

Confined Space Entry

	Page
	<u>Introduction</u>
Purpose	2
Background	2
Who's Covered?	3
Responsibilities	3
Explanation of Key Terms	3
	 <u>How It Works</u>
Identification of Permit-Required Confined Spaces	4
Preventing Unauthorized Entry	4
Authorized Permit Space Entries	4
Conditional Entry Procedure	5
Permit-Required Entry Procedure	7
Modified/Additional Requirements for Elevations Above 5000 ft	10
Training	11
Informing Contractors	11
Concurrent Contractor/University Entries	12
Program Review	12
	 <u>Appendix</u>
A – Conditional Confined Space Entry Tag	13
B – Confined Space Entry Permit	14

INTRODUCTION

PURPOSE

The purpose of this Health and Safety Instruction (HSI) is to protect employees from hazards associated with entry into and work within confined spaces.

BACKGROUND

Employees who work in permit-required confined spaces face significant risks from safety and health hazards including: asphyxiating, combustible and/or toxic atmospheres, moving parts, engulfment hazards, noise, heat, cold, electrical shock hazards, falls, communication problems, difficulty entering and exiting, etc. To control or eliminate the hazards posed by confined spaces, the Occupational Safety and Health Administration (OSHA) issued the Permit-Required Confined Spaces Standard (29 CFR 1910.146), also known as the “The Confined Space Standard.” Under the standard, the **University of Arizona (UA)** is required to:

- Identify all permit-required confined spaces in their workplace.
- Prevent unauthorized entry into them.
- Train and protect authorized workers (including contractors) from confined space hazards through a written Permit-Space Entry Program.

This HSI, developed by **Risk Management Services** serves as the UA’s written Permit Space Entry Program. It outlines the minimum requirements for protecting employees from hazards associated with entry into and work within confined spaces. It also outlines the minimum requirements for achieving compliance with OSHA’s Permit-Required Confined Spaces Standard.

WHO'S COVERED?

Employees are covered by this HSI if they are involved with entry into confined spaces.

RESPONSIBILITIES

Safety is a line-management function. The core of the document is color-coded as below to clearly identify who is responsible for the various aspects of the Program:

- **Management** is ultimately responsible for implementation of the Confined Space Entry Program, including ensuring that those under their control have the authority and resources to implement the Program, and for ensuring that areas under their charge are in compliance with the Program.
- **Supervision** is operationally responsible for implementation of the Program, and
- **Employees** are responsible for following rules and working safely.
- **Risk Management Services** is a technical resource to line-management.

EXPLANATION OF KEY TERMS

Entry means breaking the plane of the confined space entrance with any part of the body.

A **confined space** is a space that:

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

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

- Contains or has the potential to contain a hazardous atmosphere (i.e., toxic, explosive, or asphyxiating).
- Contains a material that has the potential for engulfing an entrant (e.g., grain in a grain elevator or water in a sewer line).
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross section.
- Contains any other recognized serious safety or health hazard.

HOW IT WORKS

IDENTIFICATION OF PERMIT SPACES

First-line supervisors are responsible for evaluating the work area and determining if any confined spaces are permit-required confined spaces. **Risk Management Services** is responsible for assisting first-line supervisors in making these determinations.

PREVENTING UNAUTHORIZED ENTRIES

If the work area contains permit spaces, **first-line supervisors** are responsible for preventing unauthorized entries by their employees. **First-line supervisors** must post a danger warning at the entrance(s) to the permit space(s) and lock the permit space(s) which are easily opened, if possible. If not possible, **first-line supervisors** must at least lock the permit space(s) and/or inform employee in writing of the existence, location and the danger posed by the permit space. Danger warnings must state the following information.



Warning signs and spray paint stencils are available from Risk Management Services by calling 621-1790.

AUTHORIZED PERMIT SPACE ENTRIES

First-Line Supervisors are responsible for ensuring that permit spaces to be entered and the associated work are evaluated to determine the type and extent of the hazards. **Risk Management Services and RMS-designated, qualified representative** (persons provided special training by RMS) are responsible for providing assistance to first-line supervisors. Before a permit space is entered, all hazards must be eliminated or controlled (i.e., made reasonably safe). Control of hazards is different from elimination of hazards since a person could be injured upon failure of the control.

