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**Safety**

**THE CONFINED SPACE PROGRAM**



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This instruction implements AFD 91-3, Occupational Safety and Health and AFOSH Standard 91-25, Confined Spaces and 29CFR 1910.146 Permit Required Confined Spaces. This instruction provides guidance for establishing a confined space program that covers entering and working in confined areas. The program will apply to all personnel whose duties require them to enter and work in these areas. Personal safety is paramount and at no time should it be compromised. Therefore, each unit that possesses identified confined spaces or performs tasks that require entry into confined spaces shall establish a written confined space entry program in accordance with AFOSH Standard 91-25 and 29CFR1910.146.

**1. REFERENCES:**

AFOSH Standard 91-25, Confined Spaces

- 1.1. 29 CFR 1910.146, Permit Required Confined Spaces
- 1.2. 29 CFR 1910.268 Telecommunications
- 1.3. Technical Order 00-25-245, Inspection of Rescue Equipment
- 1.4. Technical Order 1-1-3, Inspection and Repair of Aircraft Integral Tanks and Fuel Cells

**2. DEFINITIONS:**

2.1. Confined Space - A space that:

- 2.1.1. Is large enough and so configured that an employee can bodily enter and perform assigned work.
- 2.1.2. Has limited means for entry and exit;
- 2.1.3. Is not designed for continuous occupancy.

2.2. Permit Required Confined Space - is a confined space that has one or more of the following characteristics:

2.2.1. Contains, or has the potential to contain, a hazardous atmosphere;

2.2.1.1. Classification must take into consideration the probability factors when classifying a confined space.

2.2.2. Contains a material that has the potential for engulfing the entrant;

2.2.3. Has an internal configuration such that the entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross section.

2.2.4. Contains any other recognized serious health hazard.

2.3. Non permit Confined Spaces - a space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.

### **3. RESPONSIBILITIES:**

#### **3.1. Confined Space Program Management Team (CSPT) will:**

3.1.1. Be comprised of Wing Safety (437 AW/SEG), Fire Department (437 CES/CEF), Bioenvironmental Engineering Flight (437 MG/SGPB) and functional managers or designated representative.

3.1.1.1. The 437 AW/SEG will be responsible for safety program management.

3.1.2. Assist supervisors in classifying confined spaces located on base according to the above definitions of permit required and non permit required spaces.

3.1.3. Assist organizations with developing a Master Entry Plan for recurring entries having the same conditions and entry requirements. The plan must be approved by the CSPT.

3.1.4. Determine monitoring requirements.

3.1.5. Review the results of unit annual safety evaluations.

3.1.6. Periodically observe permit required entries covered under the Master Entry Plan (MEP).

#### **3.2. Organization/Units will:**

3.2.1. Ensure a written confined space program is developed IAW this CAFBI.

3.2.1.1. Ensure that Mission Risk Assessments (Job Safety Analysis) are completed for all confined space work.

3.2.1.2. Ensure a lockout/tagout program is included in the confined spaces program and entering personnel are trained in lockout/tagout procedures.

3.2.2. Coordinate with 437 AW/SE, 437 CES/CEF, and 437 MG/SGPB to classify confined spaces. The classification will be based on the characteristics of the space including, oxygen levels, flammability, carbon monoxide levels, sulfur dioxide, hydrogen sulfide levels, and any other recognized safety and/or health hazard.

3.2.2.1. Use the confined space survey to aid in the classification process. When completed,

this survey can become part of the unit's confined space program. The survey will be provided by CSPT.

3.2.3. Ensure that funds are included in their annual budget for initial and continuing confined space training and confined space equipment which includes: personal protective equipment, monitoring equipment, and confined space extraction equipment.

3.2.4. Designate entry supervisors.

3.2.5. Commander designated Confined Space Representatives will:

3.2.5.1. Maintain a master file of squadron MEP's

3.2.5.2. Maintain a list of squadron personnel qualified to enter confined spaces

3.2.5.3. Maintain a list of personnel that require confined space training

3.2.5.4. Maintain a list of qualified entry supervisors

3.2.5.5. Maintain the squadrons expired permits on file for one year.

3.2.5.6. Maintain and provide Wing Safety, Bioenvironmental, and Base Fire Department a list of the squadrons confined spaces that includes location and type of space.

3.2.5.7. Maintain a list of the squadron's confined space equipment that includes: type of equipment, the date the equipment was last calibrated or inspected, and next inspection calibration date for the equipment.

3.2.5.8. Maintain a list of chemicals used by the squadron in its confined spaces operations.

### **3.3. Work center and or entry supervisor will:**

3.3.1. Maintain the Master Entry Plan (MEP) for the shop.

3.3.2. Prepare entry permits and contact Wing Safety, Fire Dept., and Bioenvironmental Engineering Flight for all entries not covered by the Master Entry Plan. Provide completed copies to CSPT members.

