

## Is your facility OSHA Compliant for Electrical Arc Flash Hazards?



*It is estimated that in the US, 5-10 arc-flash injuries resulting in hospitalization occur every day. According to research, more than 2,000 times per year, workers are admitted to medical facilities for treatment of injuries caused by arc flash.*

### What is an Electrical Arc Flash?

A fault between 2 electrical conductors with an energy release that can be as small as a flash of light up to a major fireball explosion.

Over 70 % of incidents occur during or immediately after electrical maintenance.

### What are some Arc Flash Injuries?

Blindness, severe burns, barotrauma (shock wave), ruptured ear drum, toxic vapor inhalation, shrapnel wounds, etc.

### What is required to protect your people and comply with OSHA?

A safety program including arc flash hazard calculations, appropriate tools & personal protective equipment (PPE), worker training on arc flash hazards and warning labels on equipment provided by the equipment owners (not the standard manufacturer labels).

*In short, you may need an*

## **ARC FLASH HAZARD ANALYSIS**

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for further information and to schedule a meeting.

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# Arc Flash Hazard Frequently Asked Questions

## *What is an Arc Flash?*

An **Arc Flash** is an electrical fault between two conductors – Phase to phase, Phase to Earth, or Phase to Neutral. This energy release can be as small as a flash of light with a popping sound to a major fireball explosion with heat 4 times that of the sun (35,000°F) also known as an **Arc Blast**. The concern is that energy released above a certain level will ignite non-flammable resistant clothing and cause major flesh burns.

## *What causes an Arc Flash/Blast?*

Accidental contact by a worker or tool while working on energized equipment, mechanical breakdown, loose connections, insulation failure, unfinished or inadequate maintenance, dust build-up between conductors, animals contacting energized components, current overload, or voltage transients.

## *Why do I need to do an Arc Flash Assessment?*

**OSHA** states that employers "...shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees."

**NESC**, ANSI C2-2007, Section 410.A.3 reads "Effective as of January 1, 2009, the employer shall ensure that an assessment is performed to determine potential exposure to an electric arc for employees who work on or near energized parts or equipment. If the assessment determines a potential employee exposure greater than 1.2 cal/cm exists, the employer shall require employees to wear clothing or a clothing system that has an effective arc rating not less than the anticipated level of arc energy."

**Beyond the requirements of codes and standards, the safety of your employees should be a major consideration for conducting an Arc Flash Assessment.** An arc flash can happen at any time while working on live electrical equipment. By doing an assessment the risk to employees can be minimized if you know what the dangers are, where they are located in your plant, and how your employees are prepared to handle the situation. **A good comparison is that of police bomb squads. These specialized workers do not go into an "energized" situation without careful planning, proper protection, and training. Employees facing work on electrical equipment should be similarly prepared.**

## *What happens during an Arc Flash Assessment?*

Typically, system information is gathered through a physical inspection of the plant's electrical system. This is done to determine the working distance from a potential arc flash location. The incident energy level is calculated based on the electrical system and an analysis is generated of the over-current protective device clearing times. A circuit analysis is performed to determine the available bolted fault current. The arc duration (fault clearing time) depends on the circuit protective device. If a transformer is involved, its impedance is needed to determine the available bolted fault current, the Hazard Risk Category, and Flash Protection Boundary. Finally, the required Arc Flash PPE (Personal Protective Equipment) is determined for each point in the system based upon the potential incident energy calculated at the working distance.

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Revised November, 2009

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## *What will I receive from an Arc Flash Assessment?*

1. Fully documented one line drawing of your plant's electrical system with the following for each point in the system
  - a. Calculated fault currents
  - b. Hazard level of flash in cal/cm<sup>2</sup>
  - c. Shock hazard
  - d. Required PPE (Personal Protection Equipment)
2. Recommendations of what to do to correct problems found during the assessment
3. Warning labels to affix to your equipment that have the arc flash boundary, shock hazard, limited approach boundary, flash hazard in cal/cm<sup>2</sup>, and required PPE listed on each

## *What are the regulations to support the necessity of this assessment?*

- OSHA 29 CFR-1910, Subpart S 1910.132(d) and 1910.335
- Section 5(a)(1) of the Occupational Health and Safety Act
- NFPA 70 National Electrical Code (NEC), Section 110.16
- NFPA 70E, "Standard for Electrical Safety in the Workplace"
- NESC, ANSI C2-2007, Section 410.A.3

## *What must I do to comply?*

- ✓ Provide and be able to demonstrate a safety program with defined responsibilities.
- ✓ Calculate and post the degree of arc flash hazard.
- ✓ Provide correct personal protective equipment (PPE) for workers.
- ✓ Train workers on the hazards of arc flash.
- ✓ Provide appropriate tools for safe working conditions.
- ✓ Apply warning labels on equipment. - provided by the equipment owners, not the manufacturers.

## *Am I done once the labels are on?*

- **NO**, your employees will need to be trained in Arc Flash Hazard, what it is and how to use the required PPE (Personal Protection Equipment).
- You will need to **audit the system** periodically and update the one line drawing for new or moved equipment. For example, just because a moved piece of equipment was at a level 0 here doesn't mean it will be there... **remember it is the upstream fault that is the problem.**



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