

Chapter 10

Confined Space Entry

10-1. General

a. There are confined spaces in industrial workplaces, many of which pose unique problems due to their contents and/or configuration. Some spaces pose entrapment hazards for entrants, while others restrict air circulation so that hazardous atmospheres may accumulate quickly. Confinement itself can increase the risk of injury or death by making employees work closer to hazards than they would otherwise.

b. This regulation and OSHA standard 29 CFR 1910.146 provides minimum safety requirements to be followed while entering, exiting, and working in confined spaces.

c. Also refer to Chapter 9, Personal Protective Equipment and Chapter 8, Lockout/Tagout Procedures, when working in confined spaces.

10-2. Responsibilities

a. Installation Safety Office will:

- (1) Establish and administer a comprehensive confined space entry program.
- (2) In coordination with DPW, identify areas on the installation which are considered to be confined spaces.
- (3) Identify and maintain a current list of confined spaces on the installation. Provide the updated list of confine spaces annual to the Fire and Emergency Services.
- (4) Identify and maintain a current list of permit-required confined spaces of the installation.
- (5) Provide guidance to supervisors/entry supervisors in the preparation of SOPs on confined space entry.
- (6) Review directorate/activity SOPs prepared for confined entry before they are published.

b. DPW will:

- (1) In coordination with the Installation Safety Office, identify areas on the installation considered to be confined spaces.
- (2) Identify and maintain a current list of confined spaces on the installation.
- (3) Maintain a file on entry supervisors appointed by the directorate.

(4) Ensure contractors have supporting documents on training certification and their workers' medical records.

(5) Ensure the contractor has a valid company's permit form, approved gas monitoring equipment, communication, retrieval devices/equipment, personal protection equipment, signs, barricades, and any other OSHA required tools/equipment prior to the start of work.

(6) Review the contractor's Accident Prevention Plan and provide a copy to the Installation Safety Office.

(7) Ensure the contractor contacts FES prior to entering a permit-required confined space.

c. Preventive Medicine Service will:

(1) In coordination with the Installation Safety Office, identify confined spaces on the installation.

(2) Provide guidance to supervisors/entry supervisors in the preparation of confined space entry SOPs.

(3) Conduct on-site evaluations of confined space entry operations and permits periodically to ensure compliance IAW prescribed directives and provide the Installation Safety Office with a copy of results.

(4) Assist with confined space entry and respirator training when needed.

(5) Determine if workers assigned to enter confined spaces are physically able to perform their duties.

(6) Perform medical surveillance on employees required to enter permit-required confined spaces at least annually.

d. Civilian Personnel Advisory Center will: Refer personnel being considered for employment who may be required to enter confined spaces to the Occupational Health Clinic for pre-placement physical examinations.

e. Fire and Emergency Services Division will:

(1) Perform entry rescue/practice annually.

(2) Issue the hot-work permits and provide instruction for safe work.

(3) Be on standby when employees are performing hot work in confined spaces.

f. Directors/commanders with employees who may be required to enter confined spaces will:

- (1) Appoint, in writing, entry supervisors and submit appointment orders to the Installation Safety Office.
- (2) Ensure the number of entry supervisors appointed is sufficient to meet operation needs.
- (3) Train entry supervisors on confined space entry procedures and the proper selection, issue, calibration, maintenance, and care of instruments required to perform such duties.
- (4) Provide entry supervisors with proper monitoring equipment.
- (5) Ensure employees are supplied with required personal protective clothing and equipment to safely enter confined spaces.
- (6) Maintain entry permit for at least 1 year.

g. Supervisors will:

- (1) Be familiar with the provisions of this program as they relate to personnel or operations under their control.
- (2) Explain to all personnel under their immediate supervision the nature of the hazards with the operations and the precautions necessary to control such hazards.
- (3) Ensure personnel entering confined spaces are properly trained prior to entering confined space.
- (4) Strictly enforce safety and health guidelines for confined space operations.
- (5) Take prompt action to correct and report any unsafe acts, conditions, or procedures and, where warranted by such conditions, cease operation until corrective actions are taken.
- (6) Include proper protective clothing and equipment requirements are in job descriptions and that employees are clean-shaven for the wear of respirators.
- (7) Allow only trained entry supervisors, attendants, and entrants to do permit-required confined space work.

h. Entry Supervisors will:

- (1) Be appointed in writing with a copy furnished to the Installation Safety Office.
- (2) Be trained IAW paragraph 2 (e).