3.3.3. Issue permits in accordance with the MEP.

3.3.4. Revoke permits and notify 437 AW/SEG in writing when entry conditions are not consistent with the MEP.

3.3.5. Reclassify confined spaces from permit to non-permit IAW appropriate guidelines contained in this instruction.

3.3.6. Reclassify confined spaces from non-permit to permit IAW appropriate guidelines contained in this instruction.

3.3.7. Determine if conditions are acceptable for entry into a confined space.

3.3.8. Make sure workers are properly trained and qualified in safe operating procedures, emergency procedures, proper use of personal protective equipment (PPE), and how to egress confined spaces.

3.3.9. Brief workers on the hazards of entry prior to each entry.

3.3.10. Inspect work areas, tools, and equipment to identify and correct hazards.

- 3.3.11. Make sure that all physical and atmospheric hazards are abated to a reasonable extent.
- 3.3.12. Select proper PPE (with guidance from the CSPT) and make sure that it is readily available and works properly.
- 3.3.13. Make sure that emergency procedures have been developed and that emergency services are readily available.
- 3.3.14. Provide an attendant for each permit entry.
- 3.3.15. Provide appropriate barriers to vehicles and pedestrians to protect the entry party.

**3.4. Entrants will:**

- 3.4.1. Fully understand entry and egress procedures.
- 3.4.2. Follow safe work practices and immediately notify the supervisor when an unsafe condition is identified.

**3.5. Attendants will:**

- 3.5.1. Maintain an accurate count of all personnel entering and exiting the space.
- 3.5.2. Maintain continuous communications with the entrants.
- 3.5.3. Order entrants to evacuate when an unsafe condition occurs.
- 3.5.4. Notify emergency services when required.
  - 3.5.4.1. Ensure proper communications with emergency services, i.e., radio, cell phone, etc.
- 3.5.5. Remain outside the space until all entrants have exited the space or unless replaced by a qualified attendant.
- 3.5.6. Prohibit unauthorized persons from entering the space.
- 3.5.7. Not perform any rescues that requires entry until the rescue team has been notified and assistance has arrived.

**NOTE:** Would-be rescuers comprise over 60% of all confined space fatalities.

**4. TRAINING:**

- 4.1. Training is a vital part of every confined space program. All personnel whose duties require them to enter and work in these spaces shall be trained.
- 4.2. Personnel who perform duties as confined space entry supervisors, attendants, and entrants will be trained on the criteria outlined in this instruction and the squadrons written program and or O.I.
- 4.3. Entrants shall be trained on:
  - 4.3.1. The duties outlined in AFOSH Std 91-25, Para 2.16.
  - 4.3.2. The duties outlined in section 3.4 of this standard.
  - 4.3.3. Hazard recognition and hazard abatement.
  - 4.3.4. The proper use of all PPE.
  - 4.3.5. Self-rescue.

- 4.3.6. The effects and signs of exposure to hazardous atmospheres.
  - 4.3.7. Special work practices or procedures.
  - 4.3.8. Monitoring equipment and monitoring protocols.
  - 4.3.9. Ventilating techniques.
  - 4.4. Entry Supervisors shall be trained on:
    - 4.4.1. The duties outlined in AFOSH Std 91-25, Para 2.15.
    - 4.4.2. The duties outlined in section 3.3 of this standard.
    - 4.4.3. The effects and signs of exposure to hazardous atmospheres.
    - 4.4.4. The effective use of retrieval equipment.
    - 4.4.5. Attendants and entrants training requirements.
    - 4.4.6. Ventilating techniques.
    - 4.4.7. Monitoring equipment and monitoring procedures.
    - 4.4.8. Rescue communication techniques, i.e. who and how to call if a confined space emergency occurs.
  - 4.5. Attendants shall be trained on:
    - 4.5.1. The duties outlined in AFOSH Std 91-25, Para 2.17.
    - 4.5.2. The duties outlined in section 3.5. of this standard.
    - 4.5.3. The effective use of retrieval equipment.
    - 4.5.4. Entrants training requirements which includes special confine space work practices and procedures.
    - 4.5.5. Ventilating techniques.
    - 4.5.6. Monitoring equipment and monitoring procedures.
    - 4.5.7. Rescue communication techniques i.e., who and how to call if a confined space emergency occurs.
    - 4.5.8. The effects and signs of exposure to hazardous atmospheres.
  - 4.6. Each organization shall ensure funds are allocated to send personnel to formal confined spaced space training and/or send personnel through the wing safety confined space class.
- CAFBI 91-
- 4.6.1. Wing Safety training for the base populace will be limited to supervisors.
  - 4.6.2. 437 MG/SGPB Bioenvironmental Engineering Flight will provide training on the pre-use, calibration, use, and care of atmospheric testing and monitoring equipment and certify personnel required to test atmospheric conditions in confined spaces.
  - 4.6.3. All training shall be documented on AF Form 55, Employee Safety and Health Record.

