

Concerned about arc flash?

Application Note

Five to ten arc flash accidents that involve a fatality or serious injury to an employee occur every day in the United States, according to CapSchell Inc, a Chicago-based research firm.

Overview

Infrared (IR) thermography is now a well-established and proven method for inspecting electrical equipment. The person conducting the IR inspection usually works with live energized equipment and requires a clear line of sight to the target. Since the equipment is live the inspector must be especially aware of the hazards, the legislation and safety issues, and the techniques best suited to minimize the risks when working in these dangerous environments. This article will provide an overview of what managers and inspectors need to be aware of prior to conducting inspections on live equipment.

What is arc flash?

A particularly hazardous type of shorting fault—an arc fault—occurs when the insulation or air separation between high voltage conductors is compromised. When this happens, a plasma arc or arc flash may form between conductors—unleashing an explosive release of thermal energy. It's estimated that temperatures at the epicenter of an arc flash can reach 20,000 °C (four times hotter than the surface of the sun) within a millisecond.

Factors causing an arc flash can include, but not limited to, dropping a tool, corrosion, air in-rush when opening enclosure (dust), or inadequate safe work procedures. A National Institute for Occupational Health and Safety survey of electrical accidents found that 19% of arc flash accidents arose from the direct failure of equipment during normal operation.

If you haven't seen arc flash videos online, you should. A simple web search for arc flash will result in several very powerful and somber clips of massive explosions caught on tape, in which some folks did not survive (a number of them can also be viewed at www.fluke.com/arcblast).

Why should you be concerned?

Arc faults are potentially fatal to any personnel in the vicinity. The intense heat can severely burn human skin and ignite clothing. Treatment for arc flash burns can involve years of skin grafts, not to mention enormous healthcare costs, legal costs and fines as well as repairing damage to the facility where the accident occurred.

To minimize and prevent workplace electrical accidents, regulations have been put in place by organizations such as the National Fire Protection Association (NFPA), the Occupational Health and Safety Organization (OSHA) and the Institute of Electrical and Electronics Engineers (IEEE).

While OSHA is the governing body ensuring employers provide a safe work environment for employees, it's the NFPA 70E: Standard for Electrical Safety in the Workplace® that OSHA has adopted as the standard for electrical safety. NFPA 70E requires that an arc flash hazard analysis be performed on any energized equipment where personnel will be operating. IEEE provides a guide for performing these arc flash hazard calculations.





What does all this mean?

NFPA 70E defines the safe parameters for personnel working on electrical equipment. Although adherence is not a legal requirement, the standard provides a benchmark for most industries to demonstrate compliance with OSHA's General Duty clause. An employer adopting the guidelines offered in NFPA 70E demonstrates a clear commitment to safe working practices and the protection of employees from shock and arc flash hazards.

Compliance with NFPA 70E means conducting the arc flash hazard analysis, setting approach boundaries around live equipment and determining the appropriate steps and PPE (Personal Protective Equipment) needed to perform maintenance work on such equipment.

What's the impact on the worker conducting the IR inspection?

While NFPA 70E compliance ensures a safer work environment, it also makes the job of an electrical thermographer or inspector more difficult and time-consuming. First, any work being performed on live electrical equipment, as is the case with thermography, requires a 'live-work' permit. Additionally, the thermographer or inspector must now wear the appropriate level of PPE as specified by the arc flash hazard analysis—commonly quite cumbersome to work in. Since thermal imagers or infrared (IR) cameras cannot see through panel covers, the cover must be removed. However, working with panel covers removed is never a safe option. The ideal solution is a permanently installed 'access point' on the enclosure.

How can IR Windows help?

An infrared (IR) window provides a solid barrier between the inspector and the live conductors. By careful design, it is possible to not only reduce the trigger effects of an arc but also provide the inspector with a far safer working environment. While several types of windows exist, crystal optic IR Windows provide a clear, unobstructed view for both your camera and your eyes. This means the IR Window can serve a dual purpose—making infrared scans safer and faster and also giving your eyes a safe view into an enclosure otherwise rarely opened.

To read the entire whitepaper on arc flash and IR Windows, please visit:
www.fluke.com/whitepaper

For more information on Fluke IR Windows:

Call: 1-800-760-4523

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