

10.0 ENCLOSED AND PERMIT-REQUIRED CONFINED SPACES

1001. DEFINITIONS

ENCLOSED SPACE is a working space (such as a manhole, vault, tunnel, or shaft) that meets ALL of the following conditions:

- has a limited means of egress or entry
- is designed for periodic employee entry under normal operating conditions
- under normal conditions, does not contain a hazardous atmosphere, but may contain a hazardous atmosphere under abnormal conditions.

NOTE: *Spaces that are enclosed, but not designed for employee entry under normal conditions, or spaces that are enclosed and that are expected to contain a hazardous atmosphere are considered to be permit-required confined spaces.*

PERMIT-REQUIRED CONFINED SPACE (OR CONFINED SPACE) is a space that meets ALL of the following conditions:

- is large enough that an employee can physically enter and perform assigned work
- has limited or restricted means for entry or exit
- is not designed for continuous employee occupancy
- has ONE OR MORE of the following conditions:
 - contains (or has the potential to contain) a hazardous atmosphere
 - contains (or has the potential to contain) a material that constitutes an engulfment hazard
 - has an internal configuration such that an entrant could become trapped by inwardly converging walls or by a downward sloping floor
 - contains (or has the potential to contain) any other recognized safety hazard.

1002. GENERAL REQUIREMENTS

- A. Only authorized employees shall enter enclosed or confined spaces.
- B. Entry into enclosed and confined spaces, and any associated work, shall be done in accordance with the ***AE Confined Space Program***.
- C. Employees shall attend an AE approved training program that explains the hazards associated with enclosed and confined spaces and safe work procedures prior to performing either of the following:
 - 1. entering an enclosed or confined space
 - 2. serving as an enclosed or confined space attendant.

In addition, refresher training is required if there is a change in the AE Confined Space Program, if the employee has not been performing such duties within the past 12 months, or if the employee's proficiency reflects the need for additional training.

- D. The atmosphere in all enclosed and confined spaces entered by AE employees shall be continuously monitored with an AE-approved, calibrated air monitor. Air monitors shall be calibrated in accordance with manufacturers' recommendations.
- E. All employees making vertical entry into enclosed or confined spaces shall do so in accordance with the AE Confined Space Program.
- F. For more information, refer to the AE Confined Space Program.

1003. HOT WORK

- A. Whenever work inside an enclosed or confined space involves welding, cutting, or brazing, precautions shall be taken to ensure that adequate ventilation in the space is maintained, or approved respiratory protection shall be used.
- B. Gas cylinders shall remain on the outside of enclosed or permit-required confined spaces, and equipment shall be secured to prevent unexpected movement.

EXCEPTION: *Hand-held torch and bottle (20 oz. or less) can be used in a manhole or vault.*

1004. CONTRACTOR PERMIT-REQUIRED SPACE ENTRY

- A. All contractors working within a permit-required confined space shall comply with OSHA Standard 29 CFR 1910.146.
- B. The AE Project Manager responsible for the work that involves contractor entry into a permit- required confined space shall provide the contractor with the specific information for the confined space(s) in question, as required in OSHA Standard 29 CFR 1910.146(c)(8).

1005. ADDITIONAL INFORMATION

- A. For more information regarding confined spaces, refer to OSHA Standard 29 CFR 1910.146.
- B. For more information regarding permit-required enclosed spaces, refer to OSHA Standard 29 CFR 1910.269(e).
- C. For more information regarding underground electrical installations (manhole entry), refer to OSHA Standard 29 CFR 1910.269(t).

(Each person shall be provided with a life jacket or buoyant work vest before work is conducted. The jacket or work vest shall be inspected before and after each use for defects. Defective life jackets shall not be used.)

- B. Ring buoy
(Ring buoys with at least 90 feet of rope shall be provided and readily available for emergency use. The distance between each buoy should not exceed 200 feet. The rope on the ring buoys shall be replaced annually.)
- C. Lifesaving boat or skiff
(At least one lifesaving boat or skiff shall be immediately available for emergency rescue purposes.)

