

**Original Issuance Date:** February 2018

**Revision #1:** February 2022

## 1. POLICY PURPOSE

The purpose of this policy is to establish safe work practices that are intended to prevent fatalities, electric shock, or other injuries. These injuries can result from direct or indirect contact with equipment or circuits which are or may be energized. This policy supports, but does not replace Occupational Safety and Health Administration (OSHA) standards on electrical safe work practices as codified at 29 CFR 1910.331 through 1910.335.

## 2. RESPONSIBILITIES

Employees:

- Follow electrically safe work practices established by US&A alongside supervisors and other work practices described in this document. These practices include, the use of appropriate protective equipment and tools.
- Attend all training required relative to this program.
- Immediately report any concerns related to electrical safety to supervisors.
- Inspect personal protective equipment prior to and throughout the day's use.

Supervisors:

- Determine the applicability of the electrical safety program to activities conducted within their respective areas.
- Implement the electrical safety program within their areas.
- Ensure employees comply with all provisions of the electrical safety program.
- Ensure employees receive training appropriate to their assigned electrical tasks.
- Develop and maintain a listing of all qualified employees in their areas.
- Ensure employees are provided with and use appropriate protective equipment.
- Ensure that electrically rated gloves are tested every six months.

Environmental Health and Safety

- Assist supervisors in implementing the provisions of this program.
- Periodically review and update this written program.
- Provide or coordinate general training for staff and supervisors on the content of this program
- Periodically evaluate overall effectiveness of the electrical safety program.
- Maintain training documentation.
- Establish energy control procedures alongside electrical supervisors.

### 3. SCOPE

Any electrical circuits or equipment that has been supplied or has the potential to have 50 volts of electricity or more.

### 4. DEFINITIONS

**Arc Flash:** Energy released during an arcing fault that occurs when current flows through a medium not intended to conduct electrical current. Essentially, an arc flash is a short circuit through the air emitting extreme heat, sound, pressure, and metal fragments.

**Energized:** Electrically connected to or having a source of voltage.

**Exposed (as applied to live parts):** Capable of being inadvertently touched or suitably guarded, isolated, or insulated.

**Live Parts:** Energized conductive components.

**Lockout/Tagout (LOTO):** Refers to specific practices and procedures to safeguard employees from the unexpected energization or startup of machinery and equipment, or the release of hazardous energy during service or maintenance.

**Qualified Person:** One who has skills and knowledge related to the construction and operation of the electrical equipment and installation and has received training on the hazards involved.

**Unqualified Person:** Any person who does not meet the definition of a qualified person.

### 5. POLICY STATEMENT

#### General Requirements

All employees will use appropriate safe work practices to prevent fatalities, electric shock, or other injuries resulting from either direct or indirect electrical contacts with electrically energized circuits or equipment. Those specific work practices will be consistent with the nature and extent of the associated electrical hazards.

All new electrical wiring shall be installed by a licensed electrician and all work shall be completed within the provisions of the most current version of the National Fire Protection Association (NFPA) 70E- Standard for Electrical Safety in the Workplace and OSHA CFR 1910.333- Standard and Use of Work Practices. This document does not provide a complete listing of NFPA 70E requirements.

#### Training

Supervisors must ensure that employees who face a risk of electrical shock in their work are trained in accordance to this program. Employees who are exposed to an electrical hazard that is not reduced to a safe level by the installation shall be trained.

The level of electrical safety training provided is dependent on whether the employee is classified as a “qualified person” or “unqualified person”. It is the supervisor’s responsibility to determine what level of training is required for their employees.

1. A “qualified person” shall be trained and knowledgeable in all of the following topics:
  - Construction and operation of equipment on which work is assigned.
  - Skills and techniques necessary to distinguish exposed energized parts from other parts of electrical equipment.
  - Skills and techniques necessary to determine the normal voltage of exposed live parts.
  - The process necessary to determine the degree and extent of electrical hazards along with the PPE and job planning necessary to perform the task safely.
  - A person can be considered qualified with respect to certain equipment and methods but unqualified for others.
2. An “unqualified person” shall be trained in the inherent hazards of electricity and any related work practices that are necessary for their safety.
3. For additional information on training refer to OSHA CFR [1910.332](#) and [NFPA 70E 110.2](#)

### **Work On or Near De-Energized Parts**

This section applies to work on exposed de-energized parts or near enough to them to expose the employee to any electrical hazard they present. Conductors and parts of electric equipment that have been de-energized but have not been locked or tagged out in accordance with the appropriate standards, shall be treated as energized parts. [CFR 1910.333](#)

1. Live parts to which an employee may be exposed will be de-energized before any employee works on or near them. De-energizing is not required when the practice will introduce additional or increased hazards due to equipment design or operational limitations or when required for troubleshooting purposes. Live parts that operate at less than 50 volts to ground need not be de-energized if there will be no increased exposure to electrical burns or to explosion due to electric arc flash.
  - Examples of increased or additional hazards include: interruption of life support equipment, deactivation of emergency alarm systems, shutdown of hazardous location ventilation equipment, or complete removal of illumination for an area.
  - Examples of work that may be performed on or near energized circuit parts because of infeasibility due to equipment design or operational limitations include: testing of electric circuits that can only be performed with the circuit energized and work on circuits that form an integral part of a continuous process that would otherwise need to be completely shut down in order to permit work on one circuit or piece of equipment.
2. Whenever any employee is exposed to contact with parts of fixed electric equipment or circuits that have been de-energized, the circuits energizing the parts will be properly locked out following proper lockout/tagout procedures. Procedures must be in place before equipment is de-energized.