- (3) Approve or disapprove routine entry into permit-required confined spaces.
- (4) Ensure training certification is made part of their personnel folders.
- (5) Test confined space with properly calibrated testing equipment prior to entry.
- (6) Complete and sign the confined space entry permit IAW paragraph 3 of this regulation before permitting entry.
- (7) Ensure sufficient personnel are present for operation.
- (8) Ensure required PPE is worn and in good condition.
- (9) Ensure precautions are taken to prevent dangerous air contamination.

i. Attendants will:

- (1) Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.
- (2) Continuously maintains an accurate count of authorized entrants.
- (3) Remain outside during entry operations until relieved by another attendant.
- (4) Communicate with authorized entrants.
- (5) Monitor activities inside and outside permit space and take appropriate action if unsafe condition/act occurs or is about to occur.
- (6) Summon rescue and other emergency services as soon as assistance is needed to rescue entrant.
- (7) Perform non-entry rescues.
- (8) Perform no duties that interfere with the primary duty to monitor and protect the authorized entrants.
- (9) Continuously monitor confined space atmosphere.

j. Authorized entrants will:

- (1) Know the hazards that may be faced during entry, including information on the mode, signs, or symptoms, and consequences on the exposure.
- (2) Communicate with the attendant.

- (3) Wear a personal monitor or be monitored by a device adjacent to the entrant.
- (4) Properly use required equipment.
- (5) Alert the attendant.
 - (a) Recognize any warning sign or symptom of danger.
 - (b) Detect a prohibited condition.
- (6) Exit from the permit space as quickly as possible whenever:
 - (a) Attendant or entry supervisor orders evacuation.
 - (b) Recognize warning signs or symptom of danger.
 - (c) Detect a prohibited condition.
 - (d) An alarm activates.

k. *Contractor/subcontractor.* All permit-required confined spaces and/or non-permit required confines will follow guidance directed by OSHA, 29 CFR 1910.146, and Fort Lee regulations. The contractor/subcontractor will:

- (1) Coordinate and work closely with DPW.
- (2) Provide DPW or the Installation Safety Office a copy of the “Accident Prevention Plan.”
- (3) Provide supporting training documents on proof of certification training for all workers required to perform confined space entry tasks.
- (4) Contact the FES for hot work permit prior to any hot work operations.
- (5) Provide supporting documentation showing that continuous forced air ventilation alone is sufficient to maintain the space safe for entry. Develop monitoring and inspection data that support a non-hazardous condition. The supporting data will be updated annually as long as there is no change during the atmosphere testing.
- (6) Follow all procedures in 29 CFR 1910.146 paragraphs g – k for employees’ safety.
- (7) Use the permit-required confined space decision flow chart prior to entering a confined space listed in appendix A of 29 CFR 1910.146. The flow chart is at appendix E in this regulation.

(8) Ensure the contractor contacts FES prior to entering a permit-required confined space.

(9) Ensure that when providing a pre-work briefing, the contractor understands that in the event of an incident, dialing 911 on a cell phone will go to an off post emergency communication center.

(10) Installation Safety Officers shall conduct site inspections of active confined space work sites when it is active with person or persons entered.

(11) Recommend contacting PMO, 734-7400, prior to beginning work in the confined space area, and when work is completed. Document that all contract personnel are accounted for. FES can be notified by radio when firefighters are out of the station.

10-3. Permit required confined space

a. The permit-required confined spaces on Fort Lee are classified below unless demonstrated differently in accordance with 29 CFR 1910.146 (c) (5) (i) and (ii) that forced air ventilation alone will control all hazards in the space. Supervisors will refer to 29 CFR 1910.146 for additional guidance. These areas are identified as follows:

(1) Manholes for electrical, sewage, and telephone cable lines.

