

UC Davis Policy and Procedure Manual

Chapter 290, Health and Safety Services

Section 86, Hazardous Operations

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Responsible Department: Environmental Health and Safety

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I. Purpose

This section establishes responsibilities and procedures for the safe management of certain physically hazardous operations at UC Davis facilities, including entry into confined spaces, use of oxyacetylene welding equipment, use of portable torches for soldering and brazing, operation of forklift trucks, and operations requiring lockout/tagout, fall protection, and excavation, trenching, and shoring.

II. Definitions

- A. Confined space--as defined by Cal-OSHA, a space that has all three of the following characteristics: is large enough and configured such that an employee can enter and perform work, has limited openings for entry and exit, and is not designed for continuous employee occupancy. Two main hazards associated with confined spaces are atmospheric hazards and physical hazards. Atmospheric hazards typically involve problems with the air in a space (i.e., lack of oxygen, the presence of other gasses in the space, insufficient ventilation, etc.). Physical hazards are those caused either by equipment (rotors, sparks, moving machinery, energized systems, etc.) or by other dangerous conditions (slippery surfaces, heat, noise, lighting, vermin, insects, etc.). Examples of confined spaces include silos, tanks, vats, boilers, ducts, sewers, manholes, pipelines, vaults, bins, tubs, excavations, trenches, pits, wet wells, fireboxes, boxcars, and other confining structures.
- B. Excavation, trenching, and shoring
 - 1. Excavation--any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.
 - 2. Trench--a narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench is not greater than 15 feet.
 - 3. Shoring--a structure such as a metal hydraulic, mechanical, or timber shoring system that supports the sides of an excavation and is designed to prevent cave-ins.
 - 4. Benching--A method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.
 - 5. Competent person--one who is capable of identifying existing and predictable hazards in the surroundings or working conditions that are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them. The competent person must be able to demonstrate the following: the ability to recognize all possible hazards associated with excavation work and to test for hazardous atmospheres; knowledge of the current safety orders pertaining to excavation, trenching, and shoring; the ability to analyze and classify soils; knowledge of the design and use of protective systems; and the authority and ability to take prompt corrective action when conditions change.
- C. Fall protection--approved personal fall arrest systems, personal fall restraint systems, or positioning device systems. Cal-OSHA requires fall protection by those employees whose work exposes them to falling in excess of 7.5 feet from: the perimeter of a structure, unprotected

sides and edges, leading edges, through shaftways and openings, sloped roof surfaces steeper than 7:12 (about 30 degrees), or other sloped surfaces steeper than 40 degrees.

- D. Forklift truck--a mobile power-driven truck (gasoline, propane, electric, etc.) used for hauling, pushing, lifting, or tiering materials where normal work is normally confined within the boundaries of a place of employment.
- E. Lockout/tagout--techniques used to prevent hazardous energy from injuring or killing workers. In a lockout, a padlock is placed on a disconnected switch, circuit breaker, valve handle, or other energy-isolating mechanism that is in the off position. In a tagout, a written warning tag is placed on the energy-isolating device that is in the off or closed position.
- F. Oxyacetylene welding--commonly referred to as gas welding, a process that relies on combustion of oxygen and acetylene within a hand-held torch or blowpipe. The chemical action of the oxyacetylene flame can be adjusted by changing the ratio of the volume of oxygen to acetylene.
- G. Soldering and brazing-- joining processes where parts are joined without melting the base metals.
 - 1. Soldering filler metals melt below 840°F and is commonly used for electrical connection or mechanical joints.
 - 2. Brazing filler metals melt above 840°F and is only used for mechanical joints due to the high temperatures involved.

III. Responsibilities and Procedures

A. Confined space operations

The Office of Environmental Health & Safety (EH&S) coordinates the campus Confined Space Entry Program in accordance with the rules, regulations, requirements, and guidelines set forth in California Code of Regulations, Title 8, Sections 5156 to 5158. Program requirements are outlined in the EH&S Confined Space Entry Program Employee Guide (<http://safetyservices.ucdavis.edu/environmental-health-safety>). All confined space work on campus will strictly adhere to the guidelines set forth within this document.

- 1. EH&S is responsible for:
 - a. Providing consultation services to ensure that all confined space work is being performed in compliance with federal, state, and local regulations.
 - b. Providing technical consultation and guidance for testing, monitoring, and controlling potential hazards within confined space environments.
 - c. Providing confined space general awareness training upon request.
 - d. Assisting departments and employees in the identification of confined space locations.
 - e. Cooperating with the UCD Fire Department in rescue procedures.
- 2. Departments/supervisors are responsible for:
 - a. Implementing a written departmental confined space entry program.
 - b. Ensuring all employees entering confined spaces receive initial and annual refresher training for:
 - 1) Potential hazards associated with confined space operations.
 - 2) EH&S Confined Space Entry Program Employee Guide.
 - 3) Safety procedures and the use of personal protective equipment.

