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Six Keys to Managing Workplace Electrical Safety

WHITE PAPER

Any facility can make its workplace safer by establishing a safety program, but it takes an astute safety manager and dedicated employees working together to achieve success. After all, safety on the job is a shared responsibility and it takes teamwork to prevent accidents in the workplace.

Electrical hazards, specifically shock and arc flash, can result in serious injury or death to electrical workers. Work environments where electrical hazards may exist puts everyone, including business owners, at risk. Ensuring that electrical maintenance staff follow safety regulations and take measures to assure there's a widespread understanding for electrical hazards is of critical importance.

All too often the qualified electrical worker thinks that an electrical-related incident or injury won't happen to them. Or worse, they accept that assuming these risks is just a part of the daily work routine.

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It doesn't have to feel like you're solving a Rubik's Cube to effect change in the electrical safety culture, though it's absolutely true that electrical safety is more of a continuous and proactive process than a reactive one. A safety manager's job is challenging, because the electrical work environment is always changing. Buildings grow in size, facilities implement new technology, new employees need training, and new machinery and new shifts get added.

Electrical systems have an impact on nearly every aspect of a manufacturing facility today. A knowledgeable facility manager will recognize the importance of a reliable electrical system and what it means to productivity and the overall health of the facility. All of this must be accomplished according to national standards and regulations from both national and local authorities.

The process for achieving the goal of a zero electrical incident workplace often begins with the identification, implementation, and practice of six key electrical safety principles.

1. Prevention through Design

Safety begins with design. Prevention through Design (PtD) is a concept taking hold within the safety community. As a principle, PtD improves worker health and safety by eliminating hazards through design or incorporating features to reduce exposure to the hazards. Designing to eliminate or avoid hazards altogether, before any exposure happens in the workplace, is also the top priority in the hierarchy of risk controls. PtD examples, specific to electrical systems, include de-energizing and verifying absence of voltage, remote operators that allow technicians to keep a safe distance from the source, barriers, through-door panels, and inspection/infrared windows.

When managing workplace safety, it's important to identify and minimize potential hazards right from the start, but PtD is not just relevant in the equipment design phase—the methodology can be applied to existing equipment and even processes. The Panduit VeriSafe™ Absence of Voltage Tester is a glowing example of PtD as a new product that improves an electrical worker's ability to safely verify that electrical equipment is in a completely de-energized state, before maintenance work can begin.

Instituting components of PtD will reduce new potential safety concerns because hazards are evaluated and controls are determined during the early stage of design and implementation. This approach to risk mitigation not only benefits the business, but also workers performing installations and other electrical maintenance tasks. But, it's important to remember that PtD applies to new equipment as well as existing installations, so it's never too late to design, or redesign, for safety.

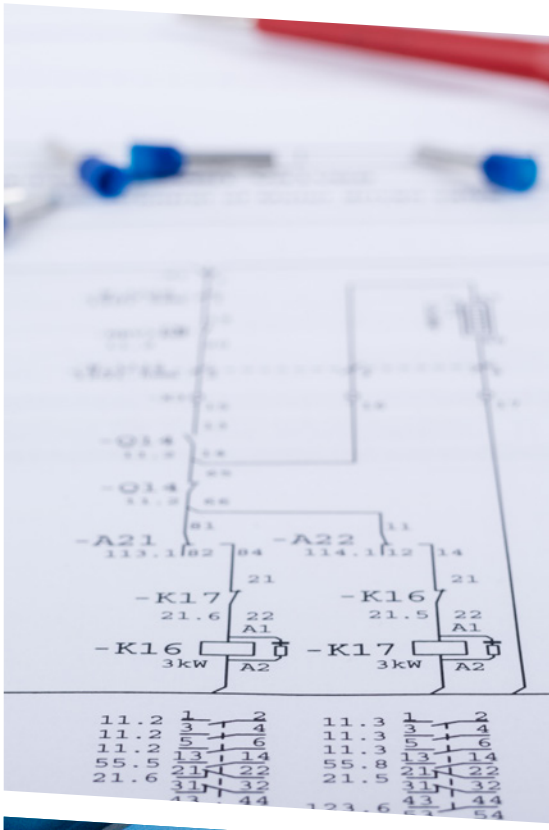
2. Compliance with Electrical Safety Standards and Regulations

The key to electrical safety is to understand and follow safety regulations and standards, local installation codes and OSHA for electrical safety regulations, as well as NFPA 70E and the process for achieving electrically safe work conditions. It's important to note that consensus standards like NFPA 70E represent the minimum for safety. In Canada, CSA Z462 is equivalent to NFPA 70E, and while they are not identical, they are similar standards and try to remain harmonized. Compliance is great, but best-in-class organizations go beyond compliance.