(2) Steam pits.

(3) Crawl spaces.

(4) Tankers/carriers.

(5) Vessels.

(6) Underground vaults.

b. Entry into a permit-required confined space shall be by permit only using Fort Lee Form 937, Fort Lee Confined Space Entry Permit, which is located at the back of this regulation, or an approved permit from a private contractor. The permit is an authorization and approval in writing that specifies the location and type of work to be done and certifies that all existing hazards have been evaluated by the entry supervisor and necessary protective measures have been taken to ensure the safety of each worker.

c. The entry supervisor shall be responsible for completing the permit and shall sign off when the following areas and actions have been reviewed and confirmed:

(1) Location and description of the work to be done.

(a) Provide adequate barriers/shields.

(b) Perform testing and monitoring.

(2) Hazards that may be encountered.

(3) Isolation checklist is complete.

(a) Blanking and /or disconnecting.

(b) Electrical lockout.

(c) Hazardous energy lockout/tagout procedures.

(4) Special clothing and equipment.

(a) Personal protective equipment and clothing.

(b) Safety harness and/or lines.

(c) Tools, approved electrical and lighting equipment, for use in accordance with the Hazardous Location Certification IAW the National Electrical Code (NEC) 1990).

(d) Ventilating equipment.

(e) Communication equipment.

(f) Any other equipment necessary for safe entry and rescue.

(g) Retrieval mechanical device.

(5) Atmospheric test monitors.

(a) Oxygen level.

(b) Flammability and/or explosive levels.

(c) Toxic substance levels.

(6) Atmospheric monitoring while work is being performed.

(7) Personnel training and complete understanding of the hazards.

(8) Attendant(s) as named on the permit.

(9) Rescue and emergency equipment and procedures.

(10) Evaluate permit-required conditions prior to entry.

(a) Document the readings.

(b) Sign the permit before entering.

(c) Made available to all authorized entrants, by posting it at the entrance so that notification of pre-entry preparation has been completed.

d. Permit-required confined space shall carry expiration time and date valid for one shift only and shall be updated for each shift. The entry supervisor authorizes entry and cancels the permit. Retain each cancelled entry permit for at least 1 year.

10-4. Medical

a. Workers who enter a permit-required confined space shall have a pre-placement physical examination. The supervisor shall provide the physician performing or responsible for the medical surveillance program information such as the type of confined space the employee may be required to enter, substances the employee may encounter, and a description of protective devices or equipment the employee may be required to use. The physical examination shall include:

(1) A demonstration of the worker's ability to use negative and positive pressure respirators as cited in 29 CFR 1910.134.

(2) A demonstration of the worker's ability to see and hear warnings, such as flashing lights, buzzers or sirens.

b. Following completion of the examinations, the physician shall approve or disapprove the employee for confined space work.

c. Periodic medical examinations shall be made available to employees required to work in permit-required confined spaces at least annually.

10-5. Emergency and rescue services

a. The authorized entrant shall wear a full body harness or a chest belt attached to a retrieval lifeline except if it creates a greater hazard. If the exit opening is less than 18 inches (45 cm) in diameter, a wristlet harness shall be used.

b. Attendant will only perform non-entry rescues. Rescue procedures shall be specifically designed for each entry. There shall be a trained attendant assigned to that confined space and properly trained with the operation of the rescue retrieval system. Under no circumstances will the attendant enter the confined space. However, while awaiting rescue services, the attendant will make rescue attempts using the retrieval system.

c. The Fort Lee Fire and Emergency Services Division is the authorized rescue service to enter permit spaces to perform rescue services. The emergency telephone number is 911.

