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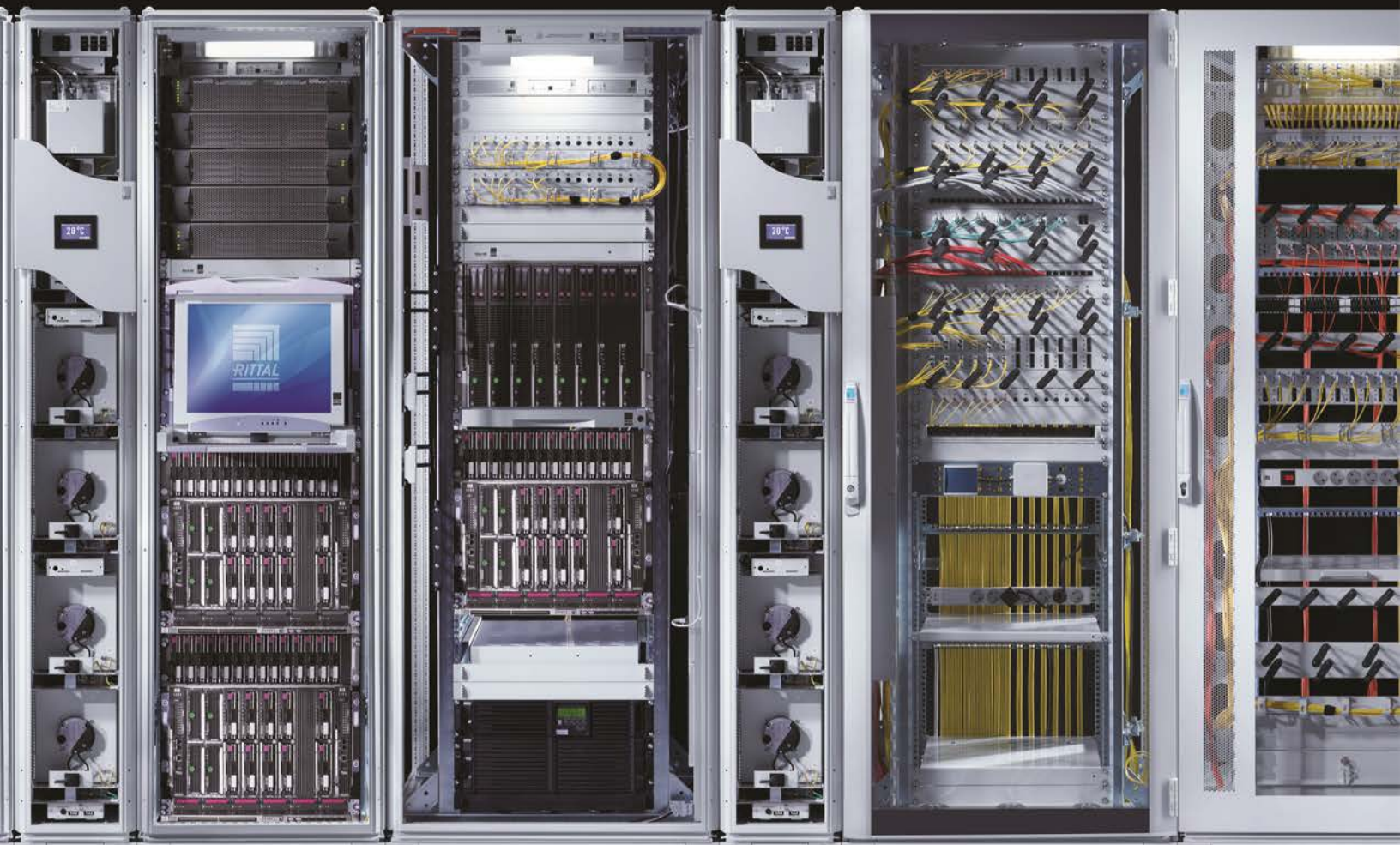
WHITE PAPER: Arc Flash and How to Prevent It



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Arc Flash and How to Prevent It

A look at the dangers of arc flash and measures you can take to defend against it

What is Arc Flash?

An arc flash is the explosive release of energy triggered by a phase-to-phase or phase-to-ground short circuit. During an arc flash event, air acts as a conductor to carry electrical current which causes an arc fault.

