

CONFINED SPACES

Purpose

The Permit/Non-Permitted Required Entry Program is provided to protect employees who will enter confined spaces and may be exposed to hazardous atmospheres, engulfment in materials or conditions which may contain other safety or health hazards.

Definitions

Acceptable entry conditions: the conditions that must exist in a permit space to allow entry and to ensure that employees involved with a permit-required confined space entry can safely enter into and work within the space

Attendant: an individual stationed outside a permit space who monitors the authorized entrants and who performs all attendants' duties

Authorized entrant: an employee who is authorized to enter a permit space

Blanking or blinding: the absolute closure of a pipeline, or duct by the fastening of a solid plate (such as a spectacle blind or a skillet blind) that completely covers the bore and that is capable of withstanding the maximum pressure of the pipeline or duct with no leakage beyond the plate

Confined space: a space that:

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

Double block and bleed: the closure of a line, duct or pipe by closing and locking or tagging two in-line valves and by opening and locking or tagging a drain or vent valve in the line between the two closed valves

Emergency: any occurrence (including any failure of hazard control or monitoring equipment) or event internal or external to the permit space that could endanger entrants

Engulfment: the surrounding and effective capture of a person by a liquid or finely divided (flowable) solid substance that can be aspirated to cause death by filling or plugging the respiratory system or that can exert enough force on the body to cause death by strangulation, constriction or crushing

Entry: the action by which a person passes through an opening into a permit/non-permit required confined space. Entry includes 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 in the space

Entry permit: the written or printed document that is provided by the employer to allow and control entry into a permit space

Entry supervisor: the person responsible for determining if entry conditions are acceptable, authorizing entry, overseeing entry operations, and for terminating entry as required by this section.

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Hazardous atmosphere: an atmosphere that may expose employees to the risk of death, incapacitation, impairment of the ability to self-rescue (that is escape unaided from a permit space), injury or acute illness from one or more of the following causes:

1. Flammable gas, vapor or mist in excess of 10% of its lower explosive limit (LEL)
2. Airborne combustible dust at a concentration that meets or exceeds its LEL
3. Atmospheric oxygen concentration below 19.5% or above 23.5%
4. Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published (the material safety data sheet should be consulted)

Hot work permit: the employer's written authorization to perform operations (for example, riveting, welding, cutting, burning and heating) capable of providing a source of ignition

Immediately dangerous to life or health (IDLH): any condition that poses an immediate or delayed threat to life or that would cause irreversible health effects or that would interfere with an individual's ability to escape unaided from a permit space

Isolation: the process by which a permit space is removed from service and completely protected against the release of energy and material into the space by such means as blanking or blinding, misaligning or removing sections of pipe, lines, or ducts, etc.

Line breaking: the intentional opening of a pipe, line, or duct that is or has been carrying flammable, corrosive, toxic material, inert gas or any fluid (at a volume, pressure, or temperature) capable of causing injury

Non-permit confined space: a confined space that does not contain an atmospheric hazard or have the potential to contain any hazard capable of causing death or serious physical injury

Oxygen deficient atmosphere: an atmosphere containing less than 19.5% oxygen by volume

Oxygen enriched atmosphere: an atmosphere containing more than 23.5% oxygen by volume

Permit-required confined space (permit space): a confined space that has one or more of the following characteristics:

1. Contains or has potential to contain a hazardous atmosphere;
2. Contains a material that has the potential for engulfing an entrant;
3. Has an internal configuration such that an entrant could be trapped by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross section; or
4. Contains any other recognized serious safety or health hazard

Permit-required confined space program: the overall program for protecting employees from permit space hazards and for controlling the entry into permit spaces

Permit system: the written procedure for preparing, issuing permits, controlling entry and returning the permitted space to service

Prohibited condition: any condition in a permit space that is not allowed by the permit

Rescue service: the personnel designated to rescue employees from permit spaces

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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 spaces.

Testing: the process by which the hazards are identified and evaluated. Testing includes specifying the tests that are to be performed in the permit space.

Responsibilities

Department Supervisors

The supervisor is responsible for the overall permit required for confined space entry and must coordinate all entry procedures, tests, permits, equipment and other relevant activities. The following duties are required by the supervisor before entry:

- ❖ Needs to determine if the space being entered is actually a confined space
- ❖ Needs to determine if the space is a non-permit or permit required confined space
- ❖ Needs to complete the permit if the space is a permit required confined space
- ❖ Know the hazards that may be faced during entry including information on the signs or symptoms of the exposure and the consequences
- ❖ Verify that the appropriate permit entries have been made, all tests (air monitoring) have been conducted and all procedures and equipment specified are in place before signing (the permit) and allowing entry to begin
- ❖ Ensure the proper training has been performed prior to entry
- ❖ Provide proper equipment for entry
- ❖ In case of an emergency contact 911. Rolla Fire Department is the only service capable of performing confined space rescue.
- ❖ Terminate the entry when the entry is complete
- ❖ The supervisor's annual review of the program and copies of the entry permits need to be sent to the Environmental Health & Safety office.