- 4) Air-monitoring instrument operation.
 - c. Ensuring each employee has access to a calibrated air-monitoring instrument and any other equipment needed to work safely in a confined space.
 - d. Ensuring employees correctly fill out entry logs and permits as well as reviewing and signing the permit-required confined space form before employees enter the space.
 - e. Ensuring that all confined space entry logs and permits are collected from employees and retained within the department for three years.
 - f. Reviewing confined space entry/rescue programs annually for completeness.
3. Employees are responsible for:
- a. Attending required initial and annual refresher classes on confined space entry before engaging in confined space work.
 - b. Informing their immediate supervisor before entering a confined space to perform work.
 - c. Obtaining necessary calibrated air-monitoring instruments, safety equipment, entry logs or permits, and any other related equipment before entering any confined space on campus.
 - d. Checking all equipment before entering to ensure it is working properly, and informing the supervisor immediately if any equipment is found not to be working properly.
 - e. Submitting completed entry logs and permits to their supervisor, immediately after completing work.
 - f. Following safety procedures as outlined in the EH&S Confined Space Entry Program Employee Guide.
 - g. Reporting observed hazardous conditions to their supervisor as soon as practical for correction.
4. The UCD Fire Department is responsible for:
- a. Providing emergency entry-rescue services for all confined space operations on campus.
 - b. Facilitating and coordinating with departments entering confined spaces annual training exercises for permit-required confined space rescues.
- B. Excavation, trenching, and shoring

Excavation, trenching, and shoring operations shall be in accordance with the rules, regulations, requirements, and guidelines set forth in California Code of Regulations, Title 8, Sections 1539 to 1547. Pursuant to Section 1541, a qualified "competent person" is required to supervise and inspect any excavation, trenching, and shoring operation. Generally, shoring is required for any excavation and trench greater than 5 feet in depth.

1. EH&S is responsible for:
 - a. Providing technical consultation and guidance for excavation, trenching, and shoring operations.
 - b. Providing excavation, trenching, and shoring general awareness training upon request.

2. Departments/supervisors are responsible for:
 - a. Implementing a written departmental excavation, trenching, and shoring operations program.
 - b. Ensuring employees receive initial and annual refresher training for:
 - 1) Potential hazards associated with excavation, trenching, and shoring operations.
 - 2) Standard Operating Procedures developed within each department.
 - 3) Safety procedures and the use of personal protective equipment.
 - c. Ensuring that excavation, trenching, and shoring procedures and requirements are followed.
 - d. Providing and ensuring appropriate excavation, trenching, and shoring equipment is used.

C. Fall protection

Fall protection shall be in accordance with the rules, regulations, requirements, and guidelines set forth in California Code of Regulations, Title 8, Sections 1669 to 1671. Fall protection is required for any operation that exposes an employee to the unprotected risk of falling 7.5 feet or greater.

1. EH&S is responsible for:
 - a. Providing technical consultation and guidance for operations requiring fall protection.
 - b. Providing fall protection general awareness training upon request.
2. Departments/supervisors are responsible for:
 - a. Implementing a written departmental fall protection program.
 - b. Ensuring employees receive initial and annual refresher training for:
 - 1) Potential hazards associated with operations requiring fall protection.
 - 2) Standard Operating Procedures developed within each department.
 - 3) Safety procedures and the use of personal fall arrest systems, personal fall restraint systems, or positioning devices.
 - c. Ensuring that fall protection procedures and requirements are followed.
 - d. Providing and ensuring appropriate fall protection equipment is used.

D. Forklift truck operation

Forklift truck operations shall be in accordance with the rules, regulations, requirements, and guidelines set forth in California Code of Regulations, Title 8, Sections 3649 to 3669. Pursuant to Section 3668, all forklift truck operators must complete initial training and be evaluated for forklift truck operation performance prior to being assigned to operate a forklift truck. Refresher training and performance evaluation is required every two years. Training is to be conducted "under the direct supervision of persons who have the knowledge, training, and experience to train operators and evaluate their competence" within each department. EH&S will issue a forklift certification card to each person successfully completing the course.

1. EH&S is responsible for:
 - a. Providing training resources and materials for departmental forklift training and evaluation.

- b. Providing technical consultation and guidance for forklift truck operations.
 - c. Issuing University forklift certification cards.
2. Departments/supervisors are responsible for:
- a. Implementing a written departmental forklift truck certification and operations program.
 - b. Ensuring all employees required to operate forklift trucks receive initial and biennial refresher training.
 - c. Permitting only trained and authorized individuals to operate forklift trucks.
 - d. Assuring ignition keys and forklift access are controlled so that only authorized individuals can use the equipment.
 - e. Assuring periodic inspections of forklift trucks are completed and documented a minimum of once per shift.
 - f. Posting and enforcing forklift truck operating rules as required in California Code of Regulations, Title 8, Sections 3650 and 3664.

E. Electrical and machinery lockout/tagout

Electrical and machinery lockout/tagout operations shall be in accordance with the rules, regulations, requirements, and guidelines set forth in California Code of Regulations, Title 8, Section 3314. Lockout/tagout operating procedures are required when an employee cleans, repairs, services, or adjusts prime movers, machinery, and equipment that may unexpectedly move or release energy.