10-6. Training

a. Personnel working in the vicinity of confined spaces shall be made aware of the hazards. Personnel required to work in a confined space or in support of those working in a confined space shall have additional training as follows:

- (1) Emergency entry and exit procedures.
- (2) Use of applicable respirators.
- (3) First aid.
- (4) Lockout procedures.
- (5) Safety equipment use.
- (6) Initial and annual rescue and training drills designed to maintain proficiency or at lesser intervals as determined necessary.
- (7) New or revised procedures.
- (8) Permit system.

b. Training shall not be considered complete until the employee has attained an acceptable degree of proficiency for entering and working in confined spaces. The trainee's judgment of the adequacy of his training should be properly considered.

c. The supervisor shall certify the employees training. Documentation of employee's name, signatures or initials of the trainers and the dates of training. Ensure copies are sent to the Installation Safety Office, and included in the office of personnel file and workplace training file.

10-7. Testing and monitoring

a. Monitoring of the atmosphere shall be performed in accordance with the permit. Equipment for continuous monitoring of gases and vapors shall be explosion-proof and equipped with an audible alarm or danger-signaling device that will alert employees when a hazardous condition develops. Instruments used for testing the atmosphere in a confined space shall be selected for their functional ability to measure hazardous concentrations. Instruments shall be calibrated in accordance with the manufacturer's guidelines or manuals. Each calibration shall be recorded, filed, and available for inspection for 1 year after the last calibration date.

b. The percentage of oxygen for entry into a confined space shall be no less than 19.5 percent or greater than 23.5 percent. If tests indicate the oxygen level to be greater than 23.5

percent hot work is prohibited until ventilating techniques have reduced the oxygen level to approximately 21 percent. If the percentage of oxygen falls below 19.5, approved respiratory equipment shall be used in accordance with the Test to be Taken chart on page 2 of Fort Lee Form 937, Confined Space Entry Permit, located at the back of this regulation.

c. When the contaminants in the atmosphere cannot be kept within permissible exposure levels as set down in 29 CFR 1910 Subpart Z, the employee shall wear an approved respirator.

10-8. Posting, labeling and barriers

a. To prevent unauthorized or inadvertent entries into confined spaces where work is in progress; such areas shall be posted, as warranted, until the operations have been completed. These signs include the following information:

CAUTION
CONFINED SPACE
WORK IN PROGRESS
DO NOT ENTER WITHOUT PROPER AUTORIZATION
EMERGENCY NUMBER 911

b. Entrances to confined spaces of permanent structures shall be posted as necessary. Signs shall include but not necessarily be limited to the following information:

DANGER
CONFINED SPACE
ENTRY BY PERMIT
ONLY
EMERGENCY NUMBER 911

c. When employees enter a confined space, a barricade shall be erected if inadvertent entry poses a problem. The barricade shall have a mechanism to prevent closure of the escape way, signs warning of the danger present, a physical barrier (fence) to keep the area clear, and an adequate platform (3 feet x 3 feet as a minimum) for entry or exit. The attendant shall be responsible for maintenance of the barricade system.

10-9. Personal protective equipment and clothing

a. The entry permit includes a list of necessary protective equipment to be used in the confined space as determined by the entry supervisor.

b. Items normally used to protect against traumatic injury include: safety glasses, hardhats, footwear, protective coveralls, and respiratory protection as directed by Fort Lee Form 937, Confined Space Entry Permit, located at the back of this regulation.

c. Other protective measures shall include: Safety nets used to protect employees working 10 feet (3m) above ground or grade level when other protective devices are impractical; life

jackets worn if workers are exposed to falls into liquid over 4 feet (1.2m) in depth; insulated floor mats when hot work requires use of electrical energy.

10-10. Work practices

Before entering a confined space, employees shall review the specific guidelines appropriate for safe entry and emergency exit. These guidelines or standards shall be compiled by the entry supervisor and be definitive on all possible hazards. Areas covered by such guidelines shall follow this recommended standard.

a. Purging and Ventilating.

