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## Standard Practice for Confined Area Entry<sup>1</sup>

This standard is issued under the fixed designation D4276; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This practice covers recognized procedures necessary to protect the health and safety of workers required to enter confined spaces. These procedures are particularly applicable to entry into the confined areas associated with the use of halogenated organic solvents.

1.2 Confined areas addressed in this practice include, but are not limited to: vapor degreasers, cold cleaning tanks, storage vessels, tank cars and trucks, van trailers, ships or barges, pits or sumps, and unventilated rooms.

1.3 This practice does not necessarily address entry into all confined spaces nor does it address the decision strategy involved in requiring such entry.

1.4 Although this practice describes specific safety steps to be taken for entry into confined spaces, it is not intended to preclude the use of any additional measures that may be deemed necessary for a particular situation.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

### 2. Referenced Documents

2.1 *Code of Federal Regulations:*<sup>2</sup>

**CFR 1910.146 U.S. Department of Labor, Occupational Safety and Health Standards, Permit-Required Confined Spaces**

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee D26 on Halogenated Organic Solvents and Fire Extinguishing Agents and is the direct responsibility of Subcommittee D26.02 on Vapor Degreasing.

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<sup>2</sup> Available from U.S. Government Publishing Office, 732 N. Capitol St., NW, Washington, DC 20401, <http://www.gpo.gov>.

### 3. Summary of Practice

3.1 Confined area entry refers to the entering of any tank, vessel, sump, pit, duct, tank car, tank truck, van trailer, or enclosed space in which there has been, or may have been chemicals, chemical vapors, or a lack of ventilation.

### 4. Significance and Use

4.1 Vapor inhalation is the primary hazard encountered in the use of chlorinated solvents. The greatest potential for over exposure to these solvent vapors occurs where the employee is exposed to the high concentrations of vapor that may be found in confined areas. The seriousness of this hazard is often underestimated by those performing this type of work.

4.2 This practice is designed for use by employers in developing their own specific standards for vessel or confined area entry.

4.3 Many of these areas are considered as permit-required confined spaces as defined by OSHA (29 CFR 1910.146). The determination of the applicability of these requirements is the responsibility of the user.

4.4 This practice represents the minimum requirements for entry into any confined area containing halogenated solvents.

4.5 This practice does not address all of the requirements contained in the OSHA confined spaces standard. Development and implementation of training programs, recordkeeping, and other additional requirements of the OSHA standard are the responsibility of the user.

### 5. Procedure

5.1 All personnel working in confined areas must be properly trained in safe entry and rescue procedures. They must have a working knowledge and understanding of the hazards that may exist.

5.2 *Entry Permit*—Entry into confined areas must be by written entry permit, issued by the responsible supervisor or other qualified person. The purpose of the entry permit is to ensure that a checklist of precautions has been reviewed prior to entry. This permit is an authorization, and approval in writing certifying that all existing hazards have been evaluated and necessary protective measures have been taken to ensure the safety of the worker. The permit should be valid for a limited time only, (usually an 8 or 10 h shift) and issuance of

a new permit required in the event of any job interruption or any indication of changes in job conditions. Issuance of the entry permit must address all of the following considerations.

### 5.3 Area Preparation:

5.3.1 *Isolation*—All process lines exiting or entering the confined area must be disconnected, capped off, and blinded. Closing of valves alone is *not* adequate protection.

5.3.2 *Lockout*—Pumps or any other mechanical or electrical equipment (particularly conveyors), connected to the confined area, are to be locked out by locking the main electrical switch in the “OFF” position.

5.3.3 *Cleaning*—The space must be cleared, flushed, and purged of hazardous materials to the extent practical. This should be followed, where practical, by cleaning with water, steam, or other suitable materials.

5.3.4 *Ventilation*—A system for positive ventilation must be provided, prior to and during the entire entry period, through the use of fans, portavents, air movers, or by adequate natural drafts.

5.4 *Atmospheric Testing*—The confined area must be tested for the following prior to and during any entry:

5.4.1 *Oxygen Content*—The oxygen content must be between 19.5 and 22.0 % in all levels of the confined area.

5.4.2 *Flammability*—The atmosphere must be nonexplosive (less than 10 % of the lower flammable limit).

5.4.3 *Toxicity*—The atmosphere must be tested to ensure the absence of toxic concentrations of vapors.

5.5 *Personal Protective Equipment*—Personal protective equipment is not an adequate substitute for safe working conditions, adequate ventilation, or safe working practices.

5.5.1 Personal protective equipment can include, but is not limited to: approved respirator, hard hat, safety glasses or safety goggles, gloves, and long-sleeved shirts.

5.6 *Area Safety Equipment*—Any person entering the confined area must be fitted with a safety harness and lifeline. The lifeline must be secured outside the entrance.

5.6.1 Where entry into the confined area must be made through a top opening, a hoisting device or other effective means must be provided to lift employee out of the space.

5.6.2 Ladders must be in place for entrances and exits where the drop or climb involves a depth of more than 3 ft.

5.6.3 Self-contained breathing apparatus or supplied-air respirators must be available at the confined area entrance. These devices must be worn if testing finds the toxicity level to be above the OSHA limits.

5.7 *Attendant*—A second person must be available at the area entrance and in sight of the person inside at all times. He

must be equipped with proper safety equipment and adequate communications equipment for summoning additional help if necessary (for example, two-way radio, whistle, etc.). Under no conditions should this attendant enter the enclosed area unless others are standing by. If the observer is required to leave his post, the person inside the enclosed space must come out.

5.8 *Tools*—Approved low-voltage electrical equipment must be used where the atmosphere in the confined area may contain flammable vapors or where the atmosphere could contain solvent vapors within their flammable limits. All electrical circuits must be equipped with a ground-fault interruptor.

5.9 *Labeling*—Entrances to confined areas must be posted, identifying the area as a confined area and that a permit is required for entry. During the work, when there is more than one entrance to the confined area, signs indicating that workers are inside, posted at each entrance, are necessary.

## 6. Testing Procedures

6.1 The tests required prior to entry into a confined area make use of specialized equipment.

6.1.1 *Oxygen Content*<sup>3</sup>—Use a portable instrument that analyzes directly for oxygen irrespective of the solvent vapors present in the air.

6.1.2 *Flammability*—Measurement of the flammability of the atmosphere may be done using a combustible gas indicator.<sup>4</sup>

6.1.3 *Toxicity*—If the prior contents of the vessel are known, the remaining concentrations of those materials may be determined as follows: for methylene chloride, tri-chloroethylene, 1,1,1-trichloroethane, and perchloro-ethylene, use gas-detector tubes found in the NIOSH certified-equipment list.<sup>5</sup> A calibrated halide meter<sup>6</sup> may be used as an alternative. For trichlorotrifluoroethane, use either a portable flame-ionization gas chromatograph<sup>7</sup> or a portable IR analyzer.<sup>8</sup>

## 7. Keywords

7.1 confined areas; confined spaces; halogenated solvents

<sup>3</sup> Model OX230 Audible Alarm Oxygen Monitor, National Mine Service Co., Oakdale, PA, or equivalent.

<sup>4</sup> Explosimeters (registered trademark), Mine Safety Appliances, or equivalent.

<sup>5</sup> Available from the National Institute for Occupational Safety and Health, 5600 Fisher Lane, Rockville, MD 20857. Publication Number 99-109.

<sup>6</sup> GasTech Inc. or equivalent.

<sup>7</sup> OVA-108 or 128, Foxboro, or equivalent.

<sup>8</sup> MIRAN 101, Foxboro, or equivalent.