



Electrical Safety Program

Developed by:

The Office of Environmental
Health and Safety

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Contents

I. Introduction	3
II. Program Scope.....	3
III. Definitions.....	3
IV. CSU Electrical Shop.....	5
V. Responsibilities.....	5
VI. Energized Work.....	7
VII. Lockout/Tagout.....	7
VIII. General Provisions – All Employees	7
IX. Specialized Controls and Practices – Electrical Workers	8
X. Electrical Safety Procedures	8
XI. Localized Electrical Outage.....	9
XII. Scheduled Electrical Outage	9
XIII. Maintenance and Repair of Electrical Equipment – Authorized Individuals	9
XIV. Training.....	9
XV. Contacts	10
XVI. References.....	10
Appendix A	Error! Bookmark not defined.

I. Introduction

Cleveland State University makes every effort to provide a safe and healthy environment for employees and students. CSU has developed this Electrical Safety Program in compliance with applicable regulations set forth in the Occupational Safety and Health Administration (OSHA) 1910 Subpart S, the National Electrical Code (NEC), and the National Fire Prevention Association (NFPA) 70 and 70E, in order to protect employees from low voltage electrical hazards. Low voltage work is defined as work performed directly or in proximity of systems of six-hundred (600) volts, nominal, or less. Detailed safety procedures designed to prevent electrical shock or other injuries resulting from direct and/or indirect contact to employees working on or near energized or de-energized parts will be developed as needed/required.

II. Program Scope

This program is applicable to all work at CSU involving electrical systems six-hundred (600) volts or less where employees may be exposed to live parts and/or those parts that have been de-energized. It is possible that some laboratories or areas under Facilities Operations, such as mechanical rooms, may require employees to work with equipment in the range between one-hundred twenty and six-hundred (120 – 600) volts AC. However most other University employees work in areas where the voltage of appliances and equipment are at one-hundred twenty (120) volts or less.

III. Definitions

- (A) Bonding – permanent joining of metallic parts to form an electrically-conductive path that ensures electrical continuity and the capacity to conduct safely any current likely to be imposed.
- (B) Circuit Breaker – device designed to open and close a circuit by non- a u t o m a t i c means and to open the circuit automatically on a predetermined over current without damage to itself when properly applied within its rating.
- (C) Conductive – suitable for carrying electric current.
- (D) Current – term referring to electric flow; it is current that can result in electric shock.
- (E) De-energized – as related to electrical safety, electrical devices and/or equipment that are disconnected from all energy sources including direct electrical connectors, stored electric energy such as capacitors, and stored non-electrical energy in devices that could re-energize electric circuit parts.
- (F) Medium Voltage Electrical Systems – Electrical systems with voltage greater than 1000 volts AC.

- (G) Energized – electrically connected to, or having a source of, voltage.
- (H) Equipment – a general term including material, fittings, devices, appliances, luminaires (fixtures), apparatus, and the like used as a part of, or in connection with, an electrical installation.
- (I) FM – abbreviation for Factory Mutual, an independent product safety testing and certificate company.
- (J) Flash Hazard – a dangerous condition associated with the release of energy caused by an electric arc.
- (K) Ground Fault Circuit Interrupter (GFCI) – a device intended for the protection of personnel that functions to de-energize a circuit or portion thereof within established period of time. GFCI provides additional protection from shocks by deactivating current to equipment when a change in electricity is sensed.
- (L) Grounding – practice whereby electrical equipment is intentionally and securely bonded to the ground, creating a safe, conductive path for electricity.
- (M) Medium Voltage – electrical systems or equipment operating at, or intending to operate at, a sustained voltage of greater than one thousand (1000) volts AC.
- (N) Low Voltage – electrical systems or equipment operating at, or intending to operate at, a sustained voltage of six-hundred (600) volts AC or less.
- (O) Outlet – a point on the wiring system at which current is taken to supply utilization equipment.
- (P) Qualified Person –
 - a. One who has demonstrated skills and knowledge related to the construction and operation of the electrical equipment and installation and has received safety training to identify and avoid the hazards involved.
 - b. Precautionary techniques used for working around the hazards.
 - c. Applicable electrical policies and procedures.
 - d. Proper use of PPE, including arc flash, insulating, and shielding materials.

- e. Proper use of insulating tools and test equipment.
 - f. Distinguish exposed, energized conductors and circuits from other parts of equipment.
 - g. Determine nominal voltage.
- (Q) Resistance – the ease with which electricity flows through material (conductor).
- (R) Service – the conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.
- (S) UL- abbreviation for Underwriters Laboratory, an independent product safety testing and certification organization.
- (T) Voltage – units of electric potential or potential difference assigned to a circuit or system.

