CONFINED SPACES

Understanding the Changes to ANSI/ASSP Z117.1

By Terry W. Krug and Terry L. Ketchum

This article discusses confined spaces in the workplace and explains the changes in the 2022 revised standard ANSI/ASSP Z117.1, Safety Requirements for Entering Confined Spaces.

Many occupational environments require the safe performance of hazardous work. This includes work in enclosed spaces or equipment, or confined spaces where hazards may exist because of the materials being used, preparation of the environment, condition of the space or structural integrity or equipment in use including pipes, valves or moving parts such as fan blades or walls and floors.

The ANSI/ASSP Z117.1, Safety Requirements for Entering Confined Spaces, national consensus standard provides minimum safety requirements to be followed while entering and working in confined spaces at ambient atmospheric pressure. In the 2022 version of the standard, the standard development committee reviewed data from OSHA's fatality database (2019, the most current data available) to include federal and state cases involving workers who have died on the job. From this data, cases involving confined spaces were extracted, and only those involving asphyxiation and poisons such as possible atmospheric hazards (e.g., oxygen deficiency, carbon monoxide, hydrogen sulfide), or engulfments (e.g., grain, water), falls and mechanical hazards were used. Mining the data shows that asphyxiants and toxic atmospheres are the leading cause of death in confined spaces, with engulfment in grain silos and storage bins a close second.

Defining a Confined Space

A confined space is an enclosed area large enough and configured to allow a person to bodily enter and has the following characteristics: 1. the primary function is other than human occupancy; and 2. has restricted entry and exit. Restricted entry and exit is a physical configuration that requires the use of hands for support or contortion of the body to enter into or exit from a confined space.

Examples of confined spaces include tanks, silos, vessels, pits, sewers, pipelines, penstock, boilers, septic tanks, utility vaults, tank cars and other mobile containers. Temporary structures also must be evaluated to determine whether they meet the definition of a confined space.

A confined space is classified as either a non-permit confined space (NPCS) or a permit-required confined space (PRCS). Simply stated, a PRCS is a confined space that after evaluation is found to contain actual or potential serious hazards and, due to the severity of the hazards, requires written authorization (permit) for entry.

Major Changes to Z117.1-2022

Several significant changes and additions were made to Z117.1-2022. OSHA's standard 1926 CFR Part 1201 to 1213, Confined Spaces in Construction, took effect in August 2015 and NFPA 350, Guide for Safe Confined Space Entry and Work, was published in 2016. The Z117.1 committee had to ensure that the ANSI standard was up to date with these requirements. Additionally, practices performed by the committee members in confined spaces and advancement in test instruments, ventilation equipment and rescue equipment necessitated an update to procedures published in previous editions. Following are summaries of significant changes and additions to the Z117.1 standard.

1. The look of Z117.1 has been updated. Previous versions had a two-column format, the first column being the standard with its requirements (i.e., "shalls") and the second column designated as explanatory information intended to clarify the standard. The revised standard uses a single column with explanatory information included as notes (italicized). The single-column format provides the user an easier read, particularly on various electronic devices (e.g., cell phone, tablet).

2. The new edition added to and clarified the definitions of terms in Section 2, including "entry supervisor" (a qualified person given the authority and responsibility to direct and implement all aspects of the confined space entry operation) and "qualified person" (a person who by reason of training, education and experience is knowledgeable in the operation to be performed and is competent to judge the hazards involved and specify controls and/or protective measures. A qualified person can provide technical guidance to the entry supervisor, who is a qualified person). These changes and clarifications were made to support the practice that the entry supervisor can rely on other technical resources (qualified person) to assess confined spaces hazards and recommend required controls and protective measures.

3. Section 4, Non-Permit Confined Spaces, is unique to the Z117.1 standard. No other standard discussing confined spaces, regulatory or recommended, requires procedures for entering non-permit spaces. The committee firmly believes that even though an NPCS meets the definition of confined space it does not meet the definition of permit space, and because of the enclosed nature of the space, hazards can suddenly appear, and some may even be fatal. Therefore, the standard recommends safe working procedures be developed and used even for entering NPCS. The

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committee expanded this section and clarified previous paragraphs to help the reader understand why Section 4 is so important. This section is discussed later in the article.

4. Section 6, Atmospheric Testing, was revised and expanded to improve the user's understanding of the testing needs, how to ensure that the test instrument is functioning properly and how to use the test instrument. Understanding atmospheric hazards or potential hazards is a key element in assessing a confined space prior to and during entry. Thus, a thorough knowledge of the testing required, tools needed, use of the equipment and verifying proper functioning supports accurate monitoring of the atmosphere.

5. Section 10, Cleaning/Decontamination, has been expanded and clarified. It addresses cleaning and decontamination of hazardous material in the confined space to the extent feasible before entry and equipment and personnel exiting the space so that other areas, coworkers and the environment are not further contaminated. These decontamination procedures also ensure that the entry team members are not transporting hazards to their vehicle or home. The goal is to prevent any transfer of contamination outside the work area.

6. The training requirements in Section 15, Entry Team Training, were revised and clarified. The successful entry and closure of a confined space activity is a function of the entry team's experience and readiness. Section 15 details the training requirements.