**5. GENERAL REQUIREMENTS:**

### 5.1. Entry Permits are only good for one shift.

5.1.1. Although specific directives and technical guidance may dictate certain confined space actions, those procedures must be tailored to meet the requirements of AFOSH STD 91-25 and 29 CFR 1910.146.

5.1.2. All confined spaces designated as permit-required shall be labeled to comply with federal standards. The label/sign shall read-"DANGER-Confined Space; Entry by Permit Only." Labels/signs are required when entry into the space can be made without the use of tools to gain entry.

5.1.3. An AF Form 1024 (Air Force Confined Space Entry Permit) shall be completed and used whenever a permit-required confined space is to be entered.

5.1.4. For permit required spaces, 437 AW/SEG, 437 CES/CEF, and 437 MG/SGPB must visit the sites and verify all requirements are met prior to signing off on the permit. The coordinating agencies will only sign completed entry permits.

5.1.5. EXCEPTION: Under the MEP, the entry supervisor can issue a permit for recurring entries having the same conditions

5.1.6. The permit shall be maintained at the work site until the work is completed or the permit expires.

5.1.7. When the work is completed, permits will be placed on file and maintained by the organization who entered the confined space. Completed permits will be kept on file for one year by the confined space representative.

5.2. All permits must be evaluated at the end of each fiscal year by the organization who initiated the permit to determine potential problems with confined spaces.

## 6. PRE-ENTRY CONFINED SPACE EVALUATION:

6.1. Entry Supervisors must plan in order to make successful confined space entries. Supervisors must consider the following before allowing personnel to enter confined spaces:

6.1.1. Determine if any solvents will be taken into the space.

6.1.2. Determine if any of the solvents have a low flash point.

6.1.3. Determine if the use of solvents necessitate the use of forced air ventilation. Bioenvironmental Engineering Flight should be consulted when determining if forced air ventilation will be used, and how long the unit must be run before entry (Ref: Section 2c).

6.1.4. If forced air ventilation is used, how must the unit and its ducting be placed to get adequate breathable air to entrants.(Ref.: Section 2c)

6.1.5. Review Material Safety Data Sheets (MSDS) on the chemicals that will be used in the space. Bioenvironmental Engineering Flight shall be notified of all products used in the confined space. They will recommend appropriate controls.

**NOTE:** MSDS's do not always adequately address the hazards of the product, especially when used in a confined space.

6.1.6. Determine if conditions outside of the space may affect entrants inside.

6.1.7. Ensure tools and equipment meet requirements AFOSH STANDARD 91-25, Para 3.6.

- 6.1.8. Determine the number of personnel that will be in the space at any time.
- 6.1.9. Determine the primary function of the confined space i.e. storage tank, hopper, pit etc.
- 6.1.10. Determine if heavy motor vehicle traffic around the space could generate carbon monoxide.
- 6.1.11. Determine if chemical residues or decomposing organic matter located on the walls and floor of the confined space can liberate gases and vapors as the result of work processes in the space.

## 7. ATMOSPHERIC MONITORING:

7.1. Monitoring shall be done according to the required permit or the MEP. Monitoring of the atmosphere in a permit required confined space shall be done prior to each entry as indicated in paragraph 7.2. below. Continuous monitoring during the entry must be performed.

7.1.1. Organizations which routinely enter confined spaces shall procure appropriate monitoring equipment. All monitoring equipment must be approved by Bioenvironmental Engineering Flight and meet requirements of AFOSH STANDARD 91-25, Para 3.6 before purchasing.

7.1.2. Organizations which enter confined spaces on an infrequent basis may request Bioenvironmental to complete required testing. Bioenvironmental equipment will not be loaned.

7.1.3. The individual who will be using the monitoring equipment shall be trained by Bioenvironmental in the operation and limitations of the monitoring equipment. This is required whether the organization owns the equipment or the equipment is borrowed.

7.2. Confined spaces must be monitored for oxygen flammability, and toxicity levels. This monitoring is conducted by Bioenvironmental or the organization.

7.2.1. If the atmosphere contains less than 19.5% oxygen, it is considered oxygen deficient and personnel are not allowed to enter the space. Personnel may only enter the space if the oxygen content is at 19.5% or greater but less than 23.5%. When atmospheric concentrations decrease below 20.6% oxygen, further evaluation may be necessary if the source of contamination is not known.