(1) Environmental control within a confined space is accomplished by purging and ventilating. The method used will be determined by the potential hazards that arise due to the product stored or produced, suspected contaminants, work to be performed, and the design of the confined space. When ventilating and/or purging operations are to be performed, the blower controls shall be at a safe distance from the confined space. In a permit-required confined space an audible warning device shall be installed in all equipment to signal when there is a ventilation failure. When a ventilation system is operational, airflow measurements shall be made before each work shift to ensure that a safe environmental level is maintained. Initial testing of the atmosphere shall be performed from outside the confined space before ventilation begins to determine necessary precautions in purging and ventilating. Testing of more remote regions within the confined space may be performed once the immediate area within the confined space has been made safe. Exhaust systems shall be designed to protect workers in the surrounding area from contaminated air. If flammable concentrations are present, all electrical equipment shall comply with the National Fire Protection Association NEC 70, article 250 requirements for bonding and grounding. Where continuous ventilation is not part of the operating procedure, the atmosphere shall be tested until continuous acceptable levels of oxygen and contaminants are maintained for three tests at 5-minute intervals. Care shall be taken to prevent recirculation of contaminated air and interaction of airborne contaminants.

(2) Continuous general ventilation shall be maintained where toxic atmospheres are produced as part of a work procedure, such as welding or painting, or where a toxic atmosphere may develop due to the nature of the confined space, such as desorption from walls or evaporation of residual chemicals. General ventilation is an effective procedure for distributing contaminants from a local generation point throughout the workspace to obtain maximum dilution. However, special precautions shall be taken if the ventilating system partially blocks the exit opening. These precautions include a method for providing respirable air to each worker for the time necessary for exit and a method of maintaining communications.

(3) Local exhaust ventilation shall be provided when general ventilation is not effective due to restrictions in the confined space or when high concentrations of contaminants occur in the breathing zone of the worker. Local high concentrations of contaminants may occur during activities such as welding, painting, and chemical cleaning. The worker shall not be exposed to concentrations of contaminants in excess of those specified in 29 CFR 1910 Sub Part Z. Therefore, respiratory protection may be needed in addition to engineering controls. The use of respiratory protection will be determined by the entry supervisor. However, when fumes may be

generated that contain highly toxic or other airborne metal contaminants, provisions of 29 CFR 1910.252 shall be observed. When freely moving exhaust hoods are used to provide control of fumes generated during welding, such hoods shall maintain a velocity of 100 feet per minute in the zone of the welding. The effective force of freely moving exhaust hoods is decreased by approximately 90 percent at a distance of one duct diameter from the plane of the exhaust opening. Therefore, to obtain maximum effectiveness, the welder shall reposition the exhaust hood as he changes welding locations to keep the hood in close proximity to the fume source.

(4) Special precautions shall be taken when out-gassing or vaporization of toxic and/or flammable substances is likely. If the vapor-generating rate can be determined, the exhaust rate required can be calculated to dilute the atmosphere below the Permissible Exposure Limit (PEL) and/or 10 percent of the Lower Explosive Limit (LEL), whichever is lower. This shall be the lowest acceptable ventilation rate. If the area of concern is relatively small, diffusion of the contaminants may be controlled by enclosure with a relatively low volume exhaust for control, or by exhaust hoods located as close as possible to the area of vaporization or out-gassing. If the area to be ventilated is too extensive to be controlled by local exhaust, general ventilation procedures shall be used to control the contaminant level. When the problem of out-gassing is due to the application of protective coatings or paint, ventilation shall be continued until the buildup of a flammable and/or toxic atmosphere is no longer possible.

b. Isolation/Lockout/Tagging.

(1) The isolation procedures shall be specific for each type of confined space. Safety equipment required during this procedure shall be designated by the entry supervisor and be depended upon the potential hazards involved. A permit-required confined space shall be completely isolated from all other systems by physical disconnection, double block and bleed, or blanking of all lines. In continuous systems where complete isolation is not possible, such as sewers or utility tunnels, specific written safety procedures that are approved and enforced by the entry supervisor shall be used.

(2) All blanks for that specific confined space shall be recorded on the entry permit.

(3) If a drain line is located within the confined space, provision shall be made when necessary to tag it and leave it open. This shall also be recorded on the entry permit.

(4) Additional procedures necessary when the confined space is of double wall type construction, such as water-jacketed or similar type, shall be determined by the entry supervisor and noted on the entry permit.

