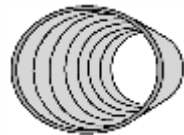
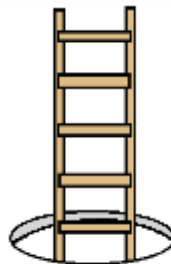
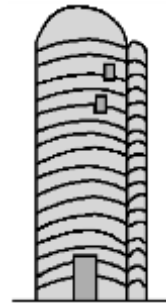


## Confined Spaces

**Confined Space** is a space large enough for a partial entry of the body so that a person can perform assigned work, with limited or restricted means for entry or exit and not designed for continuous employee occupancy.

### Examples

- Tanks
- Ducts
- Silos
- Pits
- Etc.



All Confined Spaces must be assessed for their risks involved in case of entering and demarcated accordingly. In case high risk is involved, the Confined Space cannot be accessed without a special permit (Permit-Required Confined Spaces).



## Hazards

### Oxygen deficiency & oxygen rich hazards

One of the primary hazards of entering confined spaces is oxygen deficiency. When oxygen is present in concentrations less than 19.5% the atmosphere is said to be oxygen deficient.

Oxygen in concentrations greater than 23% is too oxygen rich and can cause combustible materials to ignite very quickly.

Oxygen deficiency can be caused by several processes:

Consumption: oxygen is used up by the person who is in the confined space and turned into carbon dioxide.

Displacement: denser materials push the oxygen out of the occupied space.

Reaction: oxygen is reacted with other materials to make other compounds.

### Electromechanical hazards

These include:

- Machinery & equipment parts
- Electrical parts under voltage
- Falling of objects

### Entrapment hazards

These include:

- Narrow openings
- Low-density materials stored in bulk (grain, dust, air-rich/ bubbling water etc.)

### Physical environmental hazards

These include:

- Hot/ Cold/ Humid environment
- Poor illumination
- Slipperiness
- Noise
- Radiation

### Chemical hazards

These include:

- Dangerous substances (toxic, caustic, flammable, explosive etc.)
- Allergenic substances
- Intense odors

## Entry procedure

The entry of a confined space begins with a **Confined Space Entry Permit**.

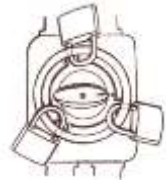
### Safety Representative

The permit system requires that a qualified safety representative visits the work location and evaluate the conditions under which entry will be made.



The safety representative tests the space for hazardous concentrations of known harmful substances, such as hydrogen sulfide, carbon monoxide, and flammable liquid or gas. The concentration of oxygen is measured at the same time.

When cleaning, inspecting, or other work requires that persons enter pits, silos, where moving equipment is inside, a Lockout-Tagout (LOTO) procedure must be followed including switches lockable by multiple padlocks.



### Attendant

This is an individual stationed outside of the confined space who monitors the authorized entrants & performs all attendant's duties assigned in employer's permit space program

#### Duties of Attendants

- Knows hazards that may be faced during entry
- Aware of possible behavioral effects of hazard exposure in authorized entrants
- Continuously maintains accurate count of authorized entrants
- Remains outside permit space during entry operations until relieved by another attendant
- Communicates with authorized entrants
- Monitors activities inside & outside space
- Summons rescue & other emergency services
- Performs non-entry rescues as specified by employer's rescue procedure
- Performs no duties that might interfere with primary duty to monitor & protect authorized entrants



### **Authorized entrant**

Employee authorized by employer to enter permit space

#### Duties of Authorized Entrants

- Know hazards that may be faced during entry, including information on mode, signs or symptoms & consequences of exposure
- Properly use equipment as required
- Communicate with attendant as necessary to enable attendant to monitor entrant status & enable attendant to alert entrants of need to evacuate space as required
- Alert attendant whenever:
  - Entrant recognizes any warning sign or symptom of exposure to dangerous situation
  - Entrant detects prohibited condition
  - Exit from permit space as quickly as possible whenever:
- Exit from permit space...
  - Order to evacuate is given by the attendant or entry supervisor
  - Entrant recognizes any warning sign or symptom of exposure to a dangerous situation
  - Entrant detects prohibited condition
  - Evacuation alarm activated

### **Entry Supervisor**

Person (such as employer, foreman or crew chief) responsible for determining if acceptable entry conditions are present at permit space where entry is planned, for authorizing entry & overseeing entry operations & for terminating entry

Note: entry supervisor *may* serve as attendant or authorized entrant, as long as that person is trained & equipped as required for each role filled

- Duties of entry supervisor may be passed from one individual to another during entry operations

#### Duties of Entry Supervisor

- Verifies that rescue services are available & means for summoning are operable
- Removes unauthorized individuals who enter or attempt to enter permit space during entry operations

- Determines, whenever responsibility for permit space entry operation is transferred & at intervals dictated by hazards & operations performed within space, that entry operations remain consistent with terms of entry permit & acceptable entry conditions are maintained

## Testing Protocol

Before employee enters space, internal atmosphere shall be tested, with calibrated direct-reading instrument, for the following conditions in the order given

- Oxygen content
- Flammable gases & vapors
- Potential toxic air contaminants

According to the measurements results additional ventilation may be supplied by approved devices. Ventilation should be placed in such a manner that it provides full Confined Space air renewal. As an example, pits and silos must be equipped with manhole on the lower part of silos to allow ventilation by cleaning, inspecting, or maintenance work and for safety entry of workers.



## Rescue & Emergency Services

Employees designated and trained to provide rescue & emergency services shall evaluate prospective rescuer's ability to respond to rescue summons in timely manner, considering hazard(s) identified



## Retrieval system

Equipment (including retrieval line, chest or full-body harness, wristlets, if appropriate, & lifting device or anchor) used for non-entry rescue of persons from permit spaces.