132. FALL PROTECTION

- A. Employees exposed to unprotected sides, edges, or surfaces presenting a fall hazard of 4 feet or more shall be protected by the use of the appropriate fall arrest equipment or positioning devices. Depending on the type of work to be performed, these devices could be safety straps, safety harnesses, lanyards, lifelines, and rope grabs.
- B. When employees are working on energized lines and equipment, the required harnesses and lanyards shall be made of arc-rated material.
- C. Guardrails shall be used as the primary fall protection system where feasible.
- D. Where guardrails are not feasible, company-provided, alternative fall protection shall be used. This might include personal fall arrest equipment, hole covers, and/or safety nets.
- E. All fall protection systems shall be inspected prior to use. Ensure harnesses, lanyards, climbing belts, ropes, and safety-positioning straps are in good condition.
- F. Fall arrest equipment is not required for qualified employees on portable ladders.
- G. For more information regarding fall arrest equipment and positioning device requirements, refer to OSHA Standards 29 CFR 1926.104 and 29 CFR 1910.269.

133. WELDING, CUTTING, GRINDING, AND HEATING

- A. Only experienced and properly trained persons shall perform welding and cutting. Before welding or cutting is started, the area shall be inspected for potential fire hazards, and a hot work permit shall be obtained if required by AE policy.
- B. When welding or cutting in elevated positions, precautions shall be taken to prevent sparks or hot metal from falling onto people or flammable material below.

9.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

901. GENERAL

- Refer to the ***AE Personal Protection Equipment GWP*** regarding the description and acquisition of PPE.
 - Refer to the ***AE Arc Flash Work Procedures GWP*** for required PPE when working around energized equipment.
- A. Personal protective equipment (PPE) shall be used if engineering or administrative controls have not eliminated any hazardous conditions. Employees shall remove hazards, where possible, to reduce the need for unnecessary PPE.
- B. Prior to using any PPE, employees shall be trained in the proper use, inspection, limitations, maintenance, and storage of the PPE.
- C. PPE shall be inspected prior to each use, and defective PPE shall be taken out of service and destroyed.
- D. All employees shall be knowledgeable with the requirements of AE's PPE guidelines.
- E. Employees-in-charge shall be responsible for performing a hazard assessment to determine the type of PPE necessary for each job based on actual or potential hazards. Completed PPE Hazard Assessments shall be approved by the supervisor, manager, and AE Occupational Health & Safety. The original shall be filed with AE Occupational Health & Safety, and a copy shall be maintained by the supervisor. AE Occupational Health & Safety staff members are available to assist in this assessment, when requested.
- F. For more information regarding PPE, refer to OSHA Standard 29 CFR 1910 Subpart I.

902. HEAD PROTECTION

- A. Industrial protective helmets (Hard Hats)
1. All helmets shall be AE issued and worn in accordance with the manufacturer's recommendations.
 2. Whenever employees are exposed to the danger of a head injury from impact, falling objects and/or electrical shock or burn, they shall wear Class E approved protective helmets on all worksites that meet the ANSI Z89.1-2009 Standard or latest version.
 3. All helmets and their suspension systems shall be inspected regularly for hairline cracks or other defects. No field modifications shall be made to the helmet. They shall be replaced immediately if any

defects are found. All helmets shall be replaced (destroyed) every five (5) years or according to manufacturers' recommendations.

4. Nonmetallic stickers or other markings with approved adhesives may be affixed to protective helmets as permitted by the supervisor. Adhesives shall be approved on a case-by-case basis by the helmet manufacturer. A copy of the documentation that supports the manufacturer's approval shall be on file with AE Occupational Health & Safety.
5. All helmets shall be kept clean and free of markings (such as paint and permanent markers). Approval must be obtained from AE Occupational Health & Safety for any markings on helmets.
- B. For more information regarding head protection requirements, refer to OSHA Standard 29 CFR 1910.135.