7.2.1.1. Oxygen Enriched Atmospheres-If the atmosphere contains more than 23.5% oxygen, it is considered an oxygen enriched atmosphere. These atmospheres make the conditions right for flash fires and personnel are not allowed to enter the space. When atmospheric concentrations of oxygen increase above 21%, further evaluation may be necessary if the source of the additional oxygen is not known.

7.2.2. Flammability Monitoring-This monitoring shall be measured before entry into confined spaces. Continual monitoring must be conducted during the entire operation.

7.2.2.1. Lower Explosive Limit (LEL)-Individuals should not enter the space if monitoring indicates levels at or greater than 4% of the LEL, without investigating the cause of the higher readings. Atmospheres that are less than 10% of the LEL are too lean to burn. Nevertheless, when a space contains or produces measurable LEL readings below 10%, it might indicate that flammable vapors are being introduced or released in the space and could present a hazard in time. Therefore, the cause of the vapors must be investigated and, if possible, eliminated prior to entry.

7.2.2.2. Meters which measure LEL are calibrated using a specific gas. The LEL reading must be corrected for the hazard present in the confined space prior to interpreting the reading, unless the calibration gas is the same as the gas present. The operating manual of the instrument shall be consulted to determine how to perform this correction.

7.2.3. Toxicity Monitoring- If required, the CSPT will establish the requirements. There are many chemicals which may be present in confined spaces. Their presence may be prior to entry or brought in as part of the job. Monitoring for toxicity is performed by Bioenvironmental or the unit. In most cases, this type of monitoring is more complex than other confined space monitoring and requires specialized equipment. Bioenvironmental must be contacted for more details.

7.2.3.1. Hydrogen Sulfide Levels- The space must be tested for hydrogen sulfide levels. Hydrogen sulfide is a colorless gas that smells like rotten eggs and can disable entrants in seconds. Hydrogen sulfide is present in confined spaces from naturally occurring chemical reactions.

7.2.3.2. Sulfur Dioxide Levels- This gas also occurs in confined spaces from naturally occurring chemical reactions. Sulfur dioxide is also generated by the burning of hydrogen sulfide as in welding operations.

7.2.3.3. Carbon Monoxide- Carbon monoxide is an odorless, colorless gas which is a byproduct of incomplete combustion of fuel. Anytime a generator or other source of carbon monoxide is present, monitoring for the gas shall be performed.

### 7.3. Monitoring Procedures.

#### 7.3.1. General requirements.

7.3.1.1. The atmosphere of a confined space must be monitored according to strict procedures; if not, the readings may be inaccurate and the safety of entrants may be jeopardized.

7.3.1.2. Atmospheric readings are only valid for one 8 hour shift.

7.3.1.3. The atmosphere of the confined space will be re-tested after extensive breaks in the work process. For example, shift change, extensive breaks, and after lunch.

7.3.1.4. Monitoring will be done continuously while entrants are inside the confined space, unless covered in other areas of this instruction.

7.3.1.5. The continuous monitoring will be performed at the point of work operation.

7.3.1.6. Before any testing begins the person using the instrument must be trained by Bioenvironmental Engineering Flight.

### 7.4. The following procedure should be followed when monitoring confined spaces:

7.4.1. Test the air in manholes by inserting the probe through the hole in the manhole cover.

7.4.2. If there is no hole in the manhole cover use the following procedure. Open the entry way to the space, but do not open it completely. Test the air around the opening of the space. Then, insert the hose a few feet into the space and monitor the atmosphere again. If the levels are safe, open the space completely and then begin monitoring the inside of the space.

7.4.3. The space must be tested in the following sequence:

7.4.3.1. Test your oxygen levels first; next.

7.4.3.2. Test for the LEL; next

7.4.3.3. Toxicity monitoring will be conducted by Bioenvironmental Engineering Flight or the unit.

7.4.4. For vertical spaces the following procedure must be followed:

7.4.4.1. Follow section 7.4.1. to 7.4.3.3.

7.4.4.2. Lower the hose into the space until it is 1 foot from the top and begin monitoring.

7.4.4.3. After the readings are complete, lower the hose 3 feet from the top and again begin monitoring. Monitoring must be done every 3 feet until the hose reaches the bottom of the space.

7.4.4.4. For every foot of hose you should monitor at each level for 10 seconds. For example, if a monitor has a 10 foot hose then the operator should keep the hose at each 3 foot level for 100 seconds or 1.25 minutes.

7.4.4.5. Follow sections 7.4.1. to 7.4.3.3. If readings are acceptable for entry, enter the space.

7.4.4.6. Utilize a probe on the end of the monitor to test the air in front of you.

7.4.4.7. The atmosphere in front of the entrant will be tested in 2 foot increments. The probe will be held at each level for 10 seconds for every foot of hose.