Employees

The employee is responsible for the overall non-permitted required confined space entry and must coordinate all entry procedures, tests, permits, equipment and other relevant activities. The following entry employee duties are required:

- ❖ Complete the check list if the space is a non-permit required confined space
- ❖ Report any previously unidentified hazards associated with confined spaces to supervisors
- ❖ Know the hazards that may be faced during entry including information on the signs or symptoms and consequences

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- ❖ Verify that the appropriate entries have been made on the check list, all tests have been conducted and all procedures and equipment are in place before signing the check list and allowing entry to begin
- ❖ Ensure the proper training has been performed prior to entry
- ❖ Provide proper equipment for entry
- ❖ In case of an emergency, call 911. Rolla Fire Department is the only service capable of performing confined space rescue.
- ❖ Terminate the entry when the entry is complete

Attendant

At least one attendant is required outside the permit/non-permitted area at all times. Responsibilities include:

- ❖ Know the hazards that may be faced during entry, including information on the signs or symptoms, and consequences
- ❖ Keep visual contact with the entrants at all times
- ❖ Remain at the entry point until relieved
- ❖ Communicate with entrants as necessary and sound the alert in case of evacuation
- ❖ Monitor activities inside and outside the space and determine the need for evacuation
- ❖ Summon rescue and other emergency services as needed
- ❖ The primary duty is to monitor and protect the entrants
- ❖ Keep all unauthorized personnel away from the permit space

Authorized Entrant(s)

All entrants must be authorized to enter the permit space, have received the required training, be competent in the use of the proper equipment, and observe the entry procedures and permit. The following entrant duties are required:

- ❖ Know the hazards that may be faced during entry including information on the signs or symptoms and consequences
- ❖ Properly use the equipment required for safe entry
- ❖ Communicate with the attendant as necessary to enable the attendant to monitor the status of the entrants
- ❖ Alert the attendant whenever the entrant recognizes any warning signs or symptoms to a dangerous situation
- ❖ If the order to evacuate is given, exit the permit space as quickly as possible

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Procedures

Permit Required Confined Space

All spaces shall be considered permit-required confined spaces until the pre-entry procedures demonstrate otherwise. Any employee required to enter a confined space shall have successfully completed, as a minimum, the training required by the following sections of these procedures. The Confined Space Entry Permit must be completed before approval can be given to enter a permit-required confined space. This permit verifies completion of the items listed below and shall be kept at the job site for the duration of the job. If circumstances cause an interruption in the work or a change in the alarm conditions for which entry was approved, a new Confined Space Entry Permit must be completed.

- ❖ Control of atmospheric and engulfment hazards.
- ❖ Surveillance. The surrounding area shall be surveyed to avoid hazards such as drifting vapors from tanks, piping or sewers.
- ❖ Testing. The confined space atmosphere shall be tested to determine whether dangerous air contamination and/or oxygen deficiency exists. A direct reading gas monitor shall be used. Testing shall be performed by the SUPERVISOR who has successfully completed the gas detector training for the monitor he will use. The minimum parameters to be monitored are oxygen deficiency, lower flammable limit and toxicity. A written record of the pre-entry test results shall be made and kept at the work site for the duration of the job. Affected employees shall be able to review the testing results. The most hazardous conditions shall govern when work is being performed in two adjoining connected spaces.
- ❖ Ventilation. Mechanical ventilation systems, where applicable, shall be set at 100% outside air. Where possible, when working in sewers or storm drains, open additional manholes to increase air circulation. Use portable blowers to augment natural circulation if needed. After a suitable ventilating period, repeat the testing. Entry may not begin until testing has demonstrated that the hazardous atmosphere has been eliminated.
- ❖ Entry Procedures. The entry will not take place under any of the following conditions: 1.) Testing demonstrates the existence of dangerous or deficient conditions and additional ventilation cannot reduce concentrations to safe levels; 2.) The atmosphere tests as safe but unsafe conditions can reasonably be expected to develop; 3.) It is not feasible to provide for ready exit from spaces equipped with automatic fire suppression systems and it is not practical or safe to deactivate such systems; or 4.) An emergency exists and it is not feasible to wait for pre-entry procedures to take effect.
- ❖ All personnel must be trained. The appropriate personal protective equipment shall be worn by any person entering the space. At least one attendant shall remain outside of the space ready to give assistance in case of emergency. The attendant shall have the appropriate personal protective equipment available for immediate use. There shall be at least one additional person within sight or call of the attendant. Continuous communications shall be maintained between the entrant within the confined space and the attendant.