903. EYE AND FACE PROTECTION

A. General

1. When employees could be exposed to hazards due to flame, flash, or arc, refer to the ***AE Arc Flash Work Procedures GWP***.
2. All protective eye and face equipment used by AE employees shall comply with ANSI Z87.1-2010 Standard or latest version, Practice for Occupational and Educational Eye and Face Protection.
3. Eye and/or face protection shall always be used when there is a risk for eye/face injury.
4. Contact lenses can be used in conjunction with appropriate eye and face protection, unless their use creates an additional hazard.
5. When employees using corrective spectacles (prescription eyeglasses) require eye protection, they shall use one of the following protective equipment methods:
 - a) spectacles with protective lenses providing optical correction eyeglasses with detachable side shields. The side shields shall always be used when eye protection is required. (Safety spectacles require special frames. Combination of normal streetwear frames with safety lenses are not adequate protection.)
 - b) goggles or safety glasses worn over corrective spectacles without disturbing the adjustment of the spectacles.
 - c) goggles that incorporate corrective lenses mounted behind the protective lenses.

B. Face Shields

Face shields alone do not provide adequate eye protection. An appropriate type of eye protection shall be used in conjunction with face shields as listed below.

Actual or Potential Hazard	Requirement
Chemical splash, such as acids and caustics	Face shield and chemical goggles (see 903.D for goggle requirements)
Flying particles resulting from grinding, chipping, or blasting	Face shield and goggles or face shield and safety glasses

C. Safety Glasses

1. Whenever there is a potential for exposure to hazards created by the work being performed, employees shall wear impact-resistant safety glasses with attached side shields.

EXCEPTION: *If the environment contains hazards such as blowing dust or debris, then goggles shall be used.*

2. The lenses of safety glasses shall comply with ANSI Z87.1-2010 Standard or latest version and may be tinted for UV protection and employee comfort. However, tinting shall not contribute to additional hazards, such as low-light conditions.

D. Goggles

1. Employees shall use the appropriate goggles as protection from the hazardous conditions as listed below:

Actual or Potential Hazard	Requirement
Chemical splashes, such as acids and caustics	Indirect vented or nonventilated chemical goggles
Fumes, mist, or vapor	Nonventilated goggles
Dust or flying particles	Direct or indirect vented goggles

2. Goggles shall fit securely over any other type of eyeglasses being worn. They shall completely enclose the eye socket area.

E. Welding and Cutting

1. When welding or cutting, employees shall wear the appropriate eye and face protection for the work that is being performed. Refer to OSHA Standard 1910.133(a)(5) when selecting appropriate shade number for protection against radiant energy.
2. Employees shall wear appropriate clothing while performing hot work.

3. When performing hot work on material containing stainless steel, refer to the AE Hexavalent Chromium (Hexchrome) Program for guidance on the appropriate PPE and engineering controls.
- F. For more information regarding eye and face protection requirements, refer to OSHA Standard 29 CFR 1910.133. Also refer to the AE Plant Chemistry Laboratories Chemical Hygiene Program for guidance regarding appropriate PPE and engineering controls.

904. HEARING PROTECTION

- A. Hearing protection shall be selected and used in accordance with the AE Hearing Conservation Program.
- B. All employees who are exposed to workplace noise levels in excess of 85 dB(A) Time Weighted Average (TWA) shall wear hearing protection. In addition, hearing protection shall be worn by all employees when entering in work areas that have been designated as HEARING PROTECTION REQUIRED areas, regardless of how much time the employee is planning to spend in this area.
- C. For more information regarding occupational noise exposure, refer to OSHA Standard 29 CFR 1910.95.

