

Electrical Safety Program

Responsible Administrator: EHS Safety Specialist
Revised: January 2024

Summary: This program applies to all work operations at UC Irvine involving electrical systems of 600 volts or less where employees may be exposed to live parts and/or those parts that have been de-energized.

| | |
|--|-----|
| 1. Program Description | 1 |
| 2. Scope | 1 |
| 3. Definitions..... | 1-2 |
| 4. Responsibilities | 3 |
| 5. Program Components | 3-5 |
| 6. Reporting Requirements | 5 |
| 7. Energized Electrical work permits | 5 |
| 8. References..... | 6 |

1. Program Description

The purpose of this program is to prevent injuries and accidents and protect University employees from low voltage electrical hazards. “Low Voltage” is defined by Cal/OSHA as work performed directly on or in proximity of systems of 600 volts, nominal, or less. Work unit specific safety procedures for preventing electric shock or other injuries resulting from direct/indirect electrical contact to employees working on or near energized or de-energized parts will be developed and implemented as required.

2. Scope

This program applies to all work operations at UC Irvine involving electrical systems of 600 volts or less where employees may be exposed to live parts and/or those parts that have been de-energized. Any work on energized equipment may be done only after it has been determined that this type of work must be performed with the equipment energized. While some lab and Facilities Management employees may work with equipment in the 120 to 600 volt range, most University employees normally work in areas with electrical appliances that operate at 120 volts or less.

3. Definitions

Current – (measured in amps/ampere) Term used to describe electric flow. It is current that can cause electric shock.

De-energized – Electrical devices that are disconnected from all energy sources including direct electric connections, stored electric energy such as capacitors, and stored non-electrical energy in devices that could reenergize electric circuit parts

Energized Electrical Work – Work conducted by an employee on or near an exposed energized circuit greater than 50 volts and less than or equal to 600.

FM – Factory Mutual – An independent product safety testing and Certification Company.

GFCI – Ground Fault Circuit Interrupter, provides additional protection from shocks by shutting off current to equipment when a change in electricity is sensed.

Grounding – Provides a safe path between electricity and the earth, preventing leakage of current. The creation of a conductive path for electricity between a circuit and the equipment to ground.

High Voltage – Electrical systems or equipment operating at or intended to operate at a sustained voltage of more than 600 volts.

Low voltage – Electrical systems or equipment operating at or intended to operate at a sustained voltage of 600 volts or less.

Polarized Plug – Helps reduce the potential for shock with easily identifiable plugs. One prong is wider than the other and can only be inserted into outlets one way.

Qualified Person – A person, designated by UC Irvine, who by reason of experience or instruction has demonstrated familiarity with the operation to be performed and the hazards involved. An employee is considered a qualified person only after they have successfully completed the UC Irvine Electrical Safety Awareness and Advanced Electrical Safety trainings.

Note One: Whether a person is considered to be a “qualified person” will depend upon various circumstances in the workplace. It is possible and, in fact, likely for an individual to be considered “qualified” with regard to certain equipment in the workplace, but “unqualified” as to other equipment.

Note Two: An employee who is undergoing on-the-job training and who, in the course of such training, has demonstrated an ability to perform duties safely at his or her level of training and who is under the direct supervision of a qualified person is considered to be a qualified person for the performance of those duties.

Qualified Electrical Worker – A qualified person who by reason of a minimum of two years of electrical training and experience with high voltage circuits and equipment and who has demonstrated by performance familiarity with the work to be performed and the hazards involved. Only a Qualified Electrical Worker is allowed to work on energized conductors or equipment connected to energized high-voltage systems. With the exception of replacing fuses, operating switches, or other operations that do not require the employee to contact energized high voltage conductors or energized parts of equipment, clearing trouble or emergencies involving hazard to life or property, no such employee shall be assigned to work alone.

An employee is considered qualified only after they have successfully completed the UC Irvine Electrical Safety Awareness, Advanced Electrical Safety, and Hazardous Electrical Voltage trainings, and have demonstrated a minimum of two years’ experience working on the specific equipment under the oversight of another Qualified Electrical Worker.

This training will be provided when the employee is initially assigned to the job with refresher training every three years after.

Resistance – The ease with which electricity flows through the material (conductor). Materials (conductors) with higher resistance properties can become hot. (Measured in ohms)

UL – Underwriters Laboratories is an independent product safety testing and certification organization.

Voltage – Electric potential or potential difference assigned to a circuit or system expressed in volts.

4. Responsibilities

The goal of the electrical safety program is to ensure that all employees understand the hazards associated with electric energy and are capable of performing the necessary steps to protect themselves and their coworkers.

Primary responsibilities include:

- Hazard identification
- Training
- Reporting/correcting safety hazards

UCI Employees

- Are aware of electrical safety issues
- Comply with safe operating procedures when working with electrical equipment Attend appropriate safety training.
- Report safety concerns

Managers

- Ensure staff are trained, qualified, and authorized to work on electrical equipment
- Conduct periodic hazard analysis of work areas
- Correct identified safety hazards

EHS

- Provide assistance in identifying electrical safety issues
- Provide electrical safety training for campus staff
- Review electrical equipment safe operating procedures as necessary

Facilities Management

- Ensure that all authorized or qualified persons have received appropriate levels of training
- Ensure appropriate Personal Protective Equipment is provided to authorized or qualified staff who work with electrical equipment

5. Program Components

All employees use electric powered equipment and systems throughout the campus. Whether in an office, lab or workshop, electricity is used continuously, usually without incident.

