

CHAPTER 23

CONFINED SPACE ENTRY

CONFINED SPACE CLASSIFICATION

Class A Immediately dangerous to life and health. Egress is limited to one available opening. Gas detector indicates an atmospheric danger. The entrant should be wearing a self-contained breathing apparatus and be tethered. Rescue person should be wearing a self-contained breathing apparatus.

Class B Dangerous but not immediately life threatening. Egress is limited to one available opening. Gas detector indicates no atmospheric dangers. Example: wet well. The entrant should be tethered with continuous gas monitoring and mechanical ventilation if indicated.

Class C This is a potential hazard. The gas detector indicates no atmospheric danger. Example: vault with a dray floor. Continuous gas monitoring might be indicated; otherwise, no modification of safe working procedures is necessary.

CONFINED SPACE ENTRY PERMIT

Confined Space Class _____

Date of Entry _____

Description and Location
of Work to be Done _____

Workers involved

at the site: 1. _____ 3. _____

2. _____ 4. _____

	Yes	No	Does Not Apply
1. Has the space been ventilated?			
2. Has the atmosphere been tested and found to be safe?			
3. Is the crew prepared for continuous atmospheric testing?			
4. Have necessary preparations been made?			
a. Safety clothing?			
b. Necessary lockouts in place?			
c. Necessary valves isolated?			
d. Necessary tools at work site?			
e. Sufficient illumination provided?			
5. Has forced ventilation been provided?			
6. Has the entrant been fitted with a safety line attached to the tripod hoist?			
7. Has an observer been assigned to watch the entrant at all times, and does he know what to do if the entrant appears to be in difficulty?			
8. If the entrant requires a Self-Contained Breathing Apparatus, has he done a negative pressure fit test?			
9. Has a vehicle radio check been done before entry?			
10. Is any source of ignition involved in the entry, and have sources of combustion been considered?			

I certify that all safety rules have been complied with and that I have considered the class of the entry.

Supervisor:

Person in charge at the entry site:

PLACE UNIT ON CHARGER AFTER USE

CONFINED SPACE ENTRY VENTILATION WORKSHEET

BLOWER CAPACITY IN CFM (CUBIC FEET/MINUTE): _____

VOLUME OF CONFINED SPACE IN CUBIC FEET:

VAULT: LENGTH ____' x WIDTH ____' x DEPTH ____' = _____

MANHOLE SIZE IN CUBIC FEET (R=½ Manhole Barrel Diameter):

$3.14 \times R^2$ _____ x DEPTH _____ = _____

NOTE: Blower must be capable of changing the air once every three (3) minutes.
To check this, take CF (volume) ÷ 3. Answer must be equal to or greater than blower capacity.

PRE-VENTILATION TIME:

Cubic Feet of Confined Space (C.F.) _____

Divide by Blower Capacity _____

Multiply by 11 (K) constant to get pre-ventilation time.

C.F. (space) ÷ Blower Capacity x 11 = PRE-VENTILATION TIME

GAS DETECTOR ALARM POINTS:

OXYGEN 19.5%

HYDROGEN SULFIDE 10 PPM

COMBUSTIBLES 20% LEL

CONFINED SPACE ENTRY PROCEDURES

PURPOSE

This procedure reviews the hazards and the minimum requirements for confined space entry for preventing employee exposure to dangerous air contamination and/or oxygen deficiency. Confined spaces include such spaces as silos, tanks, vats, vessels, boilers, compartments, ducts, sewers, pipelines, vaults, bins, tubs, pits, and bughouses. ***Please be sure to review current OSHA standards which may supersede information provided in this bulletin.***

RESPONSIBILITY

The responsibility for seeing that this procedure is followed is that of supervisors and management. All employees must be instructed in the safety significance of the confined space entry procedures by their supervisor. Each new or transferred affected employee must be instructed by their supervisor in the purpose and use of the confined space entry procedures.

DEFINITIONS

Dangerous Air Contamination. An atmosphere presenting a threat of causing death, injury, acute illness, or disablement due to the presence of flammable and/or explosive, toxic, or otherwise injurious or incapacitating substances.

Dangerous air contamination due to *flammability* of a gas or vapor is defined as an atmosphere containing the gas or vapor at a concentration greater than 20 percent of its lower explosive (lower flammable) limit (LEL).

Dangerous air contamination due to a *combustible* particulate is defined as a concentration greater than 20 percent of the minimum explosive concentration of the particulate.

Dangerous air contamination due to the toxicity of a substance is defined as the atmospheric concentration immediately hazardous to life or health.

Oxygen Deficiency. An atmosphere containing oxygen at a concentration of less than 19.5 percent by volume.

HAZARDS IN CONFINED AREAS

WORKERS SHOULD NOT ENTER ANY CONFINED SPACE WITHOUT KNOWING WHAT IS IN IT, WHAT WAS IN IT, AND WHAT ACTION SHOULD BE TAKEN TO BE SAFE WHILE IN THE SPACE.

A confined-area permit stating the above should be posted at the entrance.

