

**15.17 Scope:**

This section contains requirements for practices and procedures to protect personnel from the hazards of entry into a permit required confined space when performing rescue and recovery operations.

Confined space operations shall comply with NFPA 1670 Chapter 7 Confined Space standards and the OSHA CFR 1910.146 Standard.

**15.1701 Definition:**

Confined space: a space that:

- Is large enough and so configured that an employee can bodily enter and perform assigned work; and
- Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry.); and
- Is not designed for continuous employee occupancy.

Attendant: an individual stationed outside one or more permit spaces who monitors the authorized entrants and who perform all attendant duties assigned in this confined space standard operating guideline.

Authorized Entrant: an individual who is trained and authorized by the Fire Department to enter a permit space.

Entry: means the action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

Entry permit (permit): means the written or printed document that is provided by the employer to allow and control entry into a permit space and that contains the information specified in paragraph f of OSHA CFR 1910.146, Permit-required confined spaces.

Entry Supervisor: means the person responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required by this standard operating guideline. An entry supervisor may serve as an attendant or as an authorized entrant, as long as that person is trained and equipped as required by this section for each role he or she fills. Also, the duties of entry supervisor may be passed from one trained individual to another during the course of entry operation.

Hazardous Atmosphere: an atmosphere that may expose personnel to the risk of death, incapacitation, and impairment of ability to self-rescue injury or acute illness from one or more of the following causes:

- Flammable gas, vapor or mist in excess of 10 percent of its lower flammable limit (LFL);
- Airborne combustible dust at a concentration that meets or exceeds its LFL and/or which obscures vision at a distance of five (5) feet or less;
- Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent;
- Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published as a Toxic and Hazardous Substance and which could result in employee exposure in excess of its dose or permissible exposure limit;
- Carbon Monoxide concentration above 35 parts per million
- Hydrogen Sulfide concentration above 10 parts per million
- Any other atmospheric condition that is immediately dangerous to life or health.

Retrieval system: the equipment (including a retrieval line, chest or full-body harness, wristlets, if appropriate, and a lifting device or anchor) used for non-entry rescue of persons from permit space.

### **15.1702 First Arriving Unit:**

The first arriving officer shall establish command and begin a size-up. Command shall then assess the situation and if not already dispatched, shall request assistance from a mutual-aid confined space rescue team.

Also, if EMS has not already been dispatched, at least two advanced life support units shall be requested to stand-by on the scene.

### **15.1703 Size-up:**

Command shall make a careful size-up before deciding on an action plan. It may be necessary to take immediate action to make a rescue, but this should only be done if there is a retrieval system available that can be operated outside of the entrance to the confined space without placing fire department personnel at risk.

### **15.1704 Action Plan:**

Based on the initial size-up and any information available, Command will have to formulate an action plan to deal with the situation. Many times individuals will want action taken that could risk the lives of the rescue personnel.

The Action Plan should include the following:

- a. Isolate the scene and establish "Hot Zone" (working) 100' around access point, "Warm Zone" an additional 100' and "Cold" zone an additional 100'.
- b. Remove all "untrained rescuers" to the cold zone. This may require assistance from the Police Department.
- c. Find a responsible party and/or a witness to the accident.
- d. Locate the confined space entry permit or any other available information about the space.
- e. If possible, determine the number of victims and their potential location.
- f. Determine the length of time the victims have been down and their potential survivability.
- g. Determine if the situation is a rescue or recovery operation.
- h. Determine what potential hazards are associated with the confined space involved (hazardous materials, low oxygen levels, engulfment hazards, etc.)
- i. Ensure that proper shutdown and lockout/tag out procedures are followed for the confined space involved. Assistance shall be requested from plant personnel in an industrial situation. See 4.49 for lockout/tag out procedures.

Only confined space trained personnel are allowed to enter the confined space. If the victim is attached to a body harness and retrieval line, the rescuers may lift the victim from the confined space area. Caution must be used if it is determined that the victim is viable and further injury may occur during the rescue. Conditions may allow further medical treatment be provided to the victim before removal from the confined space. A body harness, seat harness, or wristlets may be lowered to an uninjured or slightly injured victim for removal from the confined space.

**15.1705 Operations:**

A new confined space rescue permit shall be opened by the fire department.