- If ALL HAZARDS can be ELIMINATED before entry, then the conditional entry procedure may be followed.
- If ALL HAZARDS cannot be eliminated but can be CONTROLLED before entry, the permit-required entry procedure must be followed.
- If ALL HAZARDS cannot be either ELIMINATED or CONTROLLED, the permit space must not be entered.

First-Line Supervisors are responsible for providing all necessary equipment, ensuring that equipment is properly maintained and ensuring that employees use equipment properly.

Facilities Management has equipment designated for use on entry into permit spaces. **First-Line Supervisors** in other departments should arrange to borrow the necessary equipment from Facilities Management or purchase their own for regular use. **First-Line Supervisors** are also responsible for arranging the services of Risk Management Services or a RMS-designated, qualified representative (a person who has been provided special training by RMS). Contact Risk Management Services at 621-1790 for assistance.

CONDITIONAL ENTRY PROCEDURE

This procedure alone can be utilized by employees (working in at least pairs) to enter permit spaces provided ALL HAZARDS can be ELIMINATED before entry. If all hazards are eliminated before entry, the space is not considered a permit-required confined space. If one of these employees is not a Risk Management Services, qualified representative, then a representative from RMS is also required.

Secure Space

1. Make it safe to remove the entrance cover, if present (e.g., divert car, bicycle and/or pedestrian traffic, reduce pressure or temperature inside the space, eliminate drifting vehicle exhaust, etc.).
2. Open the entrance cover (if present) slowly and carefully to avoid sparking which may ignite explosive gases, if present.
3. Guard the opening with a railing, temporary cover, or other temporary physical barrier that will prevent people or materials from falling in.

Eliminate Non-Atmospheric Hazards

ELIMINATE all other non-atmospheric hazards. This includes moving parts, engulfment hazards, noise, heat, cold, electrical shock hazards, falls, etc. (e.g., lockout/tagout interconnected process lines and electrical service).

Test Air

1. Test the air just inside of the entrance for the following atmospheric hazards: oxygen content, flammable gases and vapors, and potential toxic air contaminants (in this order). If no dangerous atmospheric conditions are detected, remotely test the various levels of the confined space, from top to the bottom (NOTE – When possible, and when the confined space entrance has a cover, test the air just inside the entrance through holes or other small openings, before the cover is removed).
 - The air must be tested by **Risk Management Services or an RMS-designated, qualified representative**.

- The testing must be conducted using a calibrated, direct-reading instrument(s). Each calibration must be recorded and kept on file for a least one year.
 - The air testing instrument must be explosion-proof and equipped with alarms that will alert employees when a hazardous condition develops. Alarms must be set at 19.5% and 23.5% oxygen, 10% of the lower explosive limit and at the Threshold Limit Value (TLV) of any toxic gas/vapor tested.
2. Enter the permit space only if the following atmospheric conditions are present:
- The oxygen content of the internal atmosphere is between 19.5% and 23.5%.
 - No appreciable flammable gases, vapors, mists or dusts, or potential toxic air contaminants are detected.
 - The atmosphere is not expected to change.

Ventilate (if necessary)

1. Force-air ventilate the permit space if necessary to ELIMINATE any atmospheric hazards and re-test the air until acceptable atmospheric conditions are present (NOTE – Control of atmospheric hazards through forced air ventilation does not constitute ELIMINATION of the hazard since the entrant could be injured upon failure of the control system. If ventilation is used to control atmospheric hazards the Permit-Required Entry Procedure must be followed).
 - Make sure the air supply is from a clean source (e.g., away from vehicle exhaust).
2. Continue the forced-air ventilation if desired or if the entry period is expected to be long.

Certify

1. Certify that ALL HAZARDS have been ELIMINATED by completing a Conditional Confined Space Entry Certification tag shown in Appendix A
 - The **Risk Management Services or an RMS-designated, qualified representative air tester** must certify by signature that ALL atmospheric hazards have been ELIMINATED
 - The **entry supervisor** must certify by signature that ALL non-atmospheric hazards have been ELIMINATED.
2. Display the completed tag near the entrance of the confined space for all entrants to see.