A confined area generally is any enclosed space in which air is not circulating naturally. A combustible, toxic, or explosive condition may result from natural causes; normal use; inadequate cleaning or disposal; or leaking valves, pipes, or containers. Heat exposure may occur in a structure still hot from normal use of subject to heating by an external source.

Oxygen Deficiency

Air with less than 19.5 percent oxygen (normal air contains about 21 percent oxygen) is hazardous. There may be a sensation of well-being or elation, followed by semi-consciousness and reduced activity. If the oxygen level is less than 16 percent, unconsciousness and death may follow.

Sudden exposure to an area with little or no oxygen brings no warning at all; immediate unconsciousness follows. If rescued, the victim has no recollection of the incident.

Gases, Vapors, and Dust

Many liquid fuels and solvents vaporize rapidly to mix with and/or displace air within a confined area. Flammable vapors and gases which are heavier than air will settle into the lowest parts of a pit, tank, trench, or below-grade room. Any source of ignition will set off the mixture.

Flammable and/or toxic gases and vapors most often involved in serious injuries or fatalities in confined spaces include:

Carbon monoxide, a colorless, odorless, and non-irritating but toxic and explosive gas. It is produced in industrial processes and by internal combustion engines.

Methane, an odorless, colorless, and tasteless product of decaying organic matter. Methane can displace oxygen and is extremely explosive. It is found in mines, sewers, sanitary landfills, and oil fields.

Hydrogen sulfide, a highly toxic gas with a distinctive "rotten egg" odor. At extremely low concentrations, it desensitizes the sense of smell and masks any increase in concentration.

Petroleum distillates. Their biggest hazards are extreme flammability. Distillates are found in petroleum tanks farms, service stations and garages, and industrial storage areas.

Heat Exposure

Another condition frequently found in confined areas is high temperature, as produced in boilers, pressure vessels, or tanks heated by the sun. The hazards include heat strokes, which can be fatal, or more likely, heat cramps or heat exhaustion. These conditions are brought about by heavy physical exertion in a hot atmosphere.

OPERATING PROCEDURES

Employees must be instructed on operating procedures and receive training on confined space before being permitted to enter a confined space.

Pre-entry

The applicable provision of this section must be implemented before entry into a confined space.

1. Lines which may convey flammable, injurious, or incapacitating substances into the space must be disconnected, blinded, or blocked off by other positive means to prevent the development of dangerous air contamination and/or oxygen deficiency within the space. The disconnection or blind must be so located or done in such a manner that inadvertent reconnection of the line or removal of the blind are effectively prevented.
2. The space must be emptied, flushed, or otherwise purged of flammable, injurious, or incapacitating substances to the extent feasible.
3. The air must be tested and documented with an appropriate device or method to determine whether dangerous air contamination and/or an oxygen deficiency exists and a written record of such testing results must be made and kept at the work site for the duration of the work. Affected employees and/or their representative must be afforded an opportunity to review and record the testing results. Be sure your measurement device is calibrated according to manufacturer specification.
4. Where interconnected spaces are blinded off as a unit, each space must be tested and the results recorded.

5. If dangerous air contamination and/or oxygen deficiency does not exist within the space as demonstrated by test performed, entry into and work within the space may proceed subject to the following provision:

Testing must be conducted with sufficient frequency to ensure that the development of dangerous air contamination and/or oxygen deficiency does not occur during the performance of any operation.

6. Where the existence of dangerous air contamination and/or oxygen deficiency is demonstrated by tests performed, existing ventilation must be augmented by appropriate means.
7. When additional ventilation has removed dangerous air contamination and/or oxygen deficiency as demonstrated by additional testing conducted (and recorded), entry into and work within the space may proceed.
8. No source of ignition must be introduced until the implementation of appropriate provisions of this section have ensured that dangerous air contamination due to flammable and/or explosive substances does not exist.
9. Whenever oxygen-consuming, such as salamanders, plumbers' torches, or furnaces, and the like, are to be used, measures must be taken to ensure adequate combustion air and exhaust gas venting.

CONFINED SPACE OPERATION

Entry Into and Work Within Confined Spaces. The requirements of this subsection apply to entry into and work within a confined space *whenever an atmosphere free of dangerous air contamination and/or oxygen deficiency cannot be ensured:*

1. Tanks, vessels, or other confined spaces with side and top openings must be entered from side openings when practicable.
2. Appropriate, approved respiratory protective equipment must be provided and worn.
3. An approved safety belt with an attached line must be used. The free end of the line must be secured outside the entry opening. The line must be at least ½ inch diameter and 2,000 pounds test.
4. At least one employee must stand by on the outside of confined space ready to give assistance in case of emergency. At least one additional employee who may have other duties must be within sight or call of the stand-by employee(s).

- a. The stand-by employee must have appropriate, approved respiratory protective equipment, including independent source of breathing air available for immediate use.
- b. A stand-by employee (or employees) protected may enter the confined space but only in case of emergency and only after alerting at least one additional employee outside of the confined space of the existence of an emergency and of the stand-by employees' intent to enter the confined space.