3. Safe procedures for de-energizing circuits and equipment will be determined before circuits or equipment are de-energized.
4. The circuits and equipment to be worked on will be disconnected from all electric energy sources. Control circuit devices, such as push buttons, selector switches, and interlocks, may not be used as the sole means for de-energizing circuits or equipment. Interlocks for electric equipment may not be used as a substitute for lockout procedures.
5. Stored electric energy that might endanger personnel will be released before starting work. Capacitors shall be discharged and high capacitance elements shall be short-circuited and grounded, if the stored electric energy might endanger personnel.
6. Stored non-electrical energy in devices that could re-energize electric circuit parts will be blocked or relieved to the extent that the circuit parts could not be accidentally energized by the device.
7. No work will be performed on or near de-energized live parts, circuits or equipment until their de-energized condition has been verified. Verification of the de-energized condition will be made as follows:
  - A qualified person will operate the equipment operating controls or otherwise verify that the equipment cannot be restarted.
  - A qualified person will use test equipment to test the circuit elements and electrical parts of equipment to which employees will be exposed and will verify that the circuit elements and equipment parts are de-energized.
  - The test shall also determine if any energized condition exists as a result of inadvertently induced voltage or unrelated voltage back feed even though specific parts of the circuit have been de-energized and presumed to be safe.
  - If circuit to be tested is over 600 volts, nominal, the test equipment shall be checked for proper operation immediately after this test.
8. Before any circuit or equipment is re-energized (even temporarily) the following requirements will be met in the order listed:
  - A qualified person will conduct tests and visual inspections, as necessary, to verify that all tools, electrical jumpers, shorts, grounds, and other such devices have been removed, so that the circuits and equipment can be safely energized.
  - Employees exposed to the hazards associated with re-energizing the circuit or equipment will be warned to stay clear of circuits and equipment.
  - Each lock and tag will be removed by the employee who applied it or under his or her direct supervision.
  - If that employee is absent from the workplace, then the lock may be removed provided that it is certain that the employee who applied the lock is not available at the workplace, and that employee is made aware that the lock has been removed before he or she resumes work.
  - There will be a visual determination that all employees are clear of the circuits and equipment.

**Work On or Near Exposed Energized Parts [\(1910.333\)\(c\)\(2\)](#)**

Energized electrical work consists of the repair, maintenance, troubleshooting, or testing on electrical circuits, components, or systems while energized (live). Some common tasks where there may be a need to work on or near live circuits include:

- Taking voltage measurements
  - Opening and closing disconnects and breakers
  - Working with ballasts
  - Racking breakers on and off the bus
  - Removing panels and dead fronts
  - Opening electric equipment doors for inspection
1. In those cases where the exposed live parts are not de-energized, either because of increased or additional hazards or because of infeasibility due to equipment design or operational limitations, other safety-related work practices shall be used to protect employees who may be exposed to the electrical hazards involved. The work practices used shall protect employees against contact with energized circuit parts directly with any part of their body or indirectly through some other conductive object or where employees are near enough to be exposed to any hazard they present.
  2. Only qualified persons may work on electric circuit parts or equipment that has not been de-energized. These employees shall be familiar with the proper use of special precautionary techniques, personal protective equipment, insulating and shielding materials, and insulated tools.
  3. Before any energized work can begin on circuits at or above 600 volts, an Energized Electrical Work Permit shall be completed and approved by the employee's supervisor.
  4. Whenever work is to be performed near overhead lines, the lines will be de-energized and grounded, or other protective measures will be provided before work is started.
  5. When overhead lines are to be de-energized, arrangements to de-energize and ground them will be made with the organization that operates or controls the electrical circuits involved.
  6. When protective measures are provided such as guarding, isolating, or insulating, those precautions shall prevent employees from contacting such lines directly with any part of their body or indirectly through conductive materials, tools, or equipment.
  7. Only qualified employees will be permitted to install insulating devices on overhead power transmission or distribution lines.
  8. Whenever an unqualified employee is working in an elevated position near overhead lines, the location will be such that the person and longest conductive object he or she may contact cannot come closer to any unguarded, energized overhead line than the following distances:
    - For voltages to ground 50kV or below= 10 feet.
    - For lines rated over 50kV= 10 feet plus 0.4 inches for each 1kV over 50kV.