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- ❖ If at any time the entrant acts erratically or stops moving, verbal contact will be made. If there is any reason to doubt the safety of the entrant or there is no response, local fire department rescue personnel shall be notified immediately by calling 911.
- ❖ If an emergency should occur, the attendant will summon help so that 911 can be called immediately and non-entry rescue can be performed. Attendants will not attempt to enter the space to perform rescue. Only trained local authorities can make an entry rescue.
- ❖ Note that ANY situation requiring rescue, even simply non-entry rescue, requires calling 911 so the fire department and other emergency services can respond.
- ❖ Non-entry rescue means removing the entrant from the space without any part of the rescuer's body entering the space. It is done by pulling the entrant from the space using retrieval line if possible.
- ❖ A quick evaluation of the specific situation should be done before pulling on the retrieval line to determine if non-entry rescue should be initiated. In some cases it may not be possible to pull the entrant from the space, or pulling the entrant from the space may create a greater hazard or further injure the entrant. Examples include a situation where the retrieval line has become caught on a projection in the space hindering retrieval, or where the entrant has fallen inside the space possibly injuring the neck or back which would require immobilization before being moved.
- ❖ The use of a hoisting device or safety harness and attached lifeline may be discontinued in any situation where their use may endanger the entrant
- ❖ When dangerous air contamination is attributable to flammable and/or explosive substances, lighting and electrical equipment shall be Class 1, Division 1 rated per National Electrical Code and no ignition sources shall be introduced into the area.

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Non-Permit Required Confined Space

If a space has no hazards, it may be considered to be a non-permit required space. Non-permit required confined spaces may be entered without a written permit provided that there are no hazards of any sort and the space is in a safe condition for entry. However a non-permit required confined space checklist must be completed. If hazards develop during entry, or if operations in the space will create hazards (such as painting or welding in the space which will affect the atmosphere inside the space) the entrant must leave the space immediately and the space must be reclassified as a permit-required space.

A permit required space may be reclassified to a non-permit required space when there are no atmospheric hazards in the space, and all other hazards may be eliminated from outside the space without requiring entry. Once all hazards have been eliminated, the space may be entered without attendant or retrieval harness. If hazards develop during entry, or if operations in the space create hazards (such as painting or welding in the space which will affect the atmosphere inside the space) the entrant must leave the space immediately and the space must be reclassified as a permit-required space.

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Permit Required Confined Space

Date and Time Issued: _____ Date and Time expires: _____

Job site/Space I.D.: _____ Entry Supervisor: _____

Equipment to be worked on: _____

Work to be performed: _____

Entry Attendant: _____

1. Atmospheric checks:	Time			8. Entry, standby and backup persons:	Yes	No	
	Oxygen			Successfully completed required			
	Explosive	%L.E.L.		training?	<input type="checkbox"/>	<input type="checkbox"/>	
	Toxic	PPM		Is it current?	<input type="checkbox"/>	<input type="checkbox"/>	
2. Testers signature:	_____			9. Equipment:	N/A	Yes	No
3. Source Isolation:	N/A	Yes	No	Direct reading gas monitor			
All mechanical, electrical				tested?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
and any other source of				Safety body harness and			
energy blinded, blocked				lifelines for entry and			
or tagged/locked out of				standby persons?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
service:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Hoisting equipment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Ventilation modification:	N/A	Yes	No	Powered communications?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mechanical:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Protective clothing?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Natural ventilation only:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10. Periodic atmospheric test:			
5. Atmospheric check after isolation and ventilation:				Oxygen	Time		
Oxygen	%	>19.5%		Explosive	Time		
Explosive	%L.E.L.	<10%		Toxic	Time		
Toxic	PPM	<10 PPM H2S		Oxygen	Time		
Time				Explosive	Time		
Testers signature:	_____			Toxic	Time		
6. Communication procedures:				Oxygen	Time		
_____				Explosive	Time		
_____				Toxic	Time		
7. Rescue procedures:							

We have reviewed the work authorized by this permit and the information contained herein. Written instructions and safety procedures have been received and are understood. Entry cannot be approved if any of the squares are marked in the "No" column. This permit is not valid unless all appropriate items are completed.