7.4.4.8. The atmosphere must be tested until the entrant reaches the location inside the space where work will be performed.

7.5. Atmospheric Monitoring And Ventilation:

7.5.1. The space must be retested if ventilation equipment is used.

7.5.2. Test the space while the ventilation equipment is running. Test the dead air spaces around the ventilation stream.

**NOTE:** Ventilating a confined space may place its atmosphere in an explosive state. Also, atmospheric readings may be inaccurate if the space is tested while ventilating equipment is operating. Personnel may also make the mistake of only testing the clean air stream produced by the ventilation equipment.

## **8. EVALUATE THE SPACE TO DETERMINE IF AN ENGULFMENT HAZARD IS PRESENT:**

8.1. Engulfment hazards exist when a confined space entrant can be surrounded and captured by a liquid or finely divided solid.

8.2. Engulfment kills confined space entrants because they breathe a liquid or finely divided solid into their lungs. As a result, the lungs become filled and plugged with the liquid or finely divided solid. Engulfment can also exert enough force on the body to cause death by strangulation, constriction, and crushing.

8.3. Examples of confined spaces that can cause engulfment include saw dust bins and spaces that contain liquids.

8.4. Engulfment hazards must be minimized through the use of life lines and retrieval system

**9. EVALUATE THE SPACE TO DETERMINE IF IT HAS AN INTERNAL CONFIGURATION THAT COULD TRAP ENTRANTS:**

9.1. These spaces have areas that taper into small cross sections. Entrants become trapped in these small areas and their chest cannot expand because it is compressed.

**10. EVALUATE THE SPACE TO DETERMINE IF IT HAS OTHER RECOGNIZED SAFETY AND HEALTH HAZARDS:**

10.1. Examples of recognized safety and health hazards include the following:

10.1.1. Slippery floors.

10.1.2. Electrical hazards.

10.1.3. Burn hazards from hot water pipes.

10.1.4. 437 MG/SGPB Biological Hazards..

10.1.5. Heat extremes that can cause heat stroke/heat stress.

10.1.6. Fall Hazards.

**11. ENTRY INTO PERMIT-REQUIRED CONFINED SPACES:**

11.1. These spaces contain atmospheres or conditions which are hazardous but not Immediately Dangerous to Life and Health (IDLH).

11.2. An entry permit will be approved by 437 AW/SEG, 437 CES/CEF, and 437 MG/SGPB.

11.3. Where contamination is caused by materials or conditions within the space, the entry supervisor will identify sources and remove it to the maximum degree possible.

11.4. Operations creating hazards will be covered by the permit, and actions will be taken to minimize and control the hazards.

11.5. When toxic materials are present or may be introduced into the space, the entry supervisor shall ensure proper respiratory protective devices are available and worn when necessary by workers.

11.6. Only explosion proof or intrinsically safe equipment is used where flammable or explosive atmospheres are present.

11.7. Entrants will wear approved harnesses and lifelines that permit extraction. The lifeline will be attached to a fixed point outside the space. The lifeline will not be attached to vehicles or mobile equipment. NOTE: When the use of a lifeline would present additional hazards, other alternatives must be considered.

11.8. Entry supervisors will notify the base fire department's alarm control center that a permit required confined space entry is in progress. Entrants must leave the space if rescue personnel must respond to an emergency unless the unit has it's own rescue team on site.

11.9. An attendant shall be present for all permit entries.

11.10. If atmospheric conditions require, ventilation will be utilized to remove contaminants and provide air.

**NOTE:** Ventilation should run continuously even when workers exit the space for breaks.

11.11. Atmospheric monitoring shall be continuous throughout entry to ensure that conditions do not become IDLH.

11.12. The space shall be barricaded to prevent vehicles and pedestrians from interfering with entries.

## **12. RECLASSIFICATION OF CONFINED SPACES:**

12.1. An entry supervisor may reclassify a permit-required space as non-permit if:

12.1.1. Atmospheric testing shows the space is free of hazards.

**NOTE:** Testing must be done outside of the space. If entry must be made to test the space, then a permit is required for entry.

12.1.2. Actual or potential hazards are eliminated, and continuous monitoring is used to ensure that the atmosphere remains free of hazards.

12.1.3. During routine work, the entrant does not take tools or material into the space that could introduce a hazard.

12.1.4. The entrant does not perform any work that would cause a hazardous condition.

12.1.5. If conditions in the space become hazardous, the entry supervisor must evacuate and secure the space until an approved permit can be issued.

