

Three Key Safeguards Against Arc Flash Injury

How electrical inspections, preventive maintenance, and training come together to bolster a facility's electrical safety culture.

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Two-thirds of workers injured by arc flash did not conduct an arc flash analysis, according to the "Occupational Injuries from Electrical Shock and Arc Flash Events" study published by the National Fire Protection Association (NFPA) in March 2015. Compare that result with this risk analysis from the Workplace Safety Awareness Council: 30,000 arc flash incidents annually lead to 2,000 burn center admissions for severe burns. At an average hospitalization of 19 days, costing \$18,000 a day, those burns total more than half a billion dollars in medical expenses alone. That's not counting damage to equipment, productivity, or quality of the worker's life. So why do so many serious arc flash burns still occur? Because the same known causes turn up over and over in investigations, including:

- Failure to verify de-energization,
- Failure to conduct a proper risk assessment or hazard analysis, and
- Failure to wear protective gear properly, even when the risk is known.

These examples all indicate that a facility has failed to establish a culture of safety.

A culture of safety, when it comes to the power distribution equipment in a facility, depends on a clear and visible commitment to safety. The effects of arc flash incidents can be catastrophic, but sadly, the human capacity for believing "it won't happen to me" means that safety can be taken for granted. A culture of safety needs more positive reinforcement to truly influence behavior. How a business treats electrical equipment is how its employees will treat electrical equipment.



A Cat. 4 arc flash suit protects a technician ready to rack in a low-voltage power circuit breaker.

Superb minds have devoted countless hours to standards that help businesses protect against these incidents. To be fair,

it's unreasonable to expect those standards to be a core competency for every business; that would be wasteful. But

when management brings in an expert to care for and monitor power distribution assets, the company demonstrates due diligence clearly to employees while reinforcing a culture of safety. Following are three key safeguards you can implement to prevent arc flash injuries.

1. INSPECTIONS AND ANALYSIS

When a new facility is constructed, an accredited third party should perform acceptance testing, along with any additional commissioning of the facility. This provides clear baseline data for safe operations. This objective data should be readily available to decision makers and maintenance personnel. It should be regularly updated, and facility operations processes should make the parameters for safe operations clear to everyone involved.

Going forward, an expert should be brought in for predictive inspections and performance tests to uncover any deviations from the expected life cycle of components. Testing should expose the effects of deteriorating insulation or other causes of faults, as well as ensure the proper operation of the circuit breakers and protective relays that are designed to protect facilities and personnel. Management's staunch commitment to verifying the safe, efficient operation of electrical distribution equipment sends a strong signal to everyone.

If an arc flash hazard analysis has not been performed, the facility should have one conducted immediately. Arc flash labels should be prominently displayed, and procedures indicated by the hazard analysis — both for normal operations and maintenance — should be clearly communicated and regularly reviewed. Since a significant portion of arc flash incidents involve non-electrical workers (as much as 50%, according to one report in the *IEEE Industry Applications* magazine), facilities should take the ut-

most care to include all parties possibly exposed to risk in mandated training. A culture of safety depends on viewing these requirements not just as business needs or compliance needs, but as the best practices of a proactive employer.

There's another place where inspection is key to maintaining a safety culture (and compliance), and that's regular inspection of personal protective equipment (PPE). Making this step a highly visible priority goes a long way to turning training into an unbreakable habit, ensuring employees keep proper PPE on when called for.

2. PREVENTIVE MAINTENANCE

The value of inspections leads naturally to preventive maintenance. Given that deteriorating insulation is a leading cause of arc flashes, a maintenance schedule that stays ahead of deterioration is key.

Maintenance and testing of overcurrent protection devices now need to be documented, and compliance with NFPA 70E now includes maintenance of all electrical equipment — not just overcurrent protection — to manufacturer standard or consensus standards. This requires knowledge of the equipment standards and precise recordkeeping.

From a safety culture viewpoint, the issue is how maintenance and testing is done. Is attention to maintenance just checking a box, or is it a proactive exercise in caring for business assets and the well-being of employees? Mandated maintenance does not guarantee a proactive culture of safety. Diligent and visible attention to preventive maintenance and recordkeeping reinforces that safety is valued and a necessary component of the working day.

A recent update to NFPA 70E requires that mandated arc flash risk assessments also document the regular performance of proper maintenance. An employee

needs to know the maintenance status of the equipment to select the proper PPE (when required).

3. TRAINING

Documented training is a staple of compliance — and for good reason. As noted above, anyone exposed to arc flash risk — not just employees qualified to work on equipment, but all those working around energized electrical equipment — must receive safety training. Compliance requires a minimum of documented safety training at three-year intervals.

Three years is a long time. Employees may change, standards may be updated, and equipment/procedures may be upgraded. Training courses provided by responsible, credible experts are necessary, but so is regularly checking in with employees on their safety knowledge. If training isn't mandated for another year and a half — but employees voice a clear need or demonstrate reluctance or confusion — training should be arranged to meet that need.

NOT BECAUSE YOU COMPLY, BUT BECAUSE YOU CARE

Testing and predictive inspections proactively identify risks so they can be safely eliminated. In addition, qualified maintenance and certified training reinforce a culture of safety that ensures proper procedures remain an operational priority. With the risk of arc flash injury so high, caring for the well-being of employees is simply the right thing to do. **EC&M**

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