The incident commander must appoint an Entrant Supervisor. The entrant supervisor shall be responsible for maintaining personnel accountability inside the confined space. The entrant supervisor shall also be responsible to ensure that a confined space rescue permit has been completed prior to an authorized entrant entering the confined space and is responsible to ensure the permit remains current during the confined space occupancy and operation.

Prior to entrance in any confined space, initial atmospheric monitoring must be completed. Additional atmospheric monitoring must take place at least every 10 minutes at minimum and be recorded on the confined space rescue permit. Atmospheric monitoring shall be performed at the entrance of the confined space for at least 15-30 seconds, then mid-level in the confined space for a period of time allowing sample to draw up the hose, and then a third sample shall be taken at floor level. Allow adequate time for the instrument to draw the sample up the extended hose to conduct the analysis, typically 30-60 seconds.

Forced air ventilation shall be operational prior to entrant entering the confined space. The air supply for the force air ventilation shall be from a clean source and may not increase the hazards in the space.

Only properly trained personnel may be authorized entrants and may be allowed to enter the confined space. Prior to entrance a rapid intervention team shall be established with at least a ratio of 1:1. All members of the rapid intervention team must be trained as an authorized entrant.

All authorized occupants will wear a full body harness prior to entrance of the confined space and be equipped with SCBA or supplied breathing air. All authorized entrants shall have an individual retrieval system attached to their harness that shall not be removed upon entrance into the confined space.

Upon fire department incident termination the confined space rescue permit shall be closed. The confined space rescue permit shall not be transferred to the facility/responsible party. This permit will become a permanent part of the incident report.

**15.1706 Safety**

Specific hazards to be aware of in a confined space:

- a. Possible oxygen deficiency or enrichment.
- b. Possible concentrations of flammable gas or vapors.
- c. Deficiencies in lighting.
- d. Very tight spaces.
- e. Temperature-heat.
- f. Unexpected ignition sources.
- g. Engulfment hazards.
- h. Energy sources (electric, steam, air, hydraulic).

To provide adequate support for confined space incidents, a minimum ratio of 2 personnel shall be provided. For every authorized entrant working in the confined space, there shall be 2 personnel outside and available to assist.

A stand-by rescue team with a 1:1 ratio shall be provided for emergency assistance to the team working the confined space. This team shall be assembled and equipped for emergency response. The team shall be equipped with SCBA and ready to enter the confined space if needed.

The Incident Commander shall appoint a Safety Officer.

All personnel entering confined spaces shall use breathing apparatus unless it is determined through recognized air monitoring procedures that the space is free of hazards and sufficient oxygen levels are present. Either self-contained or airline supplied breathing apparatus may be used, depending on the situation. Personnel shall not remove face-pieces or take any other action to compromise the effectiveness of their breathing apparatus while inside the confined space atmosphere. The firefighters rescue harness must be worn under the SCBA. The free end of the lifeline shall be affixed outside the confined space in a manner to prevent it from being pulled inside.

Protective clothing shall be worn as required by the situation, depending on an evaluation of the hazards and the products that may be inside the confined space atmosphere. At minimum personnel must be in long pants, long sleeves, and steel toe boots and have head, eye and possible hearing protection.

When feasible, the Incident Commander shall establish Ventilation Group to begin operations directed at providing fresh air and/or exhausting contaminated air from the confined space. Any electrical or mechanical equipment taken inside the confined space, including lighting equipment, shall be an explosion proof type, when any flammable hazard is suspected. When ventilating a confined space containing flammable vapors or gases, ventilation shall consider the concentration in relation to the flammable limits.

Time awareness shall be maintained for each member in the confined space. Awareness of the expected exit time for each individual based on air supply at the time of entry shall be kept. A warning at the predetermined time shall be given to begin exit procedures. Warning will be provided by radio or other communication systems to team members.

Lifelines shall be used unless they cannot be safely used. The lifeline shall be tied to the firefighters rescue harness and not his/her breathing equipment.

### **15.1707 Communications:**

The entry team(s) shall maintain constant radio communications with the Operations officer and Entrant supervisor. Should radio communications fail or not be used, communication shall be maintained with the lifeline. The following rope signals shall be used to communicate basic messages:

- a. 1 pull on rope- O OK
- b. 2 pulls on rope- A Allow slack
- c. 3 pulls on rope- T Take up slack
- d. 4 pulls on rope- H Help

When using rope to communicate, remember the word O-A-T-H.

### **15.1708 Post-Incident Analysis:**

All personnel that participated in the emergency shall be required to attend the post incident analysis.