The space is now classified as a non-permit required confined space for as long as ALL hazards are ELIMINATED. When there are changes in the use of configuration of the confined space that might create hazards to entrants, each entrant must leave the space

immediately. The entry supervisor must reevaluate the space and, if necessary, follow the Permit-Required Entry Procedure.

Upon completion of the entry, the completed certification tag must be mailed or delivered to Risk Management Services for program evaluation purposes.

PERMIT-REQUIRED ENTRY PROCEDURE

This procedure must be utilized by trained employees for entry into permit spaces where the HAZARDS CANNOT BE ELIMINATED but CAN BE CONTROLLED. At least three, and possibly four, employees are required for permit space entries: an authorized entrant, an authorized attendant, and an entry supervisor. If one of these employees is not a Risk Management Services, qualified representative, then a representative from RMS or a RMS-designated, qualified representative is also required.

Secure Space

1. Make it safe to remove the entrance cover, if present (e.g., divert car, bicycle and/or pedestrian traffic, reduce pressure or temperature inside the space, eliminate drifting vehicle exhaust, etc.).
2. Open the entrance cover (if present) slowly and carefully to avoid sparking which may ignite explosive gases, if present.
3. Guard the opening with a railing, temporary cover, or other temporary physical barrier that will prevent people or materials from falling in.

Test Air

1. Test the air just inside of the entrance for the following atmospheric hazards: oxygen content, flammable gases and vapors, and potential toxic air contaminants (in this order). Remotely test the various levels of the confined space, from top to the bottom (NOTE – When possible, and when the confined space entrance has a cover, test the air just inside the entrance through holes or other small openings, before the cover is removed).
 - The air must be tested by **Risk Management Services or an RMS-designated, qualified representative**.
 - The testing must be conducted using a calibrated, direct reading instrument(s). Each calibration must be recorded and kept on file for a least one year.
 - The air testing instrument must be explosion-proof and equipped with alarms that will alert employees when a hazardous condition develops. Alarms must be set at 19.5% and 23.5% oxygen, 10% of the lower explosive limit and at the Threshold Limit Value (TLV) of any toxic gas/vapor tested.

Issue/Comply with Permit to Control Hazards

1. Once the space is secured and the air tested, the **Risk Management Services or an RMS-designated, qualified representative** will determine the entry requirements for the particular space based on: the results of the initial air testing, the particular characteristics of the space; the activities to be conducted, and their professional judgment. He/She will outline these requirements on the entry permit shown in Appendix B and discuss them with the entry supervisor. Information contained in the entry permit will include:
 - The permit space to be entered.
 - The purpose of the entry.
 - The date and the authorized duration of the entry permit.
 - The names of authorized entrants.
 - The names of personnel serving as attendants.
 - The names of the individual serving as entry supervisor.
 - The actual or potential hazards of the confined space to be entered.
 - The measures required to control or eliminate these hazards (e.g., periodic or continuous atmospheric testing, ventilation, etc.).
 - The acceptable air conditions (i.e., oxygen content, % lower explosion limit, toxic gas/vapor concentration).
 - The time and results of initial and periodic atmospheric tests and the initials of the tester(s).
 - The rescue procedures and emergency services that can be summoned and the means for summoning those services.
 - The communication procedures used by authorized entrants and attendants to maintain contact during the entry.
 - Any other information whose inclusion is necessary, given the circumstances of the particular confined space, in order to ensure employee safety.
 - Any additional permits, such as for hot work (i.e., Hot Work Permit), that have been issued to authorize work in the permit space.
2. Before the entry is authorized, the **entry supervisor** must sign the entry permit to document the accuracy of information on the permit and completion of measures specified by RMS or the RMS-designated, qualified representative.
3. At least one attendant must be provided outside the permit space into which entry is authorized for the duration of entry operations. Attendants may be assigned to monitor more than one entrant provided their duties can be carried out. Communications between the attendant(s) and entrant(s) must be maintained throughout entry.
4. The completed permit must be made available at the time of entry to all authorized entrants, by posting it at the entry opening or by any other equally effective means, so that the authorized entrant(s) and attendant(s) are aware of the permit requirements and confirm that pre-entry preparations have been completed.