1. EH&S is responsible for:
- a. Providing technical consultation and guidance for operations requiring electrical or machinery lockout/tagout.
 - b. Setting campus criteria for standardization of locks and tags. The campus standard is as follows:
 - 1) Lock: The lock must have a red Danger label on the front of the lock, with the written warning, "This lock is to be removed only by the person shown on the back." The back must state "Locked out by" and have space to write a person's name.
 - 2) Tag: The tag must be a red Danger label on the front of the equipment, with the written warning, "Do Not Operate: This tag and lock are to be removed only by person shown on the back." The back must state "Equipment locked out by" and have space to write a person's name.
2. Departments/supervisors are responsible for:
- a. Implementing a written departmental lockout/tagout program.
 - b. Ensuring employees receive initial and annual refresher training for:
 - 1) Potential hazards associated with lockout/tagout operations.
 - 2) Standard Operating Procedures developed within each department for specific equipment.
 - 3) Safety procedures and the use of personal protective equipment.
 - c. Ensuring that lockout/tagout procedures and requirements are followed.
 - d. Providing and ensuring that standardized locks and tags are used.

F. Oxyacetylene welding operations

Oxyacetylene welding operations shall comply with manufacturer's safety procedures and the rules, regulations, requirements, and guidelines set forth in California Code of Regulations, Title 8, Sections 4794 to 4848.

1. EH&S is responsible for:
 - a. Providing technical consultation and guidance for oxyacetylene welding operations.
 - b. Providing technical consultation and guidance for proper storage and handling of compressed gas cylinders.
2. Departments/supervisors are responsible for:
 - a. Implementing a written departmental oxyacetylene welding operations program.
 - b. Ensuring all employees conducting oxyacetylene welding or cutting operations receive initial and annual refresher training for:
 - 1) Potential hazards associated with oxygen and acetylene operations.
 - 2) Standard Operating Procedures developed within each department.
 - 3) Safety procedures and the use of personal protective equipment.
 - c. Providing appropriate equipment:
 - 1) Check valves are required.
 - 2) Flashback arrestors are required on both the oxygen and acetylene lines at the regulators.
 - 3) Only approved regulators with a maximum discharge of 15 pounds per square inch gauge pressure (psig) shall be used on acetylene cylinders.
 - d. Notifying the UCD Fire Department before the start of welding/cutting operations pursuant to Section 390-40. Notification must be done before the start of each job, unless the work is in a permitted location where welding is routinely done. The UCD Fire Department requires a fire watch be maintained for at least thirty minutes after the completion of cutting and welding operations.

G. Portable torch units for soldering and brazing

All portable torch units must include separate gas cylinder and torch unit assemblies connected via a properly rated hose. Torches attached directly to gas cylinders are specifically prohibited.

1. EH&S is responsible for:
 - a. Providing technical consultation and guidance for portable torch units.
 - b. Providing technical consultation and guidance for proper storage and handling of compressed gas cylinders.
2. Departments/supervisors are responsible for:
 - a. Implementing a written departmental portable torch use program.
 - b. Ensuring all employees using portable torches receive initial and annual refresher training for:
 - 1) Potential hazards associated with portable torch use.
 - 2) Proper inspection and use of equipment.
 - 3) Standard Operating Procedures developed within each department.
 - 4) Safety procedures and the use of personal protective equipment.
 - c. Providing appropriate equipment.

3. Employees are responsible for:
 - a. Checking the condition of the torch, hose and cylinder prior to work and informing the supervisor immediately if any equipment is found defective.
 - b. Following standard operating procedures and manufacturer's guidelines.

IV. References and Related Policy

- A. California Code of Regulations, Title 8
(<http://ccr.oal.ca.gov/linkedslice/default.asp?RS=GVT1.0&VR=2.0&SP=CCR-1000&Action=Welcome>):
 1. Sections 5156-5158, Confined Spaces.
 2. Sections 4794-4848, Gas Systems for Welding and Cutting.
 3. Sections 3649-3669, Industrial Trucks, Tractors, Haulage Vehicles, and Earthmoving Equipment.
 4. Section 3314, Cleaning, Repairing, Servicing, and Adjusting Prime Movers, Machinery, and Equipment.
 5. Sections 1669-1671, Fall Protection.
 6. Sections 1539-1547, Excavations.
- B. UC Davis Environmental Health & Safety: Confined Space Entry Program Employee Guide (<http://safetyservices.ucdavis.edu/environmental-health-safety>).
- C. Office of the President: Policy on Management of Health, Safety, and the Environment, 10/28/05 (<http://www.ucop.edu/riskmgmt/bsas/documents/presidentialpol.pdf>).
- D. UCD Policy & Procedure Manual (<http://manuals.ucdavis.edu/PPM/about.htm>):
 1. Section 290-06, Safety Standards and Interactions with Regulatory Agencies.
 2. Section 290-15, Safety Management Program.
 3. Section 290-50, Protective Clothing and Equipment.
 4. Section 390-40, Fire Safety.