AMERICAN NATIONAL STANDARD

Safety Requirements for Confined Spaces

ANSI/ASSE Z117.1-2003

AMERICAN SOCIETY OF SAFETY ENGINEERS

ANSI®
Z117.1-2003

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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ANSI Board of Standards Review

American National Standard

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Foreword

(This Foreword is not a part of American National Standard Z117.1-2003)

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 establishes minimum safety requirements for confined spaces.

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 workday cases 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.

The Z117 Committee acknowledges the critical role of design in influencing the safe entry of confined spaces. Design deficiencies 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.

Suggestions for improvement of this standard will be welcome. They should be sent to the American Society Safety Engineers, 1800 East Oakton Street, Des Plaines, Illinois 60018-2187.

This standard was processed and approved for submittal to ANSI by American National Standards Committee on Confined Spaces Zl17. 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 Zl17 Committee had the following members:

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Contents

Explanation of Standard

American National Standard Z117.1-2003 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 and is printed in bold type. 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.

The information and materials contained in this publication have been developed from sources believed to be reliable. However, the American Society of Safety Engineers (ASSE) as secretariat of the ANSI accredited Z117 Committee or individual committee members accept no legal responsibility for the correctness or completeness of this material or its application to specific factual situations. By publication of this standard, ASSE or the Z117 Committee does not ensure that adherence to these recommendations will protect the safety or health of any persons, or preserve property.

American National Standard Safety Requirements for Confined Spaces

STANDARD REQUIREMENTS	EXPLANATORY INFORMATION *(Not part of American National Standard Z117.1-2003)*
1. ***Scope, Purpose, and Application***	
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 section of this standard for additional general information addressing confined space design.
Exception. 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.	
1.2 ***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.**	E1.2 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.
1.3 ***Application*****. This standard is designed for voluntary application immediately upon approval as an American National Standard.**	
2. ***Definitions***	
ATTENDANT. A person who is assigned to monitor a confined space process or operation and provide support or react as required to provide for the safety of the entrants and entry team.	
BIOLOGICAL HAZARDS. Microbial agents presenting a risk or potential risk to the well-being of humans through inhalation, ingestion, skin absorption, or injection.	Explanation: Microorganisms may cause toxic release or an oxygen deficient atmosphere. Bio 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.
BLINDING/BLANKING. Inserting a solid barrier across the open end of a pipe, or in between two flanges, leading into or out of the confined space, and securing the barrier in such a way to prevent leakage of material.	Explanation: A blank is designed as a flat plate between two flanges typically inside the flange bolt pattern (ASME B31.3 Paragraph 304.5.3). The blank must be sized for full design pressure (maximum non-shock pressure rating) of the line. A blind is designed as a bolted flat plate, which can be used to terminate a pipe line (ASME B3 1.3 Paragraph 304.5.2b).