An arc flash event is typified by extreme heat, intense light, and a violent pressure blast. This potentially lethal blast can propel shrapnel, tools, and workers through the air. Workers exposed to an arc flash can sustain serious injuries typical to an explosion: severe burns, loss of vision and hearing, broken bones, and head trauma. Arc flash is a major safety concern for any application that incorporates high current electrical equipment, and its prevention should be considered from the very beginning of any application design.

What Causes Arc Flash?

Human error is more prevalent than equipment failure as a common cause of arc flash accidents. Phase-to-phase and phase-to-ground contact sometimes occurs due to distractions when an operator is working on energized equipment. Another common cause of arc flash is the lack of using insulated tools. Other causes include the dropping of conductive components onto live circuits (screws, hand tools, etc.), and the accumulation of dust and metallic debris.

The vast majority of accidents involve high voltage applications (480VAC and above), but arc flash can also occur at lower voltages. Control panels, disconnects, bus switches, motor controls, motor starters, and switchgear are common locations of arc flash accidents.

One simple precaution to prevent arc flash accidents is to include arc flash safety as a topic in your electrical safety program. The most effective preventative measure is to segregate line side voltage within your enclosure system.

Arc Flash Misconceptions

- Arc flash will not occur at voltages below 240 volts.
    - This statement is a myth. Although it is more difficult to sustain an arc flash at lower voltages, arc flash accidents can occur at any voltages. Precautions must be taken regardless of the voltage level of the individual components.
- OSHA (Occupational Safety and Health Administration) does not enforce the guidelines set forth in NFPA 70E.
    - As arc flash accidents are becoming more prevalent, OSHA has taken a stance to give notice to facilities that are not sufficiently protecting their employees. Fines and penalties can be assessed in situations where operators have been put at risk of arc flash injury.
- There is less of a chance of an arc flash accident occurring in a facility that has not had such an accident in a long period of time.
    - As long as workers are not sufficiently protected, injuries can occur at any time regardless of past safety records.

Applicable Codes and Standards

NFPA 70E – Standard for Electrical Safety in the Workplace

NFPA (National Fire Protection Association) 70E addresses employee workplace electrical safety requirements. This standard focuses on practical safeguards that also allow workers to be productive within their job functions. NFPA 70E outlines safety related work practices, safety programs, calculations for the degree of hazard, personal protective equipment, worker training, and warning labels for equipment.

IEEE Standard 1584™ - IEEE Guide for Performing Arc Flash Hazard Calculations

IEEE 1584 deals with calculating the size of the potential fault. These calculations provide a basis for the level of personal protective equipment (PPE) that is required when examining or servicing equipment.

Rittal Arc Flash Solutions

Rittal's TS8 modular enclosure system is designed specifically for demanding industrial applications. The TS8 series features a 16-fold tubular frame for unsurpassed strength and flexibility. The TS8 can be configured to keep high-voltage and low-voltage equipment within the confines of their own respective enclosures. Low-voltage enclosures house equipment that is used for programming, data acquisition and system adjustment. By using a 16"-wide TS8 enclosure, high-voltage line side power can be isolated within its own disconnect switch cabinet. Partition walls segregate high power from low power, helping to prevent arc flash.

Rittal offers accessories that enable workers to perform data collection, programming, and visual monitoring while keeping enclosure doors shut, eliminating exposure to arc flash hazards. These accessories include interface port and access flaps, external data pockets, fold-up keyboard shelves, dead-front kits, and viewing windows.

The TS8 system assists in complying with NFPA 70E work place safety standards which outline precautions to protect personnel by reducing their exposure to major electrical hazards.

Conclusion

Arc flash accidents occur suddenly, causing serious injury and major down time within a fraction of a second. It is up to individual facilities to ensure that they are compliant with NFPA 70E.

More important than avoiding down time caused by accidents, sufficient arc flash safety helps to protect your most important asset: your people.

References

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Rittal Corporation
1 Rittal Place • Urbana, Ohio 60173 • USA
Woodfield Corporate Center • 425 Martingale Road, Suite 400 • Schaumburg, Illinois 60173
Phone: 937-399-0500 • Fax: 800-477-4003 • Toll-free: 800-477-4000
Email: rittal@rittal.us • Online: www.rittal.us