IV. CSU Electrical Shop

The CSU Electrical Shop is responsible for providing electrical service to the campus. Any work on electrical service for the campus, including construction, renovation, demolition, maintenance and repair work, requires notification of the CSU Electrical Shop. The CSU Electrical Shop also is responsible for scheduling and performing/facilitating power shutdowns for the campus. Organizationally, the CSU Electrical Shop is part of Mechanical and Electrical Operations, Facilities Management.

V. Responsibilities

Practically all employees across campus utilize power. The innate goal of this electrical safety program is to ensure all employees understand the hazards associated with electric energy and are capable of performing the necessary steps to protect themselves and any co-workers in the area. Responsibilities include hazard identification regarding electrical equipment as set forth below, reporting and correcting any observed or perceived electrical safety hazards, and training.

(A) CSU Employees shall:

1. Perform their tasks and duties so as to be aware of electrical safety issues.
2. Comply with safe operating procedures while working with electrical equipment.
3. Attend appropriate safety training.
4. Report damaged equipment and electrical safety concerns to the Mechanical and Electrical Operations (Facilities Management) or the Office of Environmental Health and Safety.

(B) CSU Supervisors/Managers shall:

1. Ensure applicable employees are trained, qualified and authorized to work on electrical equipment if so required as part of an employee's job duties.
2. Receive and correct reports of electrical safety issues from employees in conjunction with Mechanical and Electrical Operations (Facilities Management) or the Office of Environmental Health and Safety.
3. Notify the Mechanical and Electrical Operations (Facilities Management) of events where outside contractors are engaged to perform electrical repair work activities on campus.

(C) Office of Environmental Health and Safety shall:

1. Provide assistance in identifying electrical hazards.
2. Provide electrical safety training for employees.
3. Collaborate with the Facilities Management and assist Supervisors/Managers on matters of electrical safety.
4. Be authorized to stop work activities involving electrical service and equipment on campus if the work presents a threat to the health and safety of those working or others.

(D) Mechanical and Electrical Operations, Facilities Management shall:

1. Ensure that authorized departmental employees meet the definition of qualified set forth in the NEC and receive the appropriate levels of training.
2. Provide appropriate personal protective equipment to authorized, qualified employees who work with electrical equipment.
3. Be authorized to stop work activities involving electrical service and equipment on campus if the work presents a threat to the health and/or safety of those working or others.

(E) Outside Contractors shall:

1. Be contractually required to adhere to the provisions of OSHA, the NEC and NFPA 70 and 70E while performing repair of electrical equipment or any other electrical work while on campus.
2. Be informed of the prohibition of working on energized electrical equipment at CSU.
3. Adhere to the provisions of:
 - (a) OSHA's Lockout/Tagout Standard
 - (b) CSU Lockout/Tagout Program
 - (c) Outside Contractor's Lockout/Tagout Program

VI. Energized Work

Work on energized equipment at CSU is strictly prohibited unless determined by Electrical Operations for work performed with the equipment energized. In such cases, prior to work being performed on energized equipment, a signed Energized Work Permit must be obtained from Mechanical and Electrical Operations, Facilities Management.

VII. Lockout/Tagout

All electrical workers shall adhere to the provisions of OSHA's Lockout/Tagout Standard (29 CFR 1910.147, Control of Hazardous Energy).

VIII. General Provisions – All Employees

- (A) Working on energized or “hot” equipment is prohibited.
- (B) Always follow the manufacturer's instructions for use, maintenance and repair of electrical equipment. It is recommended these instructions be kept on file for reference.
- (C) Inspect all electrical equipment for damage or defects prior to use.
- (D) Replace all electrical cords that are worn, frayed, or otherwise damaged.
- (E) Take electrical equipment that is damaged or not operating properly out of service by tagging the equipment with a tag or sign that says, “DO NOT USE - DEFECTIVE”. Report to your supervisor for repair and or replacement.
- (F) Extension cords shall be used as temporary sources of power only, and shall not be in continuous use for a period of longer than thirty (30) days. CSU Electrical Shop and the Office of Environmental Health and Safety reserves the right to remove any extension cord deemed by them to be unsafe.
- (G) Be sure to not overload an outlet or circuit beyond its rating and capacity by plugging in multiple pieces of equipment into the same outlet.
- (H) Utilize ground fault circuit interrupters (GFCI) in any water-laden or wet areas.
- (I) Multiple power outlets should be plugged directly into outlets and never into an extension cord or another multiple power outlet.

