revising the permit space program. The standard requires that the employer keep all canceled entry permits for at least one year.

Worker Training

Before the initial work assignment begins, the employer must provide proper training for all workers who are required to work in permit spaces. After the training, employers must ensure that the employees have acquired the understanding, knowledge and skills necessary to safely perform their duties. Additional training is required when:

- The job duties change;
 - A change occurs in the permit space program or the permit space operation presents any new hazard; and
 - An employee's job performance shows deficiencies.
- In addition to this training, rescue team members also require training in CPR and first aid. Employers must certify that this training has been provided.

After completion of training, the employer must keep a record of employee training and make it available for inspection by employees and their authorized representatives. The record must include the employee's name, the trainer's signature or initials and dates of the training.

Assigned Duties

Authorized Entrant

Authorized entrants are required to:

- Know space hazards, including information on the means of exposure such as inhalation or dermal absorption, signs of symptoms and consequences of the exposure;
- Use appropriate personal protective equipment properly;
- Maintain communication with attendants as necessary to enable them to monitor the entrant's status and alert the entrant to evacuate when necessary;
- Exit from the permit space as soon as possible when:
 - Ordered by the authorized person;
 - He or she recognizes the warning signs or symptoms of exposure;
 - A prohibited condition exists; or
 - An automatic alarm is activated.
- Alert the attendant when a prohibited condition exists or when warning signs or symptoms of exposure exist.

Attendant

The attendant is required to:

- Remain outside the permit space during entry operations unless relieved by another authorized attendant;
- Perform non-entry rescues when specified by the employer's rescue procedure;
- Know existing and potential hazards, including information on the mode of exposure, signs or symptoms, consequences and physiological effects;
- Maintain communication with and keep an accurate account of those workers entering the permit space;
 - Order evacuation of the permit space when:

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OSHA Cites Texas Facility for Violations Following Fatality

The Occupational Safety and Health Administration (OSHA) has cited Victoria-Calhoun Grain Co., in Placedo, Texas, on March 31 following a worker's fatality, with three alleged willful and 32 serious violations of safety standards at the company's grain storage facility.

"Employers must ensure employees are fully trained and protected from all hazardous conditions in and around grain storage units," said Michael Rivera, OSHA's area director in Corpus Christi, Texas. "In this case, the employee was walking on top of the grain using a pole to loosen it. When the grain collapsed beneath him, he became engulfed and suffocated."

OSHA's Corpus Christi Area Office began its investigation Oct. 1, 2008, at the company's facility on Main Street in Placedo. The investigation found willful violations including failing to provide lockout/tagout safeguards during confined space entry and failing to provide workers with personal protective equipment. OSHA defines a willful violation as one committed with intentional disregard of, or plain indifference to, the requirements of the Occupational Safety and Health Act.

Serious violations include failing to train employees about hazardous conditions associated with grain storage facilities and confined space entry, to ensure that floor openings holes were properly guarded and to implement a respiratory protection program. A serious citation is issued when there is substantial probability that death or serious physical harm could result from a hazard about which the employer knew or should have known.

Victoria-Calhoun Grain, which employs about 25 workers at its Placedo location, is an agricultural storage facility engaged in buying, receiving and marketing grain, such as corn, sorghum and oats, from farmers.

OSHA has proposed \$109,050 in penalties against the company for the safety violations. The company has 15 business days from receipt of the citations to comply, request an informal conference with OSHA's area director in Corpus Christi or contest the citations and proposed penalties before the independent Occupational Safety and Health Review Commission.

GEAPS Announces 2008 Safety Award Winners

The Grain Elevator and Processing Society (GEAPS) honored 418 facilities from 31 companies at Exchange 2009 for their outstanding safety records last year. Together, the facilities posted over 12 million personnel hours without a work-related lost-time injury or illness during 2008.

Kevin Danner, chairman of the joint GEAPS-NGFA Joint Committee on Safety, Health & Environmental Quality, praised the participants for their skill and dedication to safety. Danner presided over the awards during the GEAPS annual meeting in St. Louis on March 3.

