What is confined space?

The information contained in this publication is not intended to be a comprehensive review of the Occupational Safety and Health Administration's (OSHA's) confined space compliance requirements. Specific detailed information concerning compliance matters may be obtained by consulting the standard. (29 CFR 1910.146).

Background and definitions

Working in a confined space requires knowledge of potential hazards, proper procedures and the right protective equipment. Too often, workers enter a pit or a tank and are overcome by deadly or toxic gases or vapors. To compound the tragedy, a coworker, sensing something is wrong enters the same confined space with little thought for his or her safety, resulting in multiple deaths.

No one checked the space to make sure there was enough oxygen or there was no toxic vapor or gas remaining in the tank. This is only one of many scenarios that produce similar undesirable outcomes. Suppose a tank being dismantled had once contained an explosive chemical. Striking the cutting torch would be disastrous. Or suppose an agitator starts suddenly because the lockout fails.

These cases are more than what-ifs. If you've ever entered a confined space you know the countless hazards waiting to cause a catastrophe — unless you follow proper procedures precisely.

OSHA's compliance requirements are a basis for developing effective confined space programs. Examine the standard carefully for specific information that will save lives. The following is a general overview of confined space entry.

Confined space programs must include:

- Measures necessary to prevent unauthorized entry;
- Means to identify and evaluate hazards associated with confined spaces;
- Procedures and practices necessary for safe entry and operations;
- Appropriate equipment to accomplish the job safely;
- Pre-entry evaluation procedures and continued monitoring procedures during entry for oxygen, flammable gases or vapors and toxic gases or vapors;
- Attendant or attendants stationed outside the confined space having specific responsibilities;
- Specifically named authorized entrants, attendants, entry supervisors or persons who test and monitor entry conditions; identify the responsibilities for each function;
- Procedures for summoning rescue and emergency personnel;
- A permit system for authorizing entry;
- Procedures for concluding or securing entry operations;
- Program review and evaluation procedures, both following entry operations and as an annual process.

According to OSHA, a confined space, is large enough and constructed so an employee can enter and perform assigned work, has limited or restricted means of entry and exit, and is not meant for continuous employee occupancy.

OSHA says it's a permit-required confined space if it:

- Contains or can potentially contain a hazardous atmosphere;
- Contains a material that has the potential for engulfing — essentially drowning, strangling or crushing — an employee allowed in the space;
- Is structured so it's possible for someone to be trapped or asphyxiated;
- Contains any other recognized serious safety or health hazard.

Examples of confined spaces include a storage tank, silo, storage bin or hopper, vault, vat or pit. Depending on the former uses of these spaces, potential hazards can include toxic vapors, gases or liquids; flammable gases; insufficient oxygen; and electric shock. Other potential hazards may include

flowing solid materials like grain, fly ash and sand; agitators, mixers, augers, pumps or valves that can activate mechanical equipment; and physical hazards, such as slippery surfaces or sharp objects.

General requirements

If employers determine the workplace contains permit-required confined spaces, they should inform workers of the existence, location and danger. Employers can rule that employees will not enter permit-required spaces. In these cases, employers have to take effective measures to prevent entry and comply with other standard requirements.

On the other hand, if employees will enter permit-required spaces, companies should develop and implement a written program, which must be available to employees or their representatives.

Employers have options for ensuring safe entry into confined spaces. A confined space program must include procedures for preventing entry, evaluating hazards, safe entry and operations, using appropriate equipment to accomplish the job safely and pre-entry evaluation. Continued monitoring for oxygen, flammable gases or vapors, and toxic gases or vapors is strongly recommended.

The program also must include procedures for attendants stationed outside the confined space with specific responsibilities and for having specifically named authorized entrants, attendants, entry supervisors or persons who test and monitor entry conditions.

Beyond that, each function has defined responsibilities. Who summons rescue and emergency personnel? Who handles the permit system for authorizing entry? Who is responsible for procedures for concluding or securing entry operations? Who reviews the program and evaluates procedures, both following entry operations and annually? Employers also must determine that the rescue service used will be timely and available during the permit space entry.

Training requirements

Employers must provide training to all workers who might be involved with confined-space entry operations before they are first assigned duties associated with confined spaces. Documentation for the training includes workers who are certified and the dates of training.

Permit system

Employers must have a standardized permit system for confined space entry. If designed properly, the permit itself contains information necessary to ensure a safe completion of the job. The information is specific and applies only to one job, not a series of jobs. Post the permit outside the entry to the confined space.

The permit must contain the following information:

- Identity of the permit space;
- Purpose of entry;
- Date of entry and the authorized duration;
- Authorized entrants;
- Eligible attendants;
- Individuals eligible to be in charge of the entry process;
- Signature of the person authorizing entry;
- Hazards of the permit space;
- Measures for isolation of the permit space;
- Measures such as lockout/tagout, purging or inerting, that are used to remove or control hazards;
- Acceptable environmental conditions, quantified with regard to the hazards identified in the permit space;
- Testing and monitoring equipment and procedures used to verify all acceptable environmental conditions are maintained;
- Rescue and other services that would be summoned;
- Communication procedures and equipment to be used;
- Personal protective equipment required.

NOTE: If hot work is required as part of the work to be done, use a separate hot-work permit.

See 29 CFR 1910.146 (f) for further details on confined-space entry permits.

Pre-entry operations

Before anyone enters the permit space, take precautions to prevent the entrance of inert gases, flammable or hazardous materials by blanking or valving off, in conjunction with a lockout system. Test the air within the space for oxygen deficiency, flammable gases or vapors and toxic materials. If you identify a hazardous condition, take steps to eliminate or alleviate the condition, such as purging the space with steam, water, air or an inert gas. The use of steam can, and the use of inerting gas certainly will, cause oxygen deficiency. So if you use these, good air ventilation should follow. Lock out and tag all energy sources — electrical, pneumatic, hydraulic, steam and gravity. In addition, block moving equipment.

Entry operations

Station a trained attendant immediately outside the space. Ventilation fans, or blowers and hoses, may be necessary to keep the atmosphere inside the space within safe limits. You should conduct confined-space atmospheric testing and record the results. To perform the needed tasks, non-sparking, pneumatic and/or low voltage electrical equipment may be necessary.

To increase safety, compressed gas cylinders, except for self-contained breathing apparatus cylinders, must remain outside the space. Those entering the space should use a full-body harness with a lifeline attached and have a communication system in place.

Personal protective equipment, such as coveralls, chemical protective clothing, safety eyewear, hearing protection, hard hat, gloves, boots, respiratory equipment and leathers, if welding, might be necessary.

Working in permit-required confined spaces is a difficult assignment, with dozens of potential hazards. It takes time to prepare the space, to negate the hazards, maybe as much time as it takes to perform the job. However, if climbing safely out of the space is one of the expected outcomes, following OSHA's guidelines is just part of the job.