Rescue

UNIVERSITY OF ARIZONA EMPLOYEES MUST NEVER ENTER A PERMIT SPACE TO CONDUCT RESCUES! All rescue attempts by UA employees must be conducted from outside the space, if possible, using retrieval lines and other non-entry rescue equipment (e.g., extraction devices). Only **local Fire Department personnel** shall enter a permit space to conduct rescues.

Cancel Permit

1. The duration of the permit must not exceed the time required to complete the assigned task or job identified on the permit. The **entry supervisor** must terminate entry and cancel the entry permit when:
 - Entry operations covered by the entry permit have been completed.
 - A condition that is not allowed under the entry permit arises in or near the permit space.
2. Upon completion of the entry, the cancelled entry permit must be mailed or delivered to Risk Management Services for program evaluation purposes.

Authorized entrants are responsible for:

- Knowing the entry hazards and their possible harmful consequences.
- Properly using all equipment (e.g., ventilators, personal protective and rescue equipment, etc.).
- Communicating with the authorized attendant.
- Alerting the authorized attendant whenever hazardous conditions are detected.
- Quickly exiting from the permit space whenever: the authorized attendant or the entry supervisor says: whenever a hazardous condition is detected, or the air testing instrument(s) alarm(s).

Attendants are responsible for:

- Knowing the entry hazards and their possible harmful consequences.
- Maintaining an accurate count of authorized entrants in the permit space.
- Remaining outside the permit space during entry operations until relieved by another authorized attendant.
- Communicating with authorized entrants to monitor their status and to alert them if there is a need to exit the space.
- Monitoring activities inside and outside the space to determine if it is safe for entrants to remain in the space.
- Ordering the authorized entrants to exit the permit space immediately if: a hazardous condition is detected inside or outside the space; the authorized entrant acts abnormal, or it is not possible to perform all attendant duties.
- Warning unauthorized persons to stay out of, and away from the permit space.
- Informing authorized entrants and the entry supervisor if unauthorized persons have entered the permit space.

- Summoning rescue and other emergency services, if necessary.
- Performing non-entry rescues and other emergency services, if possible.
- Performing no other concurrent duties that might interfere with the above mentioned duties.

Entry Supervisors are responsible for:

- Knowing the entry hazards and their possible harmful consequences.
- Verifying that all the requirements specified by the permit have been completed before signing the permit and allowing entry to begin.
- Stopping the entry and canceling the permit, as required.
- Confirming that rescue services are available and that the means for summoning them are operable.
- Removing unauthorized persons who enter or who attempt to enter the permit space during operations.
- Determining whenever responsibility for a permit space entry operation is transferred.
- Evaluation the entry operations, as necessary, to ensure the entry permit requirements are maintained.

MODIFIED/ADDITIONAL REQUIREMENTS FOR ELEVATIONS ABOVE 5000 ft

First-Line Supervisors are responsible for ensuring the following additional precautions are taken for ALL confined space entries at altitudes above 5000 ft.:

- If pre-entry air testing shows an oxygen concentration <20.9%, the confined space must be thoroughly evaluated to determine the cause and actions must be taken to assure a 20.9% oxygen atmosphere is present before entry (unless atmosphere-supplying respirator are part of a Permit-Required Entry Procedure).
- Workers must be acclimatized to the altitude of work and trained on the effects of altitude on respiration.
- Rest-work cycles must be used with reduced work rates, increased rest periods.
- At least one attendant must be provided outside the space for the duration of entry operations. Attendants may be assigned to monitor more than one entrant provided their duties can be carried out. Communications between the attendant(s) and entrant(s) must be maintained throughout entry with close observation and monitoring of workers. Entrant(s) showing any sign of oxygen deficiency or other abnormal behavior or symptoms must be immediately ordered out of the space and evaluated.
- The air within the space must be continuously monitored during entry using an instrument with the low oxygen alarm set at 20.5%. (Exception - Continuous monitoring can be substituted with continuous ventilation but only in the Conditional Entry Procedure).

TRAINING

First-line supervisors are responsible for providing confined space entry training:

- Before employees are allowed to be involved in permit space entries.
- Before there is a change in assigned duties that require permit space entry.
- Whenever a change in permit space operations presents a new hazard about which an employee has not previously been trained.
- Whenever first-line supervisors and/or Risk Management Services have reason to believe that deviations from the permit space entry procedures are occurring or that inadequacies exist in employees' knowledge or use of these procedures.

