AMERICAN NATIONAL STANDARD

ANSI/ASSE Z117.1-2009

Safety Requirements
for Confined Spaces

ANSI/ASSE Z117.1-2009

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American National Standard

Safety Requirements for Confined Spaces

Secretariat

American Society of Safety Engineers
1800 East Oakton Street
Des Plaines, Illinois 60018-2187

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American National Standard

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Foreword (This Foreword is not a part of American National Standard Z117.1 – 2009.)

This standard was developed by an American National Standards Committee, national in scope, functioning under the procedures of the American National Standards Institute with the American Society of Safety Engineers (ASSE) as Secretariat. This standard provides minimum safety requirements to be followed while entering, exiting and working in confined spaces at normal atmospheric pressure.

It is intended that the procedures and performance requirements detailed herein will be adopted by every employer whose operations fall within the scope and purpose of the standard.

Neither the standards committee, nor the secretariat, feel that this standard is perfect or in its ultimate form. It is recognized that new developments are to be expected, and that revisions of the standard will be necessary as the art progresses and further experience is gained. It is felt, however, that uniform requirements are very much needed and that the standard in its present form provides for the minimum performance requirements necessary in developing and implementing a comprehensive confined space program for the protection of personnel.

In 1993 OSHA estimated that 238,000 establishments had permit required confined spaces. These establishments employed approximately 1.6 million workers, including contractors, who entered 4.8 million permit-required confined spaces annually. OSHA further estimated that 63 fatalities and 13,000 lost workdays and non-lost workday cases involving confined spaces entry occurred annually.

OSHA and NIOSH data during the period 1980-1993 indicates atmospheric conditions were the leading cause of death associated with confined space entry. The data indicates that oxygen deficiency, hydrogen sulfide, methane, and inert gases ranked as the leading specific atmospheric hazardous conditions. Engulfment was found to be second in terms of occurrence. Mechanical asphyxiation from loose materials such as grain, agricultural products, sand, cement, and gravel was dominant. Evidence suggests that the cause of death associated with confined space entry has not changed appreciably during recent years.

During revision of the 2003 version of the standard, the Z117 ASC reviewed current data and information addressing confined space incidents. A review of 200 confined space fatality cases from the Federal OSHA database occurring between 1993 and 2004 confirms that the distribution of causes has not changed to any significant degree. Approximately 65% of incidents with fatalities involved atmospheric contamination. Engulfment accounted for less than 10% of the identified causes.

It should be understood that the fatality cases in this sampling do not represent all U.S. confined space incidents resulting in fatalities. The mining, agriculture, and maritime sectors as well as various states with their own primary jurisdiction for safety and health enforcement are likely to be the source of many more cases not discussed within the Foreword of the Z117.1 Standard. Upon review of this data, much remains to be done, particularly in regards to verification of atmospheres for entrants prior to and during confined space activity.

The Z117 Committee acknowledges the critical role of design in influencing the safe entry of confined spaces. The failure to incorporate safety during the design process and overlooked design deficiencies can often increase the risk for entrants: examples are (1) means of entry (portals, hatchways, etc.) which are too small, improperly located, or that complicate/inhibit escape; (2) spaces which are convoluted, unnecessarily obstructed, or hazardously configured; (3) internal clearances which are too tight for safe passage; (4) space penetration distances which are excessive without alternative means of access or escape; (5) absence of appropriate devices to isolate all energy sources from the space; (6) no provision for vessel mechanisms/devices to prevent loose materials from bridging, compacting, etc. (7) lack of features that would enhance space ventilation effectiveness; (8) structural weaknesses in walls, floors, ceilings, or pipes containing gases, liquids, or steam, or which increase hazard risk to entrants while

working or coming in contact with stated structures in confined spaces; (9) absence of anchor points for retrieval devices.

The standard does not attempt to address these issues. It is believed they are best dealt with by the purchaser, employer, or owner during a project's design, acquisition, or construction. However, it is recommended that designers, manufacturers, and users make confined space design issues a priority when new or modified machinery, equipment, processes or facilities are contemplated.

For existing confined spaces, which have recognized design deficiencies, it should be the responsibility of those authorizing entry to either:

- modify or correct the deficiencies when possible, or
- employ alternate means to accomplish the work without exposing personnel, or
- develop and implement specific safe entry procedures for each confined space, or
- dismantle, open, remove, etc. the equipment/process rather than enter if the risk is deemed unacceptable.

The Z117 Committee solicits public input that may suggest revisions to the Standard. Such input should be sent to the Secretariat, American Society of Safety Engineers, 1800 East Oakton Street, Des Plaines, IL 60018-2187.

This standard was processed and approved for submittal to ANSI by American National Standards Committee on Confined Spaces Z117. Committee approval of the standard does not necessarily imply that all committee members voted for its approval. At the time it approved that standard, the Z117 Committee had the following members:

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Timothy R. Fisher, CSP, CHMM, ARM, CPEA, Secretary
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Explanation of Standard

American National Standard Z117.1 uses a two-column format to provide both specific requirements and supporting information.

The left column, designated "Standard Requirements," is confined solely to these requirements. The right column, designated "Explanatory Information," contains only information that is intended to clarify the standard. This column is not a part of the standard.

Operating rules (safe practices) are not included in either column, unless they are of such a nature as to be vital safety requirements, equal in weight to other requirements, or guides to assist in compliance with the standard.

AMERICAN NATIONAL STANDARD Z117.1
SAFETY REQUIREMENTS FOR CONFINED SPACES

STANDARD REQUIREMENTS	EXPLANATORY INFORMATION *(Not part of American National Standard Z117.1)*
1. GENERAL	
1.1 Scope. This standard provides minimum safety requirements to be followed while entering, exiting and working in confined spaces at normal atmospheric pressure.	**E1.1** The scope of this standard does not address confined space design issues. Please see the Foreword of this standard for additional general information addressing confined space design.
1.2 Exceptions. This standard does not pertain to underground mining, tunneling, caisson work, intentionally inert confined spaces, or other similar tasks that have established national consensus standards.	
1.3 Purpose. The purpose of this standard is to establish minimum requirements and procedures for the safety and health of employees who work in, and in connection with, confined spaces.	**E1.3** This standard is a performance standard and, as such, is not intended to replace existing specific standards and procedures, but rather to support those that meet the performance objectives defined in this standard.
1.4 Application. This standard is designed for voluntary application immediately upon approval as an American National Standard.	
2. DEFINITIONS	
2.1 Attendant. Person assigned to monitor a confined space process or operation and provide support or react as required for the safety of the entrants.	
2.2 Biological Hazards. Microbial agents presenting a risk or potential risk to the well-being of humans through inhalation, ingestion, skin absorption, or injection.	**E2.2** Microorganisms may cause toxic release or an oxygen deficient atmosphere. Biological hazards may include, but are not limited to: infectious or parasitic agents; microorganisms such as some fungi, mold, yeasts and algae; plants and plant products, and animals and animal products, which cause occupational disease.