Supervisor Signature _____

This permit will be kept at the job site. Copies should be maintained at physical facilities and the safety office.

Revision Date: 4/16/14

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Non-Permit Required Confined Space Checklist

Date and Time Issued: _____ Date and Time expires: _____

Job site/Space I.D.: _____ Entry Supervisor: _____

Equipment to be worked on: _____

Work to be performed: _____

Entry Attendant: _____

<p>1. Atmospheric checks:</p> <table border="0"> <tr> <td>Time</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Oxygen</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Explosive</td> <td></td> <td>%L.E.L.</td> <td></td> </tr> <tr> <td>Toxic</td> <td></td> <td>PPM</td> <td></td> </tr> </table> <p>2. Testers signature: _____</p> <p>3. Source Isolation:</p> <table border="0"> <tr> <td>N/A</td> <td>Yes</td> <td>No</td> </tr> <tr> <td colspan="3">All mechanical, electrical and any other source of energy blinded, blocked or tagged/locked out of service:</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table> <p>4. Ventilation modification:</p> <table border="0"> <tr> <td>N/A</td> <td>Yes</td> <td>No</td> </tr> <tr> <td colspan="3">Mechanical:</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td colspan="3">Natural ventilation only:</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table> <p>5. Atmospheric check after isolation and ventilation:</p> <table border="0"> <tr> <td>Oxygen</td> <td>%</td> <td>>19.5%</td> </tr> <tr> <td>Explosive</td> <td>%L.E.L.</td> <td><10%</td> </tr> <tr> <td>Toxic</td> <td>PPM</td> <td><10 PPM H2S</td> </tr> <tr> <td>Time</td> <td></td> <td></td> </tr> <tr> <td>Testers signature:</td> <td colspan="2">_____</td> </tr> </table> <p>6. Communication procedures: _____</p> <p>_____</p> <p>_____</p>	Time				Oxygen				Explosive		%L.E.L.		Toxic		PPM		N/A	Yes	No	All mechanical, electrical and any other source of energy blinded, blocked or tagged/locked out of service:			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	N/A	Yes	No	Mechanical:			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Natural ventilation only:			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Oxygen	%	>19.5%	Explosive	%L.E.L.	<10%	Toxic	PPM	<10 PPM H2S	Time			Testers signature:	_____		<p>8. Entry, standby and backup persons:</p> <table border="0"> <tr> <td>Yes</td> <td>No</td> </tr> <tr> <td colspan="2">Successfully completed required training?</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td colspan="2">Is it current?</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table> <p>9. Equipment:</p> <table border="0"> <tr> <td>N/A</td> <td>Yes</td> <td>No</td> </tr> <tr> <td colspan="3">Direct reading gas monitor tested?</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td colspan="3">Safety body harness and lifelines for entry and standby persons?</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td colspan="3">Hoisting equipment?</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td colspan="3">Powered communications?</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td colspan="3">Protective clothing?</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table> <p>10. Periodic atmospheric test:</p> <table border="0"> <tr> <td>Oxygen</td> <td>Time</td> </tr> <tr> <td>Explosive</td> <td>Time</td> </tr> <tr> <td>Toxic</td> <td>Time</td> </tr> <tr> <td>Oxygen</td> <td>Time</td> </tr> <tr> <td>Explosive</td> <td>Time</td> </tr> <tr> <td>Toxic</td> <td>Time</td> </tr> <tr> <td>Oxygen</td> <td>Time</td> </tr> <tr> <td>Explosive</td> <td>Time</td> </tr> <tr> <td>Toxic</td> <td>Time</td> </tr> <tr> <td>Oxygen</td> <td>Time</td> </tr> <tr> <td>Explosive</td> <td>Time</td> </tr> <tr> <td>Toxic</td> <td>Time</td> </tr> </table>	Yes	No	Successfully completed required training?		<input type="checkbox"/>	<input type="checkbox"/>	Is it current?		<input type="checkbox"/>	<input type="checkbox"/>	N/A	Yes	No	Direct reading gas monitor tested?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Safety body harness and lifelines for entry and standby persons?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Hoisting equipment?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Powered communications?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Protective clothing?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Oxygen	Time	Explosive	Time	Toxic	Time	Oxygen	Time	Explosive	Time	Toxic	Time	Oxygen	Time	Explosive	Time	Toxic	Time	Oxygen	Time	Explosive	Time	Toxic	Time
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Employee Signature _____

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