Training for employees must include:

- An explanation of the potential health hazards associated with confined spaces.
- A discussion of methods used to control confined space hazards.
- An explanation of the UA Permit-Required Confined Space Program, including the specific duties of those involved (e.g., supervisory personnel, authorized entrants, attendants, entry supervisors, RMS, UA employees who oversee contractors).

Training must be easy to understand and communicated orally, either in person or through audio visual means.

First-line supervisors must keep adequate documentation to show that training has been provided through a written certification which contains each employee's name, the signature(s) of initial(s) of the trainer(s) and the date of training.

To assist with training, Risk Management Services conducts a class to explain the UA Confined Space Safety Program and special classes to train selected employees (RMS-designated, qualified representatives) in the details of evaluation and controlling confined space hazards. Call 621-1790 for details.

INFORMING CONTRACTORS

UA employees who oversee outside servicing personnel (i.e., contractors), are responsible for ensuring that outside contractors are informed of work that involves a permit space. This includes:

- Informing the contractor of workplace permit spaces and that permit space entry is allowed only through compliance with a Permit Space Entry Program meeting the requirements of the OSHA Permit-Required Confined Spaces Standard (29 CFR 1910.146).
- Appraising the contractor of the elements, including the hazards identified and the University's experience with the space, that makes the space in question a permit space.
- Appraising the contractor of any precautions or procedures that the University has implemented to protect employees in or near the permit spaces where contractor personnel will be working.

The above must be done in a pre-project meeting with the contractor before work is authorized to begin so that all involved (i.e., UA employees and contractor employees) are on the same page with regards to confined space entry and other safety issues. The contractor must have and follow their own written Permit Space Entry Program, conduct their own air testing, train their own employees, etc.

CONCURRENT CONTRACTOR/UNIVERSITY ENTRIES

UA employees who oversee outside contractors are responsible for coordinating permit space entry operations where UA employees and contractors are working simultaneously as authorized entrants in a permit space, so that employees of one employer do not endanger the employees of any other employer.

The above must be done in a pre-project meeting with the contractor before work is authorized to begin so that all involved (i.e., UA employees and contractor employees) are on the same page with regards to confined space entry and other safety issues. Concurrent contractor/university entries must follow UA Confined Space Entry Procedures as outlined in this HIS.

At the conclusion of entry operations, UA contractor oversight personnel must debrief the contractor regarding any hazards confronted or created in the permit space during entry operations. **Risk Management Services** are responsible for assisting UA contractor oversight personnel in fulfilling their responsibilities

PROGRAM REVIEW

Risk Management Services (RMS) is responsible for reviewing entry operations when there is reason to believe that the measures taken under this HIS may not protect employees. **RMS** must revise this HIS and correct deficiencies found to exist before subsequent entries are authorized. **RMS** is also responsible for performing an annual review of all entries performed during the previous 12-month period using the canceled entry permits and tags. **RMS** must revise this HIS as necessary to ensure that employees participating in the entry operation are protected from permit space hazards.

APPENDIX A
CONDITIONAL CONFINED SPACE ENTRY TAG

**Conditional
Confined Space Entry**

**Hazard Elimination
Certification**

Space Location: _____

I certify that all air hazards are eliminated

Air Tester: _____
(SIGNATURE)

Date: _____ Time: _____

I certify that all non-air hazards are eliminated
and that the Conditional Entry Procedure will
be followed.

