



Reducing Arc Flash Risks with Electrical Maintenance Safety Devices

By Martin Robinson, CMRP Level III Thermographer President, IRISS Inc.

Abstract:

Electrical accidents, such as arc flashes, happen daily; however, there are ways companies and individuals can reduce the occurrence of these accidents and protect everybody concerned from the physical, financial, and statutory consequences. The National Fire Protection Association (NFPA) regulation 70E provides a reference for facilities to meet the requirements of electrical workplace safety while regulation 70B outlines the best practices for setting up and maintaining an Electrical Preventive Maintenance (EPM) program.

Value of NFPA

At the heart of NFPA 70E and OSHA initiatives is the hierarchy of control. This concept attempts to mitigate arc flash risk wherever possible. In order of preference, the hierarchy of control prioritizes:

1. Risk Elimination
2. Substitution (with lower risk)
3. Engineering Controls (such as arc resistant switchgear)
4. Safe Work Practices
5. PPE

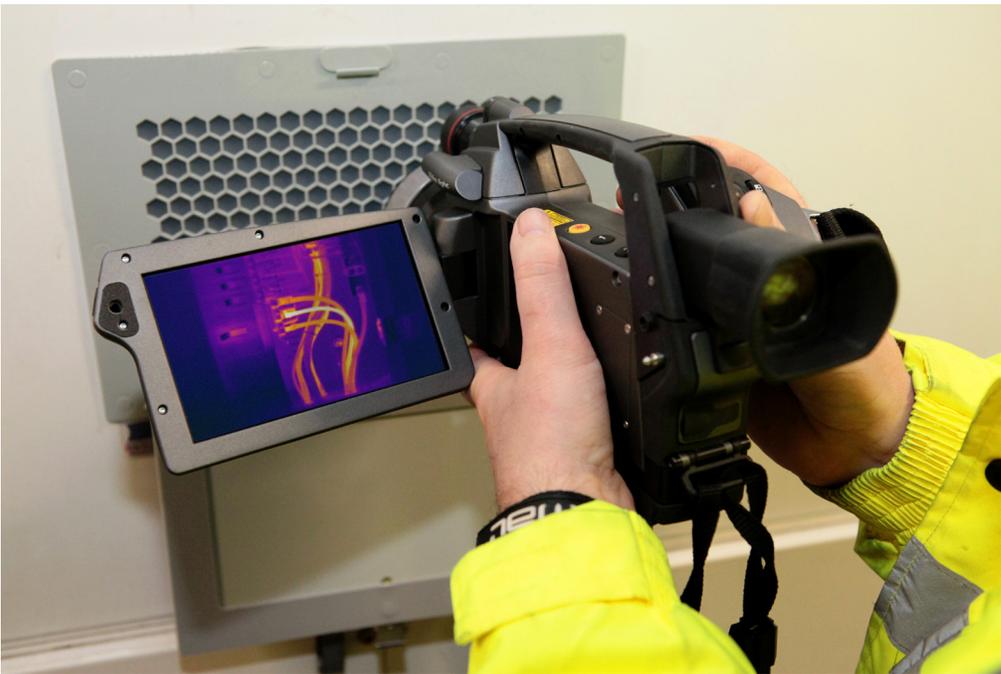
NFPA 70E and OSHA state that electrical equipment should be de-energized prior to opening. Some maintenance tasks have to be completed while the switchgear is loaded and energized, rapidly causing electrical maintenance safety devices (EMSDs) to be a hot topic. Their popularity is growing as companies strive to improve profitability, uptime and safety. Those who are implementing EMSD based programs are reaping significant benefits in terms of efficiency gains, cost control and fire prevention. Because lower PPE levels are required, inspections are quicker.



IRISS Offers Courses That Train on Content From NFPA 70E Standards.

Value of NFPA

One of the tasks that need to be completed on electrical equipment whilst it is energized and under load is infrared (IR) scanning. IR cameras can only measure what they can see and cannot see through glass or plastic viewing windows commonly fitted in switchgear. To allow the inspections to be completed under load, we use an IR window, an EMSD, that allows an IR camera to see the energized loaded connections through a special lens materials in the IR windows. Allowing switchgear to remain closed and in a safe and guarded condition thus ensuring that the inspector is never exposed to the dangers of arc flash or electrocution. Much of the recent acceptance of IR windows has coincided with the increase in level of awareness regarding electrical safety, risk reduction and arc flash. Organizations such as the IEEE have been at the vanguard of this movement with its "Safer by Design" campaign. In response, switchgear manufacturers are increasingly installing IR window at the point of manufacture.



With IRISS IR Windows, Inspectors are Never Exposed to The Dangers of Arc Flash.