"Twelve months of facility safety is a significant achievement, and doing so without any lost time is particularly worthy of note," said Danner, before naming the qualifying companies.

GEAPS also honored companies and facilities with extended records of achievement in safety. One of the awards went to the top five facilities, measured through the years in terms of cumulative hours without a lost-time injury or illness. Winners honored at the Exchange were:

Number 5: Cargill Grain & Oilseeds' Houston Export Elevator in Houston, Texas

Number 4: The Andersons' facility in Champaign, Illinois

Number 3: Farmers Grain Terminal's facility in Greenville, Missouri

Number 2: Bunge North America's facility in Decatur, Illinois

Number 1: Bunge North America's facility in Atchison, Kansas, with 1.06 million hours.

Honors were also given to facilities for the number of consecutive years they've received a GEAPS safety award. There was a four-way tie for fifth place among facilities that have gone 20 years without a lost-time work-related injury or illness. They are:

- Cargill Grain & Oilseeds' Albany Hudson River Terminal facility in Albany, New York;
- The Scoular Co's facility in Lamar, Nebraska;
- Bunge North America's facility in Newport, Arkansas; and
- The Scoular Co's facility in Sidney, Nebraska.

There was also a four-way tie for fourth place among facilities that have each gone 22 years without a lost-time work-related injury or illness. They are all Bunge North America facilities, located in Hickman, Kentucky; Huffman, Arkansas; LaGrange, Missouri; and Yazoo City, Mississippi.

In third place was Cargill AgHorizons' facility in Tipton, Indiana, which has gone 23 years without a lost-time work-related injury or illness.

In second place was Bunge North America's Fountain Bluff facility in Grand Tower, Illinois, with 26 years without a lost-time work-related injury or illness.

Bunge North America's DeSoto Landing facility in Arkansas City, Arkansas, came in first for consecutive years. The facility has gone 30 years without a lost-time work-related injury or illness.

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Safety in Confined Spaces (continued from page 4)

- A prohibited condition exists;
- A worker shows signs of physiological effects of hazard exposure;
- An emergency outside the confined space exists; and
- The attendant cannot effectively and safely perform required duties.
- Summon rescue and other services during an emergency;
- Ensure that unauthorized people stay away from permit spaces or exit immediately if they have entered the permit space;
- Inform authorized entrants and the entry supervisor if any unauthorized person enters the permit space; and
- Perform no other duties that interfere with the attendant's primary duties.

Entry Supervisor

Entry supervisors are required to:

- Know space hazards including information on the mode of exposure, signs or symptoms and consequences;
- Verify emergency plans and specified entry conditions such as permits, tests, procedures and equipment before allowing entry;
- Terminate entry and cancel permits when entry operations are completed or if a new condition exists;
- Verify that rescue services are available and that the means for summoning them are operable;
- Take appropriate measures to remove unauthorized entrants; and
- Ensure that entry operations remain consistent with the entry permit and that acceptable entry conditions are maintained.

Emergencies

Rescue Service Personnel

The standard requires employers to ensure that responders are capable of responding to an emergency in a timely manner. Employers must provide rescue service personnel with personal protective and rescue equipment, including respirators, and training in how to use it. Rescue service personnel also must receive the authorized entrants training and be trained to perform assigned rescue duties.

The standard also requires that all rescuers be trained in first aid and CPR. At a minimum, one rescue team member must be currently certified in first aid and CPR. Employers must ensure that practice rescue exercises are performed yearly and that rescue services are provided access to permit spaces so they can practice rescue operations. Rescuers also must be informed of the hazards of the permit space.

Harnesses and Retrieval Lines

Authorized entrants who enter a permit space must wear a chest or full body harness with a retrieval line attached to the center of

their backs near shoulder level or above their heads. Wristlets may be used if the employer can demonstrate that the use of a chest or full body harness is not feasible or creates a greater hazard.

Also, the employer must ensure that the other end of the retrieval line is attached to a mechanical device or a fixed point outside the permit space. A mechanical device must be available to retrieve someone from vertical type permit spaces more than five feet (1.524 meters) deep.

MSDS

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

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