7. Section 17, Contractors, has been expanded to include more requirements for both the host and contractor, and Appendix E was added to ensure that the contractor knows what is required by law. Additional information was added to provide and enhance the user's knowledge of the host's and the contractor's responsibilities.

8. References in Appendix B, Standards and Other Referenced and Related Materials on the Subject of Confined Spaces, were updated to reflect current standards and document numbers. The references provide additional resources to support the development, implementation and maintenance of an effective confined space program.

9. Appendix D was expanded to include examples of confined space training best practices, PPE issues and current references and instrument functional verification. This appendix and the other appendices provide additional information to support the user's confined space program either in the development or implementation stages.

10. Appendix E, Example Contractor Competency Questions, was added. It provides questions to assist in evaluating a contractor's competency to perform confined space work. These questions are provided as an addition to an organization's established contractor qualification procedure. Appendix E is a tool to help review and assess a contractor's competency for conducting confined space work and support the host's due diligence for a safe entry.

The revised standard also includes various updates, clarifications and improvements to assist the user in creating or enhancing a confined space program.

What Is the Hierarchy of Controls for Hazards?

The Z117.1 committee and officers needed to ensure that this revised standard met or exceeded OSHA's hierarchy of controls, namely:

1. elimination of the hazard(s) that may cause injury or death to the entry team members;
2. substitution of existing very toxic dangerous chemicals or products with less toxic substances or products;
3. use engineering controls such as ventilation or technology to minimize or eliminate the risk (e.g., locate the shutoff valve outside of the space, install remote cameras to monitor activities);
4. work practices mandated to reduce employee's exposures or administrative controls of rotating personnel through the area so that no one person gets overexposed to any hazard; and
5. lastly, PPE.

These methods are woven through the newly revised Z117.1 standard. To start off, the standard requires that hazards be evaluated by a qualified person who is experienced in determining the presence and likelihood of a hazard existing that could be dangerous to entry team members. This qualified person is also the individual who classifies the space as a PRCS or an NPCS depending on the severity and likelihood of the hazard present. If the standard did not start out requiring the space to be evaluated by a qualified person, anyone could misclassify and overlook serious hazards that could put the entire entry team at risk.

To illustrate, suppose the qualified person identifies a serious hazard such as carbon monoxide from the exhaust of a portable generator, placed in the space by a worker who thought they needed electricity to run the portable compressor used for cleaning and spotlights to inspect their work. The qualified person can easily remove the generator from the space and locate it outside away from the opening, thus eliminating the hazard.

In another example, instead of using paint stripper containing methylene chloride, use water-based stripper that contains fewer toxic chemicals or a paint remover that uses chemicals without a threshold limit value or permissible exposure limit. The product may have to be left on longer to increase contact time or applied a couple of times, but it is a lot safer. The employer can do the research and find safer products to use; it just takes a little more effort.

Engineering controls for most confined space hazards are available in industry. The employer must do the research by searching the internet or seeking information from other employers doing the same work about what works best for them (i.e., sharing best practices or lessons learned). Safety and health conferences and trade shows are great opportunities for understanding how other companies are conducting confined space activities, and learning

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The revised Z117.1 standard provides the user with the information and tools to successfully implement a confined space program.

about the current technology available that may provide better solutions.

Performing a job task the same way over and over, day after day, helps an employee gain experience and become more efficient at the task. However, when observing an employee's work activity, another supervisor or laborer who performed similar work in a different company or area may be able to offer shortcuts or solutions to help the person by using a work practice or special tool to make the job faster, safer or less strenuous. Often, work practices can be changed or modified with special tools or equipment. Examples are vacuuming instead of sweeping, or using a rake to pick up leaves instead of a leaf blower.

The Z117.1 standard recommends applying the preceding hierarchy of controls by eliminating or using engineering controls, instrumentation to identify hazards and ventilation to supply oxygen or dilute the hazard. The standard's appendices were created to improve both employer and employee awareness of how to successfully control these hazards. However, if efforts cannot control those hazards to an acceptable level, then the proper PPE must be provided to the entry team member as a last resort of minimizing the hazard. If PPE is required, it is critical that the equipment selected both adequately protects and properly fits the personnel wearing it.

It is easy to select the cheapest dust mask or respirator, only purchase one size and not fit test the employee or instruct them on how to don and doff the respirator or when to change replaceable cartridges or filters. Full-body harnesses are needed for fall protection. Unfortunately, some employers select the cheapest harness and only provide one size and do not adequately train the user. For PPE to work well, there are many actions that the employer must perform to ensure that this last line of defense is effective. The Z117.1 standard addresses many of these concerns in the body of the standard and in the appendices and aims to provide advice and questions to help the employer and employees follow best practices.

The Path Forward

The revised Z117.1 standard provides the user with the information and tools to successfully implement a confined space program. A practical and compliant program involves knowledge of confined spaces in the workplace; a written assessment of the hazards that are or may be present; the methodology to eliminate the hazards to an acceptable level (e.g., ventilation, fall protection, control of hazardous energy); training to enter and monitor the entry; and lastly, procedures for responding to an emergency. **PSJ**

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Learn more about the Z117.1 standard at https://assp.us/3mOJzY4.