Other tasks where EMSDs are used to eliminate a potential arc flash include:

- Airborne Ultrasound (EMSD - Ultrasound Ports)
- Voltage Detection (EMSD - External Voltage detection ports)
- Motor Current Analysis (EMSD – Voltage Tap Off Connections)

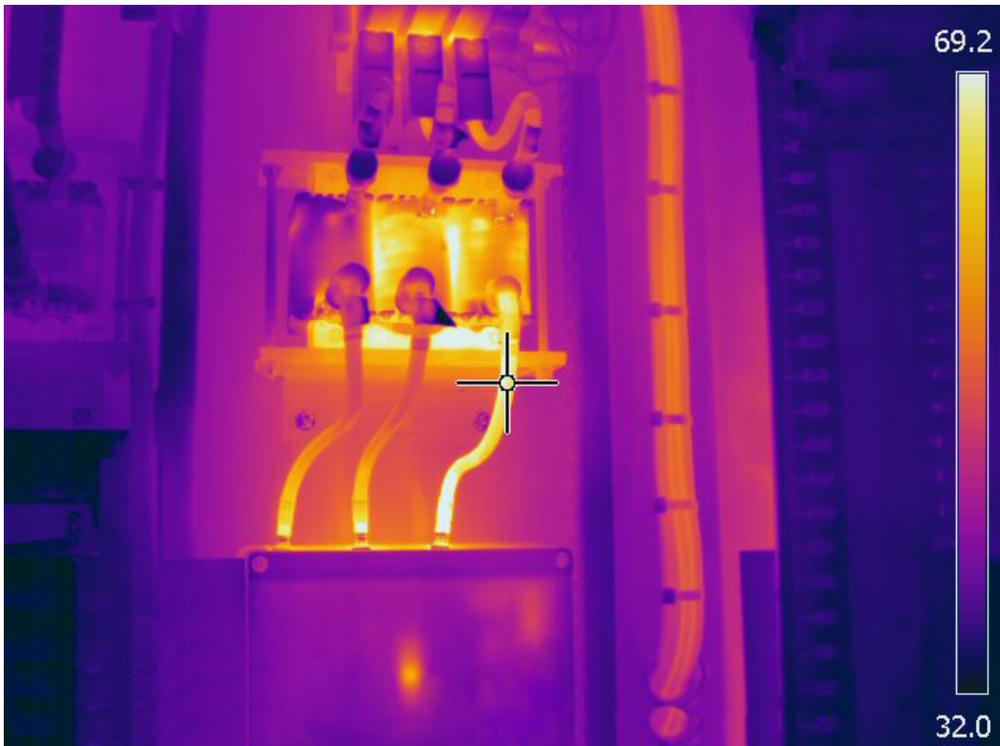
Other EMSD strategies include the use of online monitoring systems that transmit data back directly to the client utilizing either wired or wireless sensor systems. These systems include:

- Temperature measurement (Contact and non-contact systems)
- Vibration Analysis (Rotating UPS and generator Systems)
- Power Quality (Online and fixed data collection systems)
- Partial Discharge (Online and fixed data collection systems)

Benefits of EMSDs

The benefit of using EMSDs is that they standardize the inspection routes as they become data collection points for the test equipment. They also ensure that all the inspection parameters are fixed and that all collected data is standardized ensuring that any trend analysis data is accurate. Other benefits include:

- Maintain switchgear in an enclosed and guarded condition
- Remove risk of electrocution and possible triggers of an arc flash incident
- Removal of high risk behaviors
- Conduct valuable, fully loaded online inspections
- Access Inaccessible equipment
- Because there is no panel removal required:
 - inspections require less manpower
 - inspections require lower Personal Protection Equipment (PPE) levels
 - inspections are faster and more efficient
 - More inspections are completed due to ease of operation



IRISS Windows Allow for Fully Loaded Online Inspections.

Summary

It is significant that most electrical maintenance and safety standards value the use of Condition Based Maintenance (CBM) inspections such as IR surveys, ultrasound inspections, vibration analysis, MCA, and partial discharge testing as a critical part of an electrical preventative maintenance program (EPM). EMSDs, such as IR windows, have now provided a way for companies to comply with the recommendations for inspection processes, while complying with the mandate for arc flash avoidance. Most if not all of these organizations agree that electrical equipment should not be opened unless it is de-energized. EMSDs provide a way for companies to comply with recommendations for inspection and safety standards/ guidelines while protecting personnel, equipment and profits.

White Paper

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About The Author

For over 30 years, Martin Robinson has been a pioneer in the field of maintenance technology. Robinson, an innovator and pioneer of Infrared (IR) Thermography has consulted with international maintenance and reliability leaders on electrical preventive maintenance and electrical safety standards of NFPA and OSHA. A recognized authority in the field of IR Thermography, Robinson has designed CBM programs to include IR, Non-destructive Testing (NDT) and implementation of green energy initiatives and energy management strategies. He is Level III Certified IR Thermographer, Certified Maintenance and Reliability Professional (CMRP) through the Society for Maintenance and Reliability Professionals (SMRP), member of IEEE, NFPA and is a standing member on the technical committee CSA Z463 guidelines on maintenance of electrical systems and IEEE P1854 - Electrical System Design to Improve Electrical Safety.



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