**Energized Electrical Work Permit (energized work over 600 volts) [NFPA 70E 130.2\(B\)](#)**

1. If live parts are not placed in an electrically safe condition, work to be performed shall be considered energized electrical work and will be performed by written permit only.
2. Appendix A includes an Energized Electrical Work Permit. The intent of this permit is to ensure that all appropriate safety precautions are taken prior to starting energized electrical work.
3. The permit is to be originated by the individual requesting that the energized work be completed. (This will normally be the supervisor of the employee who will be completing the work).
4. Energized electrical work permits shall be kept on file by the supervisor upon completion of the task and kept for one (1) year after work is completed.

### **Personal Protective Equipment (PPE):**

Employees working in areas where there are potential electrical hazards shall be provided with, and use, electrical protective equipment that is appropriate for the specific parts of the body to be protected and or the work to be performed.

Refer to most current published NFPA 70E for guidance on required PPE:

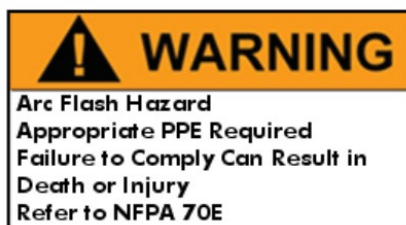
- Rubber Insulating Equipment, Maximum Test Intervals: [Table 130\(C\)\(7\)](#)
- Standards for Personal Protective Equipment- Informational Note: [Table 130.7\(C\)\(14\)](#)
- Arc-Flash PPE Categories for Alternating Current (ac) Systems: [Table 130.7\(C\)\(15\)\(a\)](#)
- Arc-Flash PPE Categories for Direct Current (dc) Systems: [Table 130.7\(C\)\(15\)\(b\)](#)
- Personal Protective Equipment (PPE)- Arc-Flash Category: [Table 130.7\(C\)\(15\)\(c\)](#)
- Standards on Other Protective Equipment- Informational Note: [Table 130.7\(G\)](#)

### **Arc Flash Requirements**

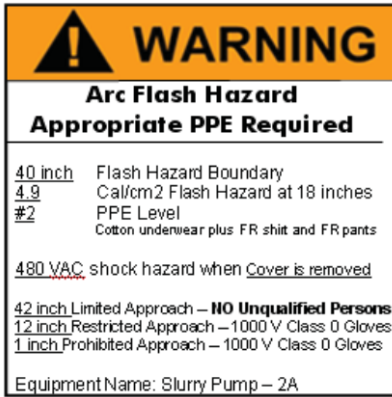
Arc Flash warning labels shall be affixed to required equipment based on an arc flash analysis. The arc flash analysis shall be conducted by qualified personnel using tables, formula, or software specified within the most current version of NFPA 70E.

Qualified and unqualified persons shall be trained on using these labels to define safe work practices and personal protective equipment requirements.

Minimum arc flash label example:



Detailed (preferred) arc flash label example:



## Contractors

Safety programs used by contractors must meet or exceed all applicable guidelines of this safety program. Contractors are required to comply with applicable safety and health regulations such as OSHA and NFPA. Contractors may be required to submit copies of their safety program upon request.

## 6. RELATED DOCUMENTS

OSHA 29 CFR 1910.331-1910.335

National Fire Protection Association (NFPA) 70E- Standard for Electrical Safety in the Workplace.

Wisconsin Legislature 101.80, Subpart IV- Electrical Wiring and Electricians.

Wisconsin Legislature SPS 305.40, Subpart IV- Electrical.

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**APPROVED BY:**

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**DATE:**

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**Appendix A: Energized Electrical Work Permit**

(Required for work over 600 volts only)

<b>Part 1: To be completed by the requestor or supervisor of the job</b>	
Description of Circuit & Equipment:	Job Location:
Description of Work to be Done:	
Justification of why the circuit cannot be de-energized or the work delayed until the next scheduled outage:	
<b>Part 2: To be completed by the qualified person(s) completing the work</b>	
(1) Detailed description of procedure to be used in performing the above work:	
(2) Description of safe work practice to be employed:	
(3) Voltage exposure (shock hazard analysis):	
(4) Determination of shock protection boundaries:	
(5) Results of flash hazard analysis:	
(6) Determination of flash protection boundaries:	
(7) PPE required to safely perform the task:	
(8) Method used to restrict access to the work area:	
(9) Do you agree the above work can be done safely? YES (proceed to Part 3) NO (return to requestor)	
Qualified Person: _____	Date: _____
Qualified Person: _____	Date: _____
Qualified Person: _____	Date: _____
<b>Part 3: To be completed by Supervisor</b>	
Approvals:	
Name	Job Title
Date	
_____	_____
_____	_____
_____	_____
Note: A supervisor shall approve all energized work before starting.	