3. Understanding and Identifying Electrical Hazards in the Workplace

Knowing what creates hazards and understanding the risk of electrical shock and arc flash is paramount to safety. Electrical hazards apply to everyone, not just the electrical workers who are likely to come in contact with electrical wiring. In your plant, the entire workforce needs to be aware of and able to recognize electrical hazards. As part of awareness training, all workers should know how to recognize when electrical work is taking place. This includes not only barriers and signage per company procedures, but also employee awareness that they are not to interrupt electrical workers. There are three types of electrical hazards that need to be understood and identified.

1. **Shock Hazards.** Workers are killed every year as a result of unintentional contact with energized conductors. What's worse is that half of those killed are workers who have no responsibility to electrical work or maintenance. A typical factor in these cases for non-electrical workers, like a painter or a landscaper, is simply the lack of hazard recognition. While for electrical



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workers, it's the failure to properly or completely de-energize the system and verify absence of voltage prior to repair work, thus underscoring the importance for understanding that a hazard exists not for one, but for all.

2. **Arc Flash Hazards.** In addition to shock, thermal burns resulting from arc flash are a common electrical injury. A significantly large number of serious electrical injuries are related to electrical arcs created during short circuits, ground faults, and switching procedures, but an arc flash can still affect more than a single individual who may be responsible for performing work on the panel. An arc flash can be created by human factors, accidental touch, dropping or misplacement of tools & other parts, improper installation practices, mechanical problems, closing into faulted lines, loose connections, dust, liquid and moisture infiltration, corrosion at contact surfaces, and failure of insulating materials.

3. **Arc Blast Hazards.** An electrical arc blast is often associated with arc flash as the explosion which occurs as a result of the rapid heating effect from the arc, like thunder that accompanies lightning. Mitigating the blast hazard begins with recognizing the magnitude of this hazard so that the right safety practices can be incorporated into electrical system designs as well as work procedures. The blast includes several other hazards that require PPE beyond arc-rated clothing, like hearing protection from the intense sound, tinted face shield to protect against the intense light, and the pressure wave that is created when the rapid heat wave causes materials to expand can create internal organ damage, not to mention that a blast can knock you down and further injuries can be sustained from the fall.

When taking the next step in managing workplace electrical safety, companies should not only identify hazards, but also take action to mitigate them. It is a good idea to consider implementing hazard assessments, which will estimate the likelihood of an occurrence and potential severity of injury—then, the company is better informed and better positioned to determine what additional protective measures are necessary.

4. Maintaining and Monitoring to Ensure Safety

When a good workplace safety program is in place, it's always wise to maintain the momentum. Keeping up with maintenance and monitoring the electrical systems is critical to ensuring safety. Equipment that is properly installed and maintained will be more reliable and safer to operate and maintain. Written procedures are required for workers to perform work on or near energized electrical parts.

It's also important for safety managers to track leading indicators versus lagging indicators. This would include tracking near misses, paying attention to where unplanned maintenance is occurring, and identifying anomalies based on shift, time of day, and/or even with specific operators. These all indicate opportunities for training and mitigation before an event occurs.

A few mechanisms to communicate the electrical safety program may include:

- Displaying rules and procedures for everyone to see and remind everyone to work safely
- Demonstrating the employer's mission, personal commitment, values, and workplace safety expectations
- Monitoring work performance
- Motivating staff, assessing staff competencies, and providing revision or updates to training as required
- Holding meetings (with staff) to talk about issues, near misses, observed potential risks, etc.
- Providing instruction on safe hands-on work with equipment, tools, materials, and processes

5. Communicating the Electrical Safety Program

When it comes to safety, talk isn't cheap. After establishing an electrical safety program, the success of that program is dependent on how well it is communicated to the electrical worker as well as the rest of the workplace talent in the facility.

Communication is key. In terms of creating a culture of safety, focusing on positive reinforcement over penalties and blame will encourage team buy-in. Encouraging openness about near misses will create opportunities to mitigate hazards.

6. Always De-Energize Equipment

Before performing any electrical work, always de-energize equipment and verify that an electrically safe work condition has been established. Lockout/tagout procedures prescribe the steps qualified electrical workers must perform to isolate power from electrical equipment, and to lock out and tag the equipment so that nobody else can re-energize it while maintenance work is in progress. Verifying absence of voltage is important because there is always the chance that documentation can be out of date. Changes may have also been made to the electrical system and it's not worth running the risk of encountering error from mislabeled or look-alike equipment.

The testing method to work on de-energized equipment must be safe and effective. The electrical worker who conducts the testing needs to understand testing procedures and be proficient with the testing devices. A best practice: Prevention through Design; verifying the absence of voltage with the Panduit VeriSafe AVT before equipment is accessed makes it easy for qualified electrical workers to identify an electrically safe work condition.

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