Company Name:
Policy/Procedure ID Number: 222
Date:

Arc Flash Prevention Policy

This is (Enter Company Name Here) Arc Flash Prevention policy. (Enter Name Here) will be responsible for overall direction of the Safety Program.

INTRODUCTION

Arc flash is a short circuit that flashes from one exposed live conductor to another, or to ground. The resulting ionized air creates electrically conductive super-heated plasma that can reach temperatures of 5000°F and above. The explosion takes less than one second and produces a brilliant flash, intense heat, and a pressure blast equivalent to several sticks of dynamite. Since the vast majority of events (>80%) are caused by human error, there is a high risk that one or more people will be in the flash zone. Without adequate PPE, the risk of serious injury or death is high.

PURPOSE
The purpose of this policy is to prevent accidental injury caused by an arc flash event and to promote safe facility practices among employees. This policy is intended to comply with OSHA 29 CFR Part 1910, Subpart S, National Fire prevention Association 70E.

RESPONSIBILITIES

Facility General Manager

- Assure implementation of this policy.

Facility Safety Manager and Engineering Manager

- Oversee completion of Arc Flash Analysis and implementation of arc flash hazard remediation.
- Assure the proper placement of Arc Flash hazard labels.
- Assist shops in implementing the provisions of this program.
- Provide or assist in task specific training for electrical work qualifications.
- Periodically review and update this written program.
- Provide or coordinate general and specific training for shops on the content of this program.
- Evaluate overall effectiveness of the Arc Flash Safety Program on a periodic basis.

Supervisors/Shop Foremen

- Determine the applicability of the Arc Flash Safety Program to activities conducted within their respective areas.
- Responsible for the implementation of Arc Flash Safety Program within their areas.
- Ensure employees comply with all provisions of the Arc Flash Safety Program.
- Ensure employees receive training appropriate to their assigned electrical tasks and maintain documentation of such training.

- Develop and maintain a listing of all qualified employees in their areas.
- Ensure employees are provided with and use appropriate protective equipment.

Employees

- Follow the work practices described in this document, including 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 supervision.

GENERAL REQUIREMENTS

Implementation of this policy requires:

- Completion of Arc Flash analysis surveys.
- Labeling electrical switches, bus locations, and panel boards with warning labels.
- Training qualified employees on safe work practice and personal protective equipment (PPE) requirements.
- Acquisition of necessary PPE based upon the arc flash surveys.

Completion of Arc Flash Surveys

This is an analysis performed on your facility. The analysis involves a detailed field verification of your electrical distribution system from your utility to the equipment on the floor. The analysis is conducted by engineers utilizing software specifically designed to perform the calculations of the arc flash hazard levels. Hazard levels in most cases can be reduced by simple, cost effective modifications. Arc flash surveys can be out sourced and completed by contractor or they can be done by qualified electrical engineering staff.

Labeling

Analyzed electrical panels, disconnects, and bus locations are labeled to indicate hazard boundaries and required PPE needed to safely work on the circuit. A sample label can be found as an attachment to this policy.

Training

Employees who are exposed to an electrical hazard that is not reduced to a safe level by the installation must be trained.

The level of electrical safety training provided is dependent on whether the employee is classified as a "qualified person" or "unqualified person."

A "qualified person" shall be trained and knowledgeable in all of the following topics:

- Arc Flash program PPE requirements, what PPE must be worn, when, and by whom.
- 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 nominal voltage of exposed live parts.
- The approach distances specified in this document and the corresponding voltages to which the qualified employee will be exposed.
- 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.
- An "unqualified person" shall be trained in the inherent hazards of electricity and any related work practices that are necessary for their safety.
- Training must be provided before the employee is assigned duties that involve work near or on electrical systems.
- Each supervisor and the Safety Manager shall maintain a record of all electrical training provided to their employees along with a listing of all employees classified as qualified persons.

Proper Personal Protective Equipment

PPE shall be worn when any work is conducted within the arc flash zone for specific equipment.