## **13. ENTRY INTO PERMIT REQUIRED SPACES THAT ARE IDLH:**

13.1. The CSPT will authorize entry and work in IDLH spaces.

13.2. All confined spaces on Charleston Air Force Base must be tested and evaluated by entry supervisors prior to any confined space entry to determine if the space is a permit required confined space. This evaluation is only valid for one 8 hour work shift.

13.3. The following conditions must be met for entry into IDLH atmospheres:

13.3.1. Efforts are made to reduce the hazard by isolation, ventilation, purging, inserting or other techniques. If efforts are unsuccessful, entry is only authorized in cases of EXTREME EMERGENCY.

13.3.2. The entry permit must be approved by the CSPT prior to entry.

13.3.3. Workers entering the space shall wear a positive pressure self-contained breathing apparatus or airline respirator with an escape bottle, harness, and lifeline. At no time, will the Self-contained Breathing Apparatus (SCBA) be taken off the back of the wearer while inside the space.

13.3.4. Emergency rescue personnel, equipped for extraction of workers, are stationed immediately outside of the space. Entrants must be removed from the space if rescue personnel must leave to respond to another emergency.

13.3.5. Communication is maintained at all times with entrants.

13.3.6. Only explosion proof or intrinsically safe equipment and non-sparking tools are used where flammable or explosive atmospheres are present.

13.3.7. A qualified safety official, fire protection specialist, and 437 MG/SGPB representative are present at the time of entry.

**14. ENTRY INTO NON-PERMIT SPACES:**

14.1. Entry into a non-permit confined space will require documentation that atmospheric testing was accomplished and shows the readings present at time of testing. No further testing is required if testing results are within limits specified in other parts of this publication. However if you introduce any hazardous materials, perform any operation, or change any condition, the space must be reevaluated by the CSPT. Entry is only authorized without a permit when absolutely nothing has changed from the time it was evaluated by the CSPT and current testing shows no changes from the CSPT evaluation..

14.2. The space shall be barricaded to prevent vehicles and pedestrians from interfering with entries. Even though the space is non-permit, it may be appropriate for entrants to use fall protection, radio communications, and other measures used for permit required confined spaces.

**15. LOCKOUT/TAGOUT AND THE CONTROL OF HAZARDOUS ENERGY:**

15.1. All hazardous energy sources will be isolated and controlled prior to entry.

15.2. The squadron's lockout O.I. and/or written program will be used to the fullest extent possible to protect confined space entrants from start-up and release of energy sources.

15.3. Consideration will be given to energy sources that exist in different forms to include:

15.3.1. Electrical.

15.3.2. Hydraulic

15.3.3. Water

15.3.4. Pneumatic.

15.3.5. Mechanical.

15.3.6. Springs.

15.3.7. Radiation.

15.3.8. Steam.

15.3.9. Stored energy.

15.4. Whenever possible locks must be used instead of tags.

15.5. Valve handles must be locked into place via a valve locking device, or padlock and chain.

**16. CONTRACTOR OPERATIONS:**

16.1. When contractors are required to perform work in confined spaces, the base contracting office shall ensure:

16.1.1. The contractor has a written confined space program that meets the requirements of 29 CFR 1910.146 and shows verifiable proof that the contract employees have undergone confined space training.

16.1.2. The contractor is informed that all of Charleston Air Force Base confined spaces are considered permit required confined spaces until tested and evaluated. Contractors may reclassify the space IAW with 29 CFR 1910.146 (c)(7)(i).

16.1.3. The contractor will be informed by the Contracting Squadron that the base fire department performs confined space rescues.

16.1.4. The contractor knows the phone number to the Base Fire Department and knows how to properly summon a confined space rescue.

16.1.5. Rescue procedures have been established.

16.1.6. The contractor is briefed on the contents of each confined space in which they will be working. This brief should be conducted by the contract inspector.

16.1.7. If the space does not belong to a particular squadron, contracting personnel must conduct the briefing with technical assistance from safety, fire dept., and 437 MG/SGPB Bioenvironmental Engineering Flight. This briefing must include a description of the confined space hazards and the Air Force's past experience with the space.

16.1.8. At the end of the job, the contractor conducts a debrief with a contract inspector to discuss the permit space program that was followed and hazards confronted or created during entry.

16.1.9. When Air Force personnel work in confined spaces with contract employees entry operations will be coordinated. When there is a conflict between Air Force entry procedures, and contractor entry procedures the contracting office, safety, fire, and 437 MG/SGPB Bioenvironmental Engineering Flight will determine the correct entry procedures.

16.2. The 437 AW/SEG reserves the right to terminate at any time, any contractor confined space operations that place Air Force personnel or property in dangerous situations.

## **17. COMMUNICATION:**

17.1. Communication for confined space entries will take two forms. One form will be between the confined space entrant(s) and attendant. The other form of communication must be between the attendant and rescue personnel.

