

The Business Case: Using Electrical Maintenance Safety Devices to Protect Personnel, Productivity, and Profit

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Abstract

The use of Electrical Maintenance Safety Devices (EMSD) is a hot topic. Their popularity is growing as companies strive to improve profitability, uptime and safety. So what are EMSDs and what could they mean for your facility? Infrared inspection windows are typical examples. They allow the testing of fully energized electrical systems without risk to personnel. 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.

In this presentation, we will review the different EMSDs and their role in your electrical safety programs. We will also discuss real world applications where EMSDs were incorporated and how companies benefited from the use of EMSDs.

Discussion

Every year thousands electrical workers are injured or even killed while at work. Safety and trade organizations around the world are enforcing that workers do not open electrical switchgear for maintenance activities unless it is put into a safe work condition, the proper engineering controls are used, and the appropriate level of safety and equipment training is given to everyone involved in the maintenance operation. In the USA and Canada, the National Fire Prevention Association (NFPA) and Canadian Standards Association are at the vanguard of driving a cultural change within the electrical maintenance industry with the NFPA 70E / 70B and CSAZ 462/463 standards and guidelines.

The essential element for electrical safety is to ensure that the equipment is in an electrically safe condition before any work is commenced. Keeping personnel away from energized electrical equipment is paramount. At the core of all electrical safety initiatives is the hierarchy of control. Put simply, this concept attempts to control or mitigate risk wherever possible. In order of preference, the hierarchy of control seeks to mitigate risks by:

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

Maintenance tasks have to be completed while the switchgear is loaded and energized; therefore, companies are starting to implement the use of Electrical Maintenance Safety Devices (EMSD's) to allow maintenance tasks to be completed while the switchgear remains closed and in a safe and guarded condition and the inspector is never exposed to the dangers of arc flash or electrocution.

The use of Electrical Maintenance Safety Devices is a hot topic. Their popularity is growing as companies strive to improve profitability, uptime, and safety. They allow the testing of fully energized electrical systems without risk to personnel. 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.

EMSDs in Action

One of the tasks that needs to be completed on electrical equipment while 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, which is a EMSD, that allows an IR camera to see the energized, loaded connections through a special lens material in the IR window. This allows 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 the level of awareness regarding electrical safety and risk reduction. 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 windows at the point of manufacture.

Other tasks where EMSD's are used 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 directly back 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 Protective Equipment (PPE) levels
 - inspections are faster and more efficient
 - more inspections are completed due to ease of operation

Conclusion

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 preventive maintenance program. 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 and/or guidelines while protecting their personnel, equipment, and profits.