905. RESPIRATORY PROTECTION

- A. Prior to using a respirator, employees must have been trained, fit-tested, and medically qualified within the past 12 months.
- B. Appropriate respiratory protection is required if the work performed or the work environment involves a respiratory hazard.
- C. Respiratory protection shall be selected, used, and maintained in accordance with the AE Respiratory Protection Program.
- D. When performing hot work on material containing stainless steel, refer to the AE Hexavalent Chromium (Hexchrome) Program for guidance on appropriate respiratory and engineering controls.
- E. For more information regarding respiratory protection requirements, refer to OSHA Standard 29 CFR 1910.134.

906. TORSO PROTECTION

- A. When employees could be exposed to hazards due to flame, flash, or arc, refer to the ***AE Arc Flash Work Procedures GWP***.
- B. Exposure to Heated Materials: Whenever employees are exposed to hazards resulting from heated materials that could splash or spill (such as molten metals), they shall wear protective garments such as leather aprons, sleeves, and/or leggings.

C. Exposure to Chemicals:

1. Employees shall wear approved chemical-resistant torso protection when exposed to chemical hazards that could injure their bodies. The type of protection shall be determined in the hazard assessment and shall comply with Safety Data Sheet (SDS) for the chemical(s).
2. For guidance regarding appropriate PPE and engineering controls, refer to the AE Plant Chemistry Laboratories Chemical Hygiene Program.
- D. For information regarding clothing, raingear, and outerwear, refer to Section 126 Clothing.

907. ARM AND HAND PROTECTION**A. Work Gloves**

Employees shall wear, at a minimum, AE-approved work gloves when exposed to hazards such as abrasions, splinters, punctures, frostbite, and cuts to the hands.

B. Leather Work Gloves

Employees shall wear, at a minimum, leather gloves with gauntlets that extend over the wrist when exposed to hazards that may lead to injury of the hand and wrist. These gloves shall be worn when climbing wood poles.

C. When Handling Chemicals

1. Employees shall use appropriate hand protection when handling chemicals, which could expose them to hazards from skin absorption of harmful substances, chemical burns or dermatitis.
 2. Employees shall select the appropriate hand protection according to the task(s) to be performed, conditions present, duration of use, and the actual and potential hazards identified. For more guidance regarding appropriate PPE and engineering controls, refer to the AE Plant Chemistry Laboratories Chemical Hygiene Program.
- D. Abrasion Hazard: Employees performing work that may present an abrasion hazard to their arms shall wear an approved long-sleeve work shirt.
- E. For additional information concerning hand protection requirements, refer to OSHA Standard 29 CFR 1910.138.

908. INSULATING PROTECTIVE GLOVES (RUBBER GLOVES)

- A. Rubber Gloves: AE employees shall wear appropriate rubber gloves (see table 9-1) when working within reaching or falling distance from energized electrical parts or any electrical equipment that may become energized.

B. Care and Use of Rubber Gloves

1. Rubber gloves shall be maintained in a safe, reliable condition.
2. Rubber gloves shall be inspected for damage before use and immediately following any incident that can reasonably be suspected of having caused damage. The inspection shall include both air test and visual inspection.
3. Rubber gloves with any of the following defects may not be used:
 - a. a hole, tear, puncture, or cut
 - b. ozone cutting or ozone checking (the cutting action produced by ozone on rubber under mechanical stress into a series of interlacing cracks)
 - c. an embedded foreign object
 - d. any change in the glove's texture, such as swelling, softening, hardening, or becoming sticky or inelastic
 - e. any other defect that damages the insulating properties.
4. Rubber gloves found to have defects that might affect their insulating properties shall be removed from service and returned for testing as specified in OSHA Standard 29 CFR 1910.137 (b)(2)(viii) and (b)(2)(ix).
5. Rubber gloves shall be cleaned at the end of the shift prior to storing them.
6. Rubber gloves shall be stored in a location and manner that protects them from light, temperature extremes, excessive humidity, ozone, and other injurious substances and conditions.
 - a. Rubber gloves shall be stored in approved bags in a fully extended position; they shall not be folded.
 - b. Bags shall be either hung up or placed in a special compartment. They shall not be placed where other tools or equipment can damage them.
 - c. No items shall be placed in the rubber glove bag other than the rubber gloves and protector gloves.

