**The Pennsylvania State University**

**Lab Electrical Safety – For Modified / Lab-Made Equipment**

**Introduction:**

Electricity is a serious workplace hazard, capable of causing property damage, injury, and even death. It is the policy of the Pennsylvania State University (PSU) to protect all employees, students, and other personnel from potential electrical hazards. This will be accomplished through compliance with the work practices described herein along with effective application of engineering controls, administrative controls, and the use of personal protective equipment.

**Purpose:**

This program has been established in order to:

* Ensure the safety of employees and students who may work on or near electrical systems.
* Ensure that work units understand and comply with safety standards related to electrical work.
* Ensure that work units follow uniform practices of electrical work.

**Scope & Applicability:**

This program applies to all Penn State properties and work performed by Penn State employees regardless of job site location. The Hershey Medical Center and the College of Medicine are exempt from this program.

Completing this documented risk assessment **IS NOT REQUIRED** for any of the following:

1) Equipment with a maximum system voltage less than 50 Volts.

2) Appliance type devices used as originally intended by the manufacturer. Examples include, but aren’t limited to, those bought at any department store, appliances, hot plates, power strips, wood/metal working machines, refrigerators, microwaves, ovens, computers, televisions.

3) Instruments/devices typically found in lab/research settings used as originally intended by the manufacturer. Examples include, but aren’t limited, signal generators, analyzers, amplifiers, waveform generators, frequency counters.

**Lab personnel are not permitted to modify/lab-build equipment that is commercially available for purchase. UL or similarly approved devices must be purchased whenever possible.**

**This program does not permit lab personnel to service/work on building electrical systems (i.e. panel boards). See Section 4.0 for more information.**

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1.0 **References:**

The following documents and resources were used as references when developing this program:

* Pennsylvania State University Energized Electrical Safety Program - <https://ehs.psu.edu/energized-electrical-safety/requirements-guidelines>
* Pennsylvania State University Laboratory & Research Safety Plan - SY43 - <https://ehs.psu.edu/laboratory-safety/guidelines>
* NFPA 70E – 2021 edition
1. **Qualifications for those Completing the Risk Assessment:**

The person designated to complete the risk assessment must be deemed as a Qualified Person. For a person to be deemed qualified the following must be true:

1. They must have completed training as indicated in Appendix B. Training is necessary to ensure the Qualified Person is able to recognize and eliminate/control electrical hazards.

2. Be familiar with the construction and operation of the equipment being evaluated.

Appendix B must be completed by the PI and the Qualified Person. Refer to Appendix B for complete details.

1. **Responsibilities:**

1. The Principal Investigator (PI) is responsible for:

* + 1. Ensuring that a risk assessment (Appendix A) and an equipment usage standard operating procedure (SOP) are created and documented as required and defined in the Laboratory and Research Safety Plan- Policy SY43.
* The risk assessment can be a separate document from the SOP or both documents can be merged into one. This allows for flexibility in developing the documents.

b. Designating employee/s such as lab supervisor/lab manager/research assistant to become the Qualified Person.

* This shall be documented using Appendix B – Risk Assessment for Modified/Lab-Made Electrical Equipment – Qualified Person Approval Form.

2. The Qualified Person is responsible for:

a. Conducting and documenting the risk assessment and SOP for the equipment.

b. Ensuring that employees/students are trained pertaining to the equipment’s use.

* Training shall include at a minimum:

i. Review of the risk assessment (Appendix A);

ii. Review of the SOP;

ii. Overview of equipment operation;

iii. Safe work practices;

iv. Potential hazards (shock, arc flash, thermal, etc.);

v. The required personal protective equipment (PPE).

c. Ensuring that controls (safe work practices, guarding, etc.) are put in place and utilized according to the risk assessment and SOP.

 3. Lab Workers are responsible for:

 a. Attending all required training;

 b. Complying with all requirements described in this document, the equipment’s SOP, and training requirements;

 c. Reporting any incidents/concerns/questions to the Qualified Person.

4.0 **Requirements**:

1. General safe work practices:

* + 1. No live electrical work 50 volts or higher is permitted except for voltage testing and troubleshooting. Appropriate PPE must be worn during these tasks.
		2. Lockout/Tagout procedures must be utilized when performing servicing/maintenance on equipment hard wired to the electrical system. Contact EHS for training information.

 -Lockout/Tagout training is required for employees who perform these activities.

* + 1. Cord and plug powered equipment must be unplugged before performing servicing/maintenance activities to ensure that there is no risk of electrical shock.
		2. Training must take place before circuit breakers/disconnects can be operated. There are specific safe work practices that must be followed for this task. Training accessed via this website: <https://ehs.psu.edu/training>
		3. Exits and pathways to exits must remain clear.
	1. Special restrictions pertaining to lab - PI’s, supervisors, managers, research assistants, graduate assistants, and undergraduate students where interaction of building electrical components is required.
		1. University Policy AD38 – “Administration of University Physical Facilities” must be adhered to. The policy establishes the responsibility for the administration of the University physical facilities, including buildings, infrastructure, and grounds at all University locations.

-Refer to PSU Policy AD38. <https://policies.psu.edu/policies/ad38>

* + 1. Common tasks that would require interaction with building infrastructure include but are not limited to:
		2. Operating (opening/closing) a circuit breaker/disconnect switch that is affixed to a Penn State University owned/operated building.

-This task is permitted by PI’s, supervisors, managers, research assistants, graduate assistants if they have received the online EHS training to safely do so.

* + 1. Installing/removing breakers/fuses in electrical distribution equipment/panels affixed to a Penn State University owned/operated building:

-PSU electrician or other qualified Technical Service employees must perform this work. Contact OPP or your campuses Maintenance Department.

* + 1. Making final wiring connections to/from an electrical breaker panel/disconnect box that is a Penn State University (OPP) owned asset for the intentions of installing/un-installing equipment.

-PSU electrician or qualified Technical Service employee is required to perform this work.

* As noted in University Policy AD38, exemptions can be requested through the formal memoranda of understanding process. This process is initiated through OPP Buildings & Grounds. Contact OPP – Director of Buildings and Grounds or Facilities Management.

For other questions or concerns regarding electrical work in the laboratory, contact EHS. (<https://ehs.psu.edu/contact-us>).