Voltages as low as 12 volts can be dangerous. When working with or around electrical equipment, one may inadvertently become part of an electrical circuit. Only trained and authorized or qualified individuals should do any repair or work on electrical equipment.

As part of the Injury and Illness Prevention Program, departments are required to conduct a hazard analysis of the workplace. This analysis will provide a mechanism for defining work unit specific hazards associated with electricity and create a plan for hazard mitigation and employee training.

General Precautions for All Staff

- Never work on “hot” or energized equipment unless it is necessary to conduct equipment troubleshooting.

- Use extension cords only as temporary power sources.
- Do not connect too many pieces of equipment to the same circuit or outlet as the circuit or outlet could become overloaded.
- Be sure that ground-fault circuit interrupters (GFCI) are used in high-risk areas such as wet locations (GFCI's are designed to shut off electrical power within as little as 1/40 of a second).
- Plug strips, such as those used on computers, should be plugged directly into outlets and not into extension cords or other plug strips.
- Inspect all equipment periodically for defects or damage.
- All cords that are worn, frayed, abraded, corroded or otherwise damaged must be replaced.
- Grasp the plug to remove it from a socket - never pull the cord.
- Keep all cords away from heat, oil and sharp edges.
- Always follow the manufacturer's instructions for use and maintenance of all electrical tools and appliances.
- Keep equipment operating instructions on file.
- Never touch an electrical appliance and plumbing at the same time.
- Always unplug electrical appliances before attempting any repair or maintenance.
- All electrical devices must be properly grounded with approved three wire plugs unless they are "double insulated". Grounding provides a safe path for electricity to the ground, preventing leakage of current in circuits or equipment.
- All electrical equipment used on campus should be UL or FM approved.
- Keep cords out of the way of foot traffic so they don't become tripping hazards or become damaged by traffic.
- Never use electrical equipment in wet areas or run cords across wet floors.
- Ensure energized parts of electrical equipment operating at 50 volts or more are guarded against accidental contact.
- Only properly trained employees should work on electrical equipment.
- Know how to respond to emergencies such as electric shock incidents or fires.

Localized Electrical Outage

- All Staff should immediately report electric outages to Facilities Management Service Desk at 949-824-5444.
- If possible, identify the defective equipment or the cause of the failure and remove it from service.
- Report this information to Facilities Management personnel upon their arrival.

Labs and Facilities Management

- NEVER work with electricity greater than 600 volts without specific permission, training and written procedures. Notify your supervisor immediately if you have any questions.
- Be able to recognize electrical safety hazards in your work area.
- Ensure that all authorized or qualified persons have received appropriate training in order to operate or repair equipment.
- Keep equipment in good working order to help prevent electrical accidents.
- Maintain a three-foot clearance around electrical panels.
- Electrically operated equipment must be deenergized before work may commence.
- Always follow lockout/tag-out procedures when working on electrical equipment (Lockout/Tag-out Program) and wear appropriate Personal Protective Equipment (PPE) such as safety glasses, rated rubber gloves, rated rubber sleeves, insulated boots, or face shield.
- Never override safety devices such as electrical interlocks.
- Remove all rings, key chains or other metal objects when working around electricity.

- Wear appropriate personal protective equipment, such as eye protection or insulated gloves, as needed.
- Never use metal ladders when working near energized wiring.
- Damp or wet environments may be dangerous when working with electricity.
- Never plug in cords that are wet or touch electrical equipment with wet hands.
- Employees working with lasers, performing hardware or software testing, or other activities that do not require direct contact with electrical components, should be aware of electrical safety issues and be alert to the possibility of other employees conducting energized work in the area.

6. Reporting Requirements

Damaged or Defective Electrical Equipment

Report malfunctioning equipment or devices to your supervisor or Facilities Management at 949-824-5444. Typical issues include

- Damaged cords, plugs or outlets;
- Receiving a shock when touching the equipment; and
- Arcing, sparking, smoking, or otherwise malfunctioning equipment

Any electrical equipment not operating properly should be:

- Taken out of service immediately.
- Tagged or labeled as “Do Not Use”.
- Reported to the appropriate department or individual for repair.

Do not attempt to repair any electrical equipment yourself unless you are properly trained and authorized to do so.

If safety issues persist, please notify your supervisor or submit a Report of Safety Concern.

7. Energized Electrical Work and Permits

CAL/OSHA allows for Energized Electrical Work in certain situations. Electrical work is to be performed on a “dead” circuit which has been tested and locked out unless:

- Responsible supervision has determined that the work is to be performed while the equipment or systems are energized.
- Involved personnel have received instructions on the work techniques and hazards involved in working on energized equipment.
- Suitable personal protective equipment and safeguards (i.e., approved insulated gloves or insulated tools) are provided and used.
- When de-energizing the circuit is not feasible due to equipment design or operational limitations.
- When de-energizing the circuit will introduce additional or increased hazards.

If Energized Electrical work must be done then an “Energized Electrical Work Permit” must be filled out and kept on site. https://ehs.uci.edu/safety/_pdf/Energized-Electrical-Work-Guidance.pdf

8. References

Title 8, California Code of Regulations, Subchapter 5, “Electrical Safety Orders”

<http://www.dir.ca.gov/Title8/sb5g1.html>