C. Periodic Electrical Tests for Rubber Gloves

1. Rubber gloves shall be subjected to periodic electrical tests. Test voltages and the maximum intervals between tests shall be in accordance with OSHA Standard 29 CFR 1910.137. The tests shall be conducted before first issue and every 6 months thereafter or more often if field conditions warrant. If the rubber gloves have been electrically tested but not issued for service, they may not be placed into service unless they have been electrically tested within the previous 12 months.

2. Employees shall not use rubber gloves that do not pass inspections or electrical tests.
3. The supervisor shall maintain documentation, which certifies that equipment has been tested in accordance with the requirements. The certification shall identify the equipment that passed the test and the date it was tested.

NOTE: *Marking of equipment with the test dates and results or entering them on logs are two acceptable means of meeting this requirement.*

Table 9-1. Maximum-Use Voltage for Rubber Gloves*

Class of Gloves	Voltage, V (RMS) Phase-Phase
0	1,000
1	7,500
2	17,000
3	26,500
4	36,000
<p>The maximum use voltage is the ac voltage (rms) rating of the protective equipment that designates the maximum nominal design voltage of the energized system that may be safely worked. The nominal design voltage is equal to the phase-to-phase voltage on multiphase circuits.</p> <p>Exception 1: If there is no multiphase exposure in a system area (at the worksite) and the voltage exposure is limited to the phase (polarity on dc systems) to ground potential, the phase (polarity on dc systems) to ground potential shall be considered to be the nominal design voltage.</p> <p>Exception 2: If electric equipment and devices are insulated, isolated, or both, such that the multiphase exposure on a grounded wye circuit is removed and if supplemental insulation (e.g., insulated aerial device or structure-mounted insulating work platform) is used to insulate the employee from ground, then the nominal design voltage may be considered as the phase-to-ground voltage on that circuit.</p>	

*(Source: OSHA 29 CFR 1910.137(b)(2)(ix) Table I-5)

- D. For more information regarding protection requirements, refer to OSHA Standard 29 CFR 1910.137, Electrical Protective Devices.

909. LEG PROTECTION

- A. Employees shall wear appropriate PPE including, at a minimum, long pants and protective footwear when operating equipment such as string trimmers, weed eaters, or other equipment that may expose them to flying debris hazards.
- B. Employees shall wear appropriate PPE when using a machete, chain saw, or other cutting operations. (For more information, refer to Section 122 Chain Saws.)
- C. Employees shall wear approved chemical-resistant torso protection that provides leg protection (such as full-length apron, jacket, coveralls, or full-body suit) if exposed to chemical hazards that could cause leg injury.

910. FOOT PROTECTION

- A. Safety toe footwear is required as basic foot protection for all employees who are exposed to foot hazards, such as falling, dropped, or rolled heavy loads or objects. Safety footwear shall comply with ASTM F 2413-11 Standard or latest version, and shall meet AE specifications. (For more information, refer to the ***AE Personal Protective Equipment GWP.***)
 - 1. Employees shall wear footwear that has ½ inch defined heels (non-sloping).
 - 2. Employees shall wear approved puncture-resistant footwear if their job duties expose them to sharp objects that may penetrate the sole.
- B. When the work is performed in the vicinity of live parts where the possibility of an electric arc exists, employees shall ensure that their protective footwear does not have exposed metal toe guards.
- C. Employees shall wear approved chemical-resistant footwear if exposed to chemical hazards that could cause foot injury.
- D. For more information regarding occupational foot protection requirements, refer to OSHA Standard 29 CFR 1910.136.

911. FLASH SUITS

Whenever AE personnel are making or breaking a contact on a distribution/station breaker or network protector, they shall wear a flash suit, including a full-head flash hood, made of an arc-rated material, which incorporates an appropriate arc-rated face shield and is used in conjunction with an approved hard hat. (For more information, refer to the ***AE Arc Flash Work Procedures GWP.***)