17.2. Entrant and Attendant Communication:

17.2.1. The entrant may communicate with the attendant visually and by voice if the entrant is in plain view and sight from the attendant. However, if the entrant must disappear around corners or excessive noise prohibits voice communication, then radios must be used.

17.2.2. Radio communication can take the form of hand held radios or headsets. The radios that are taken into confined spaces must be intrinsically safe.

17.3. Rescue Communication:

17.3.1. Attendants must have a two way radio or telephone/cellular phone capable of contacting the fire alarm communications center or a control center that can immediately contact the fire department in the event of an emergency.

17.3.2. Attendants are responsible for immediately calling the fire department in the event of an emergency.

17.3.3. The fire department must contact the attendant to order the entrant out of the permit required confined space in the event the fire department must respond to and emergency on or off base.

**18. RESCUES AND EMERGENCIES IN CONFINED SPACES:**

## 18.1. Charleston Air Force Base Confined Space Rescue Team.

18.1.1. The Charleston Air Force Base Fire Department will be responsible for all confined space rescue operations unless the unit has a trained rescue team on site.

18.1.2. All rescue providers shall be First Aid, Bloodborne Pathogen, and CPR trained.

18.1.3. The Base Fire Department will simulate a variety of confined space rescues with mannequins semiannually, to keep confined space rescue training current.

18.1.3.1. Organizational rescue teams must conduct semiannual training.

18.1.4. The base fire department will conduct their own confined space rescue training.

## 18.2. Confined Space Rescues-General Requirements.

18.2.1. Attendants will at no time enter the confined space to attempt a rescue of personnel. Only non-entry rescues are allowed.

18.2.2. Rescue providers shall be on site for IDLH permit entries and be readily available for all permit-required entries.

18.2.2.1. Only hand powered winches will be used for extraction of personnel.

18.2.3. Before entering permit required confined spaces, entry supervisors and/or attendants will notify the fire departments alarm control center of the:

18.2.3.1. Location of space being entered.

18.2.3.2. Type of space being entered.

18.2.3.3. Type of work being performed in the space.

18.2.3.4. Time contacted.

18.2.3.5. Expected amount of time the permit entry will take.

18.2.3.6. Name of the entry supervisor.

18.2.4. Alarm control center personnel will maintain a log that noted the:

18.2.4.1. Location of space being entered.

18.2.4.2. Type of space being entered.

18.2.4.3. Type of work being performed in the space.

18.2.4.4. Time contacted.

18.2.4.5. Expected amount of time the permit entry will take.

18.2.4.6. Name of the entry supervisor.

## 18.3. Confined Space Emergencies:

18.3.1. Attendants will notify the alarm control center of the space's location on base and any special conditions associated with the emergency.

18.3.2. The alarm control center will then notify ambulance personnel.

18.3.3. Attendants must prepare for the confined space rescue teams arrival by:

18.3.3.1. Preparing to tell the on-scene commander details about the confined space.

18.3.3.2. Keeping unauthorized personnel away from the space. After the fire department arrives, the attendant will be responsible for keeping unauthorized personnel away from the confined space.

18.3.3.3. Informing the on scene commander of the hazards associated with the confined space and the special conditions associated with the confined space. For instance, the space could have angled floors that are slippery or welding operations could have been going on inside the space before the emergency occurred.

18.4. Non-entry rescue:

18.4.1. All entrants will be trained to perform self-rescue.

18.4.2. Entrants will wear a full body harness with a D -ring attached to a tripod and winch to facilitate non-entry rescue. The retrieval line will be attached at the center of the persons back near shoulder level.

18.4.3. Wristlets will not be used unless the employer can demonstrate that the use of a chest or full-body harness is unsafe and that the use of wristlets is the safest and most effective alternative.

18.4.4. A mechanical device will be available to retrieve personnel from vertical spaces more than five feet deep.

18.4.5. The full body harness, tripod, and winch will not be used if the retrieval system would create a greater hazard for the entrant.

18.4.6. Cases where the retrieval system would create a greater hazard for entrants include:

18.4.6.1. Cases where the space contains obstructions or turns that prevent pull on the line from being transmitted to the entrant.

18.4.6.2. Cases where the entrant could risk contact with projections in the space.

18.4.6.3. Cases where an air supplied respirator would put entrants at risk of airline entanglement with the retrieval line.

18.4.6.4. Cases where retrieval lines would become tangled with a large number of employees in the space at the same time.

