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ARC FLASH HAZARDS: WHAT ARE THEY & HOW TO PROVIDE A SAFE WORK ENVIRONMENT

In today's safety conscious environment, there is growing concern and increased discussion regarding arc flash hazards. An arc flash is a technical name for an electrical explosion—this occurs during a fault, or short circuit condition, which passes through an arc gap. An arc flash event can expel large amounts of deadly energy in the form of a super-heated ball of gas, with arc flash temperatures reaching as high as 35 thousand degrees Fahrenheit. Without proper precautions, it can have deadly or disabling consequences for workers, and cost business owners millions per case for treatment of injuries.

WHAT ARE ARC FLASH HAZARDS?

When workers open live electrical panels with voltage exceeding 50V, usually for the purpose of troubleshooting an issue or metering, they are exposed to arc flash hazards. Almost all buildings have these types of hazards, and it only takes a fraction of a second for the electrical explosion to produce fire, burning flesh at distances of 10 feet or more. Arc flash temperatures can also liquefy or vaporize nearby metal including copper, aluminum conductors or steel equipment parts—resulting in explosive pressure and sound waves strong enough to throw workers across the room.

To provide an increased level of safety for the electrical workers, it is crucial for those involved in the design, implementation and evaluation of electrical distribution systems to have a keen understanding of how to evaluate arc flash hazards as well as how to minimize or mitigate the situation.

PERSONAL PROTECTIVE EQUIPMENT

HAZARD/RISK CATEGORY 1

MINIMUM PPE REQ.
4 CAL/CM²

Arc-rated long-sleeve shirt
Arc-rated pants or overall
Arc-rated face shield with hard hat
Safety glasses
Hearing protection
Leather & voltage rated gloves (*as needed*)
Leather work shoes

HAZARD/RISK CATEGORY 2

MINIMUM PPE REQ.
8 CAL/CM²

Arc-rated long-sleeve shirt
Arc-rated pants or overall
Arc-rated face shield & balaclava **or**
Arc-rated flash suit with hard hat
Safety glasses
Hearing protection
Leather & voltage rated gloves (*as needed*)
Leather work shoes

HAZARD/RISK CATEGORY 3

MINIMUM PPE REQ.
25 CAL/CM²

Arc-rated long-sleeve jacket
Arc-rated pants
Arc-rated flash hood with hard hat
Safety glasses
Hearing protection
Leather & voltage rated gloves (*as needed*)
Leather work shoes

HAZARD/RISK CATEGORY 4

MINIMUM PPE REQ.
40 CAL/CM²

Arc-rated long-sleeve jacket
Arc-rated pants
Arc-rated flash hood with hard hat
Safety glasses
Hearing protection
Leather & voltage rated gloves (*as needed*)
Leather work shoes

HOW CAN I PROTECT MY WORKERS AGAINST ARC FLASH HAZARDS?

Employees who work on electrical panels can be best protected against existing arc flash hazards by working on the equipment de-energized. If de-energizing equipment is not an option due to life safety concerns, then proper electrical safety training and wearing

personal protective equipment (PPE) suitable for the level of hazard that may occur at each piece of equipment is the best approach. To understand the appropriate level, an arc flash study in which a model of your electrical system is prepared can be used to quantify the hazard present at each section of equipment. Also note that most PPE gear are not to be used as the only measure of protection against hazards, and an arc flash study can help employers understand all the details surrounding compliance.

WHAT IS AN ARC FLASH STUDY AND WHY DO YOU NEED IT?

RTM offers arc flash studies and analyses, but we often find that building owners don't understand what they entail or why they are important. An arc flash study determines how much electrical energy is available at each piece of electrical equipment; the more available energy, the greater the arc flash potential, and the greater the risk to life safety.

When installing a new system or making modifications to a building's electrical infrastructure, OSHA (Occupational Safety and Health Administration) requires companies to have an arc flash study performed to provide a safe work environment. OSHA's main goal is to expose any hazards that exist within a facility. Workers that are aware of the hazards and trained to deal with them are less likely to be injured. Christopher Kneeland, Principal at RTM, explained that, "Creating a safe work environment is our main goal, and life safety through awareness and training is key to achieving this."

Arc flash survey results, including arc flash distances and incident energy potential, should be labeled on the equipment so that workers who maintain it will understand how to best protect themselves. The level of incident energy is provided on the label to allow the trained worker to pick the best PPE for each situation. *(See example on side)*

Section 110.16 of the 2008 National Electrical Code requires that electrical equipment be marked to warn qualified personnel of potential arc flash hazards.

RTM Engineering Consultants conducted an arc flash study encompassing the entire electrical distribution system within the 1.2 million-square-foot All Saints Healthcare main campus in Racine, WI. The study followed the methodology and procedures outlined in IEEE Standard 1584 and NFPA 70E Electrical Safety in the Workplace.

After reviewing the existing electrical distribution system documentation, RTM performed a site survey at the facility where changes were reviewed, and an up-to-date one-line power diagram was provided. Floor plans depicting all panel locations were also developed and an electrical equipment summary was created including the name, description, location, voltage, panel source, and source branch. In doing this, RTM was able to perform a short circuit, over current protection coordination, and arc flash study.

A report for each of these studies was provided to the client, as well as a one-line diagram depicting fault current and arc flash levels, and a list of recommended circuit breaker settings. RTM also provided and installed the necessary arc flash labels to all electrical equipment and provided electrical safety training to facility staff and maintenance workers.

PARTNER WITH RTM

RTM Engineering Consultants provides turnkey arc flash studies and can train engineers and electricians in your building to help ensure ongoing arc flash compliance. Our team also performs electrical system studies that include a report that details results, updated electrical one-line diagrams, recommendations, and a prioritized action plan.

Interested in performing an arc flash analysis on your building's electrical system? Contact an RTM team member today!

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