Making Safer Facilities

Six Things Every Company Should Know About Arc Flash Prevention




If you're overseeing or insuring an industrial facility today, you face a number of growing challenges. You need to reduce risk, fend off growing costs and cope with an increasingly litigious environment.

The good news? You're in a prime position to make your facility and workforce safer. One way to accomplish this is to ensure compliance with the new requirements in NFPA 70E, the Standard for Electrical Safety in the Workplace. In this report, we'll focus on the heart of the updated 70E, arc flash safety, and cover six important facts about arc flash.

An arc flash is a small explosion several times hotter than the sun.

Whenever electricity passes through the air between conducting materials—such as when you shock yourself on a doorknob—we see an arc as the current produces light and plasma. The industrial arc flash is a different animal. It almost always occurs in systems running 480 volts or more and always occurs accidentally.

An industrial arc flash is essentially an explosion. The electricity in the circuit breaks loose, finding the path of least resistance and moving through a conductive plasma air path. This converts much of the energy in the arc to heat; in milliseconds the temperature can reach 35,000F, several times hotter than the surface of the Sun. Intense light—easily bright enough to cause permanent blindness—flares out from the arc carrying enough energy to vaporize materials in the vicinity, set them on fire and cause fatal burns up to 10 feet away.

Arc flashes can reach 35,000F, several times hotter than the surface of the sun.

Like any dangerous explosion, an arc flash produces deafening noise and an expanding pressure wave. The conductors the arc is jumping between—and other nearby metals—are vaporized. As they change from a solid to a vapor, their volume increases enormously, over 67,000 times in the case of copper. Other metals are liquefied. The extreme heat causes air expansion, adding to the explosive force. The pressure wave pushes plasma, debris, molten metal and loose objects outward with enormous force into nearby equipment and workers. Secondary fires will likely keep burning after the arcing power is cut off.

A proper arc flash hazard survey can prevent these explosions and save life and limb if they do occur.

An arc flash hazard survey is a detailed inspection and evaluation of your facility's powered systems. Once the survey is accomplished, every worker interacting with high voltage equipment will be aware of the hazards in the specific items they're working with and will be wearing the correct Personal Protection Equipment (PPE). The survey will also set approach boundaries designed to keep untrained or unprotected workers out of the area. If an arc flash occurs, these employees will be at a safe distance and escape harm.

Complying with NFPA 70E reduces risk and cost.

While OSHA does not officially require compliance with 70E, it is a “consensus safety standard” and as such, is considered by OSHA and other agencies to be necessary for a safe workplace. The “general duty clause” of the Occupational Safety and Health Act requires employers to have a workplace “free from recognized hazards.” During enforcement

actions, compliance with industry safety standards such as 70E “can be used as evidence of whether the employer acted reasonably,” according to OSHA. If you're complying with all the requirements of 70E, you can be sure you've complied with the general duty clause, avoiding hefty fines and regulatory hassles.

Beside the substantial savings from preventing injuries or death in the first place, a proper survey can limit financial damage if an arc flash occurs. The care you took to ensure employee safety can prevent a lawsuit or reduce a settlement significantly. The typical cost for the discovery phase of a trial alone can far outstrip the cost of a proper arc flash survey.

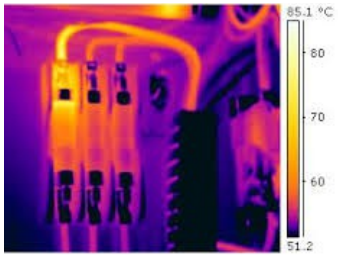
Arc flash hazard surveys are done by trained engineers and electricians using specialized software.

The survey is an exhaustive on-site evaluation (by a qualified electrical engineer) of a facility's systems, beginning with an identification of all equipment which might produce an arc flash. The system is mapped and each piece of equipment identified as a hazard is evaluated further. The engineer uses specialized software to calculate how much energy would be released in an arc flash, using factors such as how much energy is present when the system is energized, how long the arc would exist before safety equipment “upstream” cut it off, etc. Each piece of equipment is labeled with a customized warning unique to that component. The label makes it clear what must be done to interact with the system in a safe manner.

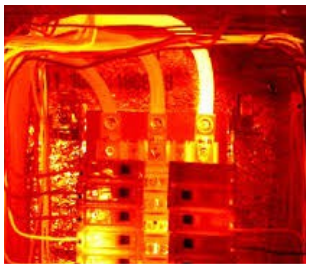
Combining thermal imaging with the survey increases safety & productivity while reducing costs.

During an arc flash hazard survey, technical staff will already be studying the facility's equipment, so combining thermal inspection with the survey will avoid duplication of work and save time. Using sophisticated cameras which can see into the infrared and display information in a blended or picture-in-picture format, technicians can examine equipment while it's running. By revealing hot spots which would otherwise be missed, they can detect failing motors, faulty or clogged cooling equipment, overloads, corrosion, loose connections and even short circuits.

Thermal imaging will make inspection more effective, safer and reduce its cost. It will also reduce repair costs by identifying bad components before they fail and cause damage. Productivity will be increased because instead of a component failing without notice and shutting down production, it can be scheduled for replacement during downtime.



Thermal imaging allows technicians to see into the infrared portion of the spectrum...


...and detect overheated equipment that might otherwise be missed.

Choosing the right company is necessary for a proper arch flash hazard survey.

There's little point to completing an arc flash hazard survey which does little to make workers safer. Unfortunately, that's just what some companies new to the field will deliver. Check these six things before hiring a survey firm:

1. What is their level of experience?

2. Will an electrical engineer and a fully qualified electrician accomplish the survey? This should be a minimum.

3. What level of detail do they offer? Beware of companies which perform no real inspection before slapping mass-produced labels on equipment.

4. How does their cost compare with the industry?

5. Can they provide thermal imaging as part of their services?

6. Can they partner with you in establishing proper training and procedures in the workplace?

Questions?

If you would like to know more about arc flash hazards and protection, please contact:

David Martindale, PE
Ballard Engineering
Office: (815) 229-1800
Cell: (815) 494-3696
david@ballardcos.com
www.ballardengineering.com

BALLARD ENGINEERING
a Ballard Company

3555 Electric Avenue, Rockford, Illinois 61109
Phone: (815) 229-1800
Fax: (815) 229-2367
www.ballardengineering.com