Entry Supervisor: _____
(SIGNATURE)

Date: _____ Time: _____

**This confined space may only be
entered upon completion of this tag**

**Return tag to Risk Management & Safety
upon completion of entry**

THE UNIVERSITY OF
ARIZONA
TUCSON ARIZONA

APPENDIX B
CONFINED SPACE ENTRY PERMIT

THE UNIVERSITY OF ARIZONA
CONFINED SPACE ENTRY PERMIT

DATE: _____ LOCATION: _____
 PURPOSE OF ENTRY: _____
 ENTRY SUPERVISOR: _____ AUTHORIZED DURATION OF ENTRY: _____
 NAMES OF AUTHORIZED ENTRANTS: _____ NAMES OF ATTENDANTS: _____

ACTUAL OR POTENTIAL HAZARDS OF PERMIT SPACE (specify those that apply)

<input type="checkbox"/> Asphyxiating Atmosphere _____	<input type="checkbox"/> Engulfment Hazards _____
<input type="checkbox"/> Toxic Atmosphere _____	<input type="checkbox"/> Moving Parts _____
<input type="checkbox"/> Flammable Atmosphere _____	<input type="checkbox"/> Electrical Hazards _____
<input type="checkbox"/> Poor Lighting _____	<input type="checkbox"/> Excessive Noise _____
<input type="checkbox"/> Converging Internal Configuration _____	<input type="checkbox"/> Extreme Heat _____
<input type="checkbox"/> Falling Objects _____	<input type="checkbox"/> Severe Cold _____
<input type="checkbox"/> Slippery Surfaces _____	<input type="checkbox"/> Fall Hazards _____
<input type="checkbox"/> Interconnected Process Lines _____	<input type="checkbox"/> Tripping Hazards _____
_____	<input type="checkbox"/> Other _____

MEASURES REQUIRED TO CONTROL THE HAZARDS (specify those that are required)

Air Testing	Special Equipment and Tools
<input type="checkbox"/> Periodic _____	<input type="checkbox"/> Lighting _____
<input type="checkbox"/> Continuous _____	<input type="checkbox"/> Scaffolding _____
Ventilation	<input type="checkbox"/> Explosion-Proof Tools _____
<input type="checkbox"/> Forced Air _____	Communications and Equipment
<input type="checkbox"/> Exhaust _____	<input type="checkbox"/> Verbal or Visual _____
Isolation (Lock/Tag/Clear/Try)	<input type="checkbox"/> Two-Way Radio _____
<input type="checkbox"/> Moving Parts _____	<input type="checkbox"/> Mobile Phone _____
<input type="checkbox"/> Electrical Energy _____	Rescue Equipment
<input type="checkbox"/> Interconnected Process Lines _____	<input type="checkbox"/> Body Harness _____
Safety Equipment and Clothing	<input type="checkbox"/> Wristlets _____
<input type="checkbox"/> Eye and Face Protection _____	<input type="checkbox"/> Retrieval Line _____
<input type="checkbox"/> Head Protection _____	<input type="checkbox"/> Extraction Device _____
<input type="checkbox"/> Foot Protection _____	Other
<input type="checkbox"/> Body Protection _____	<input type="checkbox"/> Fire Extinguisher _____
<input type="checkbox"/> Hand Protection _____	<input type="checkbox"/> Hot Work Permit (attach) _____
<input type="checkbox"/> Hearing Protection _____	<input type="checkbox"/> _____
<input type="checkbox"/> Respiratory Protection _____	_____

Acceptable Air Conditions: _____ % Oxygen < _____ % LEL < _____ PPM or Mg/M³ Toxic _____
 Air Testing Equipment Used: _____ Is instrument calibrated? _____
 Oxygen (%) _____
 Flammable (%LEL) _____
 Toxic (PPM or Mg/M³) _____
 Time/Initials _____ / _____ / _____ / _____ / _____ / _____

Rescue Procedure (specify procedure):

<input type="checkbox"/> Do not enter space to attempt rescue	<input type="checkbox"/> Prior to entry, place Fire Dept. on notice of potential need of services
<input type="checkbox"/> Do not leave space until emergency services arrive	<input type="checkbox"/> Extract from outside of space
<input type="checkbox"/> Call Fire Dept. - 911 for emergency services	<input type="checkbox"/> Radio _____ to request emergency services
<input type="checkbox"/> Verbally request _____ to summon emergency services by <input type="checkbox"/> phone <input type="checkbox"/> radio	
<input type="checkbox"/> Other _____	

PERMIT PREPARED BY: (print) _____ (signature) _____
 ENTRY SUPERVISOR AUTHORIZING ENTRY (signature) _____
NOTICE: This permit is to be kept at the job site until cancelled
 Return cancelled permit to Risk Management and Safety. **CANCELLED:** (time) _____