Note: The primary method of protecting employees from arc flash as spelled out in 70E is de-energizing live parts prior to working on or near them using proper lockout-tagout procedures. This limits the employee's exposure to electrical hazards during the shutdown and verification process. Many believe they don't have to worry about arc flash because they have instituted a "no live work" policy at their facility. Because the employee is still exposed during shutdown and verification, this policy does nothing to remove the need to protect against arc flash. Until you have verified that the circuit is de-energized, it must be treated as energized and the appropriate Personal Protective Equipment (PPE) must be used to protect against arc flash.

Flame retardant (FR) clothing shall be in compliance with the following NFPA 70E Table.

Category	Cal/cm2	Required Clothing
0	1.2	Untreated cotton
1	5	Flame retardant (FR) shirt and FR pants.
2	8	Cotton underwear, FR shirt, and FR pants
3	25	Cotton underwear, FR shirt, and FR pants; and FR coverall
4	40	Cotton underwear, FR shirt, FR pants, and double-layer switching coat and pants.

FR eye protection and FR hearing protection shall be worn as part of the PPE requirement for arc flash safety.

Employees working in areas where electrical hazards are present shall be provided with, and shall use, protective equipment (Arc Flash Gear) that is designed and constructed for the specific body part to be protected and for the work to be performed.

Protective equipment (Arc Flash Gear) required by this program is to be provided at no cost to employees. Such equipment shall include an Arc Flash rated apparel, eye protection, head protection, hand protection, insulated footwear, and face shields where necessary.

All protective equipment shall be maintained in a safe, reliable condition by the employee to whom it is issued.

Employees shall wear nonconductive head protection whenever there is a danger of a head injury from electric shock or burns due to contact with live parts or from flying objects resulting from an electrical explosion.

Employees shall wear nonconductive protection for the face, neck, and chin whenever there is danger of injury from exposure to electric arcs or flashes or from flying objects resulting from an electrical explosion.

Employees shall wear protective equipment for the eyes and face whenever there is a danger of injury from electric

arcs, flashes, or from flying objects resulting from an electrical explosion.

Employees shall wear rubber-insulating gloves where there is a danger of hand and arm injury due to contact with live parts or possible exposure to arc flash burn.

If an employee is wearing shoes other than hard-soled type (tennis shoes are not considered hard soled), he/she must wear dielectric overshoes, which will be provided by the employer.

Face shields without an arc rating will not be used for electrical work. Safety glasses or goggles must always be worn underneath face shields.

Personal protective equipment shall be provided to and used by all employees working within the Flash Protection Boundary.

FR apparel shall be visually inspected before each use. FR apparel that is contaminated or damaged shall not be used. Protective items that become contaminated with grease, oil, flammable liquids, or combustible liquids shall not be used.

The garment manufacturer's instructions for care and maintenance of FR apparel shall be followed.

When FR apparel is worn to protect an employee, it shall cover all ignitable clothing and allow for movement and visibility.

FR apparel must cover potentially exposed areas as completely as possible. FR shirtsleeves must be fastened and FR shirts/jackets must be closed at the neck.

Non-melting, flammable garments (i.e. cotton, wool, rayon, silk, or blends of these materials) may be used as under layers beneath FR apparel.

Meltable fibers such as acetate, nylon, polyester, polypropylene, and spandex shall not be permitted in fabric under layers next to the skin. (An incidental amount of elastic used on non-melting fabric underwear or sock shall be permitted.)

FR garments worn as outer layers over FR apparel (i.e. jackets or rainwear) must also be made from FR material.

Flash suits must permit easy and rapid removal by the user.

Contract Employees

Safety programs used by contractors on facility jobsites must meet or exceed all applicable guidelines of this Safety Program.

APPENDIX

Appendix A - Definitions

Appendix B - Sample Arc Flash Label

Appendix C - Checklist

Appendix A - Definitions

Flash Hazard Analysis - A study investigating a worker's potential exposure to arc-flash energy, conducted for the purpose of injury prevention and determination of safe work practices and the appropriate levels of PPE.

Flash Protection Boundary - An approach limit at a distance from exposed live parts within which a person could receive a second degree burn if an electrical arc flash were to occur.