- (J) Handle plugs on electrical cords by grabbing the plug itself – never pull the electrical cord as a means to remove it or for any other reason.
- (K) Keep all cords away from heat, oil and sharp edges.
- (L) Unplug all electrical equipment prior to performing maintenance and repair activities.
- (M) All electrical service lines and equipment used on campus shall be properly grounded.
- (N) Electrical equipment shall be either Underwriters Laboratories (UL) or Factory Mutual (FM) listed.
- (O) Ensure electrical cords are placed in a manner such that they do not become a trip hazard.
- (P) Only properly trained employees are permitted to perform maintenance and repair activities on electrical equipment. Unless you were hired to work on electrical equipment and possess appropriate training, do not perform maintenance and repair.
- (Q) Never reset a circuit breaker that has tripped to the off position-contact the CSU Electrical Shop via FAST Coordination Center at extension 2500.

IX. Specialized Controls and Practices – Electrical Workers

- (A) Every electrical conductor or circuit part shall be considered energized until proven otherwise by field verification.
- (B) De-energizing an electrical conductor or circuit part and making it safe to work on is, in itself, a potentially hazardous task.
- (C) Wear personal protective equipment specified for a particular job.
- (D) Utilize appropriate tools designed for work with electrical service.

X. Electrical Safety Procedures

Employees trained to work on electrical equipment should develop procedures that include, but are not limited to, the following:

- (A) Purpose of the task/job
- (B) Potential hazards involved

- (C) Safe work practices to be employed
- (D) Personal Protective Equipment to be used
- (E) Insulating materials and tools to be used
- (F) Any special precautions or techniques needed
- (G) If applicable, electrical diagrams

XI. Localized Electrical Outage

All employees should report any electrical outages to Facilities Management immediately by contacting FAST Coordination Center at extension 2500 or (216-687-2500) before 4:30 pm, and Campus Police Dispatch at extension 2020 (216-687-2020) after 4:30 pm and on holidays and weekends.

XII. Scheduled Electrical Outage

No employee shall facilitate or perform an electrical outage (power interruption) to campus electrical service without first obtaining the approval of the CSU Mechanical and Electrical Operations (Facilities Management). Electrical power outages are coordinated by the CSU Electrical Shop. A minimum lead time of five (5) days is required for approval to be granted.

XIII. Maintenance and Repair of Electrical Equipment – Authorized Individuals

- (A) NEVER work with electricity greater than six-hundred (600) volts AC unless you have received the appropriate authorization and specific written permission from the facilities electrical engineer to do so.
- (B) Remove jewelry, key chains or any other metal item from your person before beginning work with electrical equipment.
- (C) De-energize all equipment prior to beginning maintenance and repair work.
- (D) Follow safety protocols as set forth in the University's Lock-Out/Tagout Program.
- (E) Maintain a three (3) foot clearance around electrical panels.
- (F) Wear appropriate personal protective equipment for work with electrical equipment as set forth by OSHA and NFPA 70 and 70E.
- (G) Use only wooden, non-metal ladders when working with electrical equipment.

XIV. Training

Lockout/Tagout. This includes generalized safety training topics on electrical hazards for employees who are not qualified persons under NFPA 70E and not expected to perform maintenance and repair on electrical equipment.

Safety training requirements for employees who perform work on electrical service and

equipment shall be provided. It is the responsibility of the employing department to facilitate the appropriate training for their employees to safely perform their duties. Training topics should include:

- (A) Understanding specific hazards associated with electrical energy.
- (B) Safety-related work practices and procedural requirements as necessary to provide protection from electrical hazards.
- (C) Identify and understand the relationship between electrical hazards and possible injury.
- (D) Emergency procedures and methods of release of victims from contact with exposed energized conductors or circuit parts.

XV. Contacts

For further information on electrical operations at Cleveland State University, please contact Facilities Management, Mechanical and Electrical Operations at extension 6964 or 216-687-6964.

For further information on safety programs at Cleveland State University, please contact the Office of Environmental Health and Safety at extension 9306 or 216-687-9306.

XVI. References

National Fire Protection Association 70E, Standard for Electrical Safety in the Workplace, 2018.

Occupational Safety and Health Administration, 29 CFR 1910 Subpart S, Electrical, 1990.

Occupational Safety and Health Administration, 29 CFR 1910.147, Control of Hazardous Energy, 1989.

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