(5) Electrical isolation of the confined space to prevent accidental activation of moving parts that would be hazardous to the worker is achieved by locking circuit breakers and/or disconnects in the open (off) position with a key-type padlock. The only key is to remain with the person working inside the confined space. If more than one person is inside the confined space, each person shall place his own lock on the circuit breaker. In addition to the lockout system, there must be an accompanying tag that identifies the operation and prohibits use.

c. *Cleaning.*

(1) Procedures and processes used to clean the inside of a confined space shall be reviewed by the Installation Safety Office, Fire and Emergency Services Division, and Industrial Hygienist. The method to be prescribed shall be dependent upon the product in the space. If the confined space contains a flammable atmosphere above the upper flammable limit, it shall be purged with an inert gas to remove the flammable substance before ventilating with air. Initial cleaning shall be done from outside the tank if at all possible.

(2) Special procedures should be adopted to handle the hazards created by the cleaning process itself. If the tank is steamed:

(a) It shall be allowed to cool prior to entry.

(b) Ventilation shall be maintained during neutralization procedures to prevent build-up of toxic materials.

(c) Steaming shall not be used as a cleaning method when the product stored was a liquid with an auto ignition temperature 120 percent or less of the steam temperature.

(d) The pipe or nozzle of the steam hose shall be bonded to the tank to decrease the generation of static electricity that could accumulate in tanks during steaming procedures. These and other hazards and controls shall be evaluated by the Installation Safety Office and the Fire and Emergency Services Division.

d. Equipment and tools to be used in a confined space shall be carefully inspected and shall meet the following requirements:

(1) Hand tools shall be kept clean and in good repair.

(2) Portable electric tools, equipment, and lighting shall be approved in accordance with 29 CFR part 1910 Sub Part Z and be equipped with a ground fault circuit interrupter that meets the requirements of 29 CFR 1910.309. All grounds shall be checked before electrical equipment is used.

(3) All electrical cords, tools, and equipment shall be of heavy-duty type with heavy-duty insulation and inspected for defect use.

(4) Air-driven power tools shall be used when flammable liquids are present. Air-driven power tools reduce the risk of explosion but do not eliminate it. Explosions can arise by tools overheating (drilling), sparks produced by striking (percussion), grinding or discharge of accumulated electrostatic charges developed from the flow of compressed air.

(5) Lighting used in permit-required confined spaces shall be explosion-proof and where necessary, equipped with guards. Only equipment listed by Underwriters Laboratories for use in Division 1, atmospheres of the appropriate class and group, or approved by U.S. Bureau of

Mines or Mining Enforcement (MESA) and Safety Administration or Mine Safety and Health Administration (MSHA), or the U.S. Coast Guard shall be used. Lighting shall not be hung by electric cords unless specifically designed for that purpose. The illumination of the work area shall be sufficient to provide for safe work conditions as referenced in the ANSI/IES-RP-7-1991. Under no circumstances will matches or open flames be used in a confined space for illumination.

(6) Cylinders of compressed gases shall never be taken into a confined space and shall be turned off at the cylinder valve when not in use. Exempt from this rule are cylinders that are part of self-contained breathing apparatus (SCBA) or resuscitation equipment.

(7) Ladders shall be adequately secured or of a permanent type which provides the same degree of safety as cited in 29 CFR 1910 Sub Part D.

(8) Scaffolding and staging shall be properly designed to carry maximum expected load, be equipped with traction-type planking, and meet the requirements of 29 CFR 1910.28.

(9) Electrical lines, junctions, and appurtenances will be in accordance with National Electric Code and 29 CFR 1910.309.

(10) Only hose lines and components designed specifically for the compressed gas and working pressure shall be used, and such systems shall have a pressure relief valve outside the confined space.

(11) All equipment that may be used in a flammable atmosphere shall be approved as explosion-proof or intrinsically safe for the atmosphere involved by a recognized testing laboratory such as the U. S. Bureau of Mines, MESA, or MSHA for methane and by the Underwriters Laboratories or by Factory Mutual for all cases.