Flame Resistant (FR) - The property of a material whereby combustion is prevented, terminated, or inhibited following the application of a flaming or non-flaming source of ignition, with or without subsequent removal of the ignition source.

Flash Hazard - A dangerous condition associated with the release of energy caused by an electric arc.

Qualified Person - One who has skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training on the hazards involved.

Restricted Approach Boundary - An approach limit at a distance from an exposed live part within which there is an increased risk of shock, due to electrical arc over combined with inadvertent movement, for personnel working in close proximity to the live part.

Arc Rating - The maximum incident energy resistance demonstrated by a material (or a layered system of materials) prior to break open or at the onset of a second degree skin burn. Arc rating is normally expressed in cal/cm2.

De Energized - Free from an electrical connection to a source of potential difference and from electrical charge; not having a potential different from that of the earth.

Energized - Electrically connected to or having a source of voltage.

Occasional Users - Qualified persons who work in a limited capacity in arc flash zones, not on a daily basis.

Note: For any other definitions concerning this policy, refer to NFPA 70E: Standard for Electrical Safety in the

Workplace.

Appendix B - Sample Arc Flash Label

Appendix C - Checklist

Arc Flash Design Review
__ Has a design review been conducted to identify potential areas to reduce hazards including fault levels, exposure times, remote operations, remote racking, and system grounding?
__ Have protective devices been tested/checked to verify performance per study?
__ Is there a procedure in place to assure studies are updated and testing has been done?

Documentation
__ Is your Arc Flash Hazard plan documented?
__ Does the documentation include the results of the arc flash analysis, labels on equipment, and at hazardous areas? Do all labels include the type, name/ID, incident energy at working distances, flash protection boundary, hazard/risk category, and arc flash training?
__ Are all single-line diagrams up-to-date reflecting any modification or expansions to your electrical distribution system or any changes in the electrical utility system?
__ Do you have a documented method for maintaining required Personal Protective Equipment?

Safety
__ Does your safety program include a certified training program including awareness of electrical hazards?
__ Does your safety program identify hazard/risk evaluation procedures, electrically safe work procedures, tools and PPE, and electrical safety principles?
__ Do you have appropriate safety procedures in place to minimize dangers where exposure cannot be avoided?
__ Do you have a formal recordkeeping process for documenting accidents and near misses?
__ Is there a process in place that ensures actions will be taken to update procedures or take other corrective action when an accident or near miss occurs?
__ Do workers comply with manual procedures?
__ Is there a periodic audit of workers to confirm compliance with safety manual procedures?

Training
__ Do you have an effective arc flash training program? Does it provide workers the knowledge and understanding of the existence, nature, causes, and methods to prevent electrical hazards?
__ Does your arc flash training program include training on arc flash awareness, standards and codes, understanding of arc flash quantities, selection and use of appropriate PPE, reading and following warning signs and labels, methods to reduce risk while working on live exposed parts, and arc flash hazard assessment?
__ Is there a process in place that ensures the training program is periodically reviewed to identify needed changes?
__ Have all personnel working on or near energized equipment undergone specific training in the hazards of working on energized equipment, and the use and proper application of PPE?
__ Do training records exist?

Labeling
__ Does all electrical equipment that may remain energized during maintenance or repair post a warning label in compliance with the National Electrical Code 110.16?

Personal Protective Equipment
__ Do you have a personal protective equipment plan?
__ Does the plan address all OSHA standards regarding PPE?
__ Does the plan cover how PPE should be worn, maintained, and disposed of after the equipment life has expired?
__ Is there a process in place to ensure PPE requirements are updated when system or utility supply changes are made?

Regulatory Compliance
__ Does your arc flash hazard program address all regulatory requirements imposed by NFPA 70E 2004, The National Electrical Code 110.16, IEEE 1584, and OSHA 1910.132(d), and 1926.28(a)?
__ Do you have an established process for updating Arc Flash Hazard programs as new information becomes available?

Electrical Preventive Maintenance Program
__ Does your preventive maintenance program specifically address arc flash hazards?
__ Is the program being followed rigorously?
__ Is there a procedure in place that updates the program based on changes to plant equipment or processes?