18.4.7. When a confined space emergency occurs:

18.4.7.1. The attendant will call for fire and ambulance response.

18.4.7.2. The attendant will immediately retrieve the attendant from the space.

18.4.7.3. The attendant will assess the entrants condition.

**NOTE:** The effects of electric shock and some chemical exposures are not immediately apparent. The individual must be examined by a competent medical authority after electric shock, severe falls, chemical overexposure, welding fume overexposure, and any other serious injury.

## **19. WELDING, CUTTING, AND BRAZING IN CONFINED SPACES AND ENCLOSED AREAS:**

19.1. All confined space entries that require welding, cutting, riveting, and/or brazing will be permit-required confined space entries.

19.2. AF FORM 592: USAF welding, cutting, and brazing permit - Whenever workers perform hot riveting, welding, cutting burning, or heating operations within a confined space, an AF FORM 592 must be obtained from the base fire department.

19.3. The welding permit will be maintained with its corresponding entry permit. The welding permit must be placed outside the space next to the confined space entry permit.

19.4. Continuous forced air and exhaust ventilation will be used while welding, cutting, riveting, and/or brazing in confined spaces.

**NOTE:** Never use pure oxygen to ventilate confined spaces since flash fires may result.

19.5. If ventilation proves not to be feasible, an airline respirator with at least a 5 minute escape bottle or self contained breathing apparatus will be used.

19.6. The attendant will ensure proper airflow and proper function of airline units.

19.7. All electrical leads will be inspected for nicks and cuts prior to entry. Any electrical leads that have substantial nicks and cuts will not be use inside the space.

19.8. When arc welding is to be stopped for any substantial period of time all electrodes shall be removed from the holders and the holders carefully located so that accidental contact cannot occur and the machine is disconnected from the power source.

19.9. Gas cylinders will not be taken into any confined spaces (small propane cylinders are exempt when used in a maintenance operation).

19.10. All hoses used for transferring gas and oxygen for welding, cutting, and burning purposes will be inspected before entering confined spaces and after welding is stopped for any substantial period of time e.g. lunch breaks, overnight, etc.

19.11. All welding hoses and torches will be removed from the confined space when welding is stopped for a substantial period of time e.g. lunch, overnight.

19.12. Welding equipment that is mounted on wheels will be chocked to prevent it from rolling.

19.13. Torch valves must be closed and the fuel-gas and oxygen supply to the torch shut off at some point outside the confined space whenever the torch is not to be used for a substantial period of time.

19.14. At no time will a mechanically powered retrieval system i.e., vehicle, winch, be used to retrieve entrants.

## **20. VENTILATION:**

20.1. 437 MG/SGPB shall approve any ventilation configuration. They also may provide assistance in determining ventilation requirements.

20.2. Pre-planning.

20.2.1. The positioning of ventilating equipment is crucial to ensure the confined space is being ventilated properly. The supervisor must truly understand the nature of the confined space in order to properly ventilate it. This can be accomplished by analyzing the following:

20.2.1.1. Determine if you need to ground or bond the air blower unit. Blower units will generate static electricity. An arc from static electricity could cause an explosion in and around explosive atmospheres.

20.2.1.2. Determine how large the space is in terms of volume.

20.2.1.3. Determine the type of atmosphere you are trying to ventilate. For instance, the way you position your duct work depends whether the contaminates are lighter or heavier than air.

20.2.1.4. Determine if there is more than one opening into the space.

20.2.1.5. Determine where the contaminated exhausted air will leave the space. At times, people have placed the intake for their air blower next to the exhaust portal for the confined space. In essence, contaminated air is recirculated back into the confined space.

20.2.1.6. Determine the shape of the space. This influences the type of directional device and the volume of air pressure needed to ensure that the space can be adequately ventilated.

20.2.1.7. Determine the clean air source. Do not place the intake in an area that contains contaminated air.

20.2.1.8. Determine the length of time ventilation is needed. Ventilation may only be needed to purge the space or to provide continuous ventilation.

20.2.1.9. Determine the type of work that will be performed in the space. If the work produces dust or fumes, local exhaust ventilation is better than general ventilation. If work will be done throughout the space, then continuous general ventilation in combination with local exhaust ventilation may be needed to control the atmosphere.

### 20.3. Improper Ventilating Techniques.

20.3.1. Entry supervisors and attendants will ensure the following improper ventilating techniques do not occur.

20.3.1.1. Recirculation of contaminated exhaust back into the space.

20.3.1.1.1. This situation occurs when contaminated air is forced out of the space and then the ventilation equipment captures the contaminated air and blows it back into the space.

20.3.1.2. Short Circuiting The Air Flow.

20.3.1.2.1. Short circuiting occurs when fresh air moves directly from the inlet into the confined space and to the exhaust outlet without circulating through the other areas of the space.

20.3.1.2.2. When this occurs much of the space never gets ventilated because there is no airflow through it.

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