

How to Improve Safety



by Mose Ramieh III, Tony Demaria, Craig Corey,
Gary Donner, Rick Eynon, Lynn Hamrick, and Jim White –
NETA Safety Committee

The mantra of Safety can be a daunting challenge. The broad implications of the word cross every boundary of our daily lives, from not falling down in the shower to navigating rush hour traffic on the way to work. Then, if you are a safety professional, like those of us quoted in this article, your job is to ensure that electrical workers negotiate the inherently hazardous landscape of industrial electricity without incident. We all see safety as a journey we continually travel....

So why is this seemingly simple word so challenging?

Gary Donner, IEEE Fellow, notes that the first thing we must understand is that people see the world through their personal filters which comprise a lifetime of experiences. These preconceived ideas affect our ability to work safely because we may not recognize something as hazardous. Haven't we all heard the phrase "I've been doing electrical work for twenty years, and I've never had a (fill in bad situation here)." The other item that Gary points toward as a hurdle to safety dovetails with the previous comment. Workers are typically injured doing high-frequency, low-risk tasks. During this "routine work people tend to operate in autopilot.

So how do we begin to adjust these filters, protect our personnel during routine tasks, and improve safety?

Historically, electrical workers (and their training) concentrated on the hazard of electrocution (shock). Lynn Hamrick is quick to point out that a shock-hazard analysis is fairly straight forward. The worker must know the highest voltage level of the electrical hazard and apply the requirements associated with the limited approach boundaries. A significantly more challenging feat is to perform an arc-flash hazard analysis. One must also know the fault current and fault clearing time associated with the hazard and then apply those values to a set of complex equations to determine the flash protection boundary and the incident energy at a selectable working distance. It would be impractical to expect most qualified workers to be able to determine these values in the field.

This industry has made big improvements in safety, notes Tony Demaria. Increased knowledge and quantification of electrical hazards by the worker and leadership have led to a decrease in the amount of energized work performed and the manner in which workers conduct themselves around energized equipment.

Our increased knowledge, understanding, willingness, courage, and ingenuity have given us fewer incidents and injuries.

Initially, Tony thought that 70E was the answer to all electrical hazard problems. When he could not find the answer to a particular situation quickly and simply, he was frustrated (and sometimes angry). Jim White was the man who helped Tony adjust his "filter." Jim pointed out that 70E was not the only way to solve these electrical hazard problems and explained what 70E is and what it is not.

Jim White states, first, that 70E is a consensus standard made up of 47 members from such organizations as NETA, OSHA, IBEW, NJATC, American Petroleum Institute, Edison Electric Institute, and the Canadian Standards Association, to name just a few. It is a diverse cross-section of the electrical industry, and viewpoints can vary greatly among the different members.

The 70E started out as a compilation of the safety-related portions of the NFPA 70 National Electrical Code in 1976. Electrical Safety-Related Work Practices were added by OSHA's request and used by OSHA to develop Subpart S, 29CFR1910.331 through .335. The 70E was used primarily as a vehicle to assist OSHA and shares language with these regulations. Until the 2009 cycle, the 70E was an immature document, growing and adding new information so quickly that it was inconsistent in wording and style.

Craig Corey noted during the 2008 PowerTest Conference Safety Panel discussion that everyone was attempting to implement, train, and ultimately use 70E to maintain a safe work environment for employees. Craig says, "I had been one of those safety professionals to whom the previous editions of 70E were wonderful engineering references, but not very helpful as a field resource." It was filled with important and detailed information but was difficult to understand. During the panel discussions, both audience and speakers wanted a document that testing technicians could understand, implement, and apply to make their daily work tasks safer.

Around the same time as the 2008 PowerTest Conference, members of NFPA 70E committee were working to produce the 2009 edition. During the 2009 cycle the 70E committee recognized that there were shortcomings in the way the document was developed and moved to correct as many as possible during one cycle. As member of the Word and Phrase Task Group (W&P TG) Jim White recognized the 70E was being used in court as standard industry practices and that there were areas that 70E was unclear or inconsistent. An example is the phrase "working on or near," which is used by OSHA in its regulations; this phrase was changed to be clear as to the specific hazard. If shock hazard was the concern the committee used "working within the limited-approach boundary." If arc flash was the concern, then it became "working within the flash-protection boundary." The use of jargon was eliminated as much as possible by removing words such as "hot" and "live" and using "energized" in their place.

Everyone involved in this article agrees that the NFPA 70E 2009 is a significant improvement. However, the standard is not easily interpreted in part because of the NFPA Manual of Style (the legalese format), and 70E is not the silver bullet for every situation that a worker may encounter in the field.

So how do we increase understanding and plan for the unexpected situations? The Safety Committee offers four thoughts: train, analyze, get creative, keep it real.

1. Training

- a. Turn it off. Electrically safe equipment is the safest method to conduct all work.
- b. Repeat the basics daily! A qualified worker is expected to know the limited-approach boundary to 480 volts. Do you? What about your workers?
- c. As the safety leader, communicate — in plain English — when and how work is to be done inside the limited-approach boundary.
- d. Bring in a trainer if you are unsure or uncomfortable in this role.

2. Analyze Job Hazards

- a. The more you discuss a job the more clearly you will see *all* the hazards. This may never be more important than during routine tasks.

- b. Get input from everyone involved. Don't allow your "filters" to miss something that other may see as a hazard.

- c. Be mindful of the little things. When it gets cold outside, do your workers have FR coats?

3. Get Creative

- a. Think you have to remove covers to conduct an IR survey? Utilization of IR windows eliminates this routine hazard.

- b. Tired of putting on that 40 Cal suit to rack out a circuit breaker? Remote racking is not only safe but requires a lot less physical work.

4. Keep it real. Rick Eynon is eager to point out that the 70E tables and those engineered labels on the switchgear are developed in a place that does not exist... a perfect world. In a perfect world circuit breakers trip in cycles, not seconds, when under fault conditions. All of us routinely visit plants where equipment has not been tested in years and occasionally decades. This lack of maintenance dramatically (exponentially) impacts the available fault. The longer things like old grease, damaged mechanisms, and unresponsive relays delay the circuit breaker open cycle, the more energy is released.

Anyone attending NETA's PowerTest conference who is interested in the topic of safety should plan to attend the entire Safety Track. Those that attend the *Arc-Flash Calculations Simplified* presentation on Wednesday morning will be presented with a free short-circuit ampere calculator slide ruler. For those unable to attend the PowerTest Conference — stay tuned to upcoming *NETA World* articles for information on how to perform calculations, understand 70E, and build your safety program.

Tony Demaria worked for the Los Angeles Department of Water and Power in substation maintenance prior to starting his own company. He has owned and operated Tony Demaria Electric for over 25 years, specializing in maintenance and testing of switchgear and large motors for industrial facilities. Tony Demaria Electric is a NETA Accredited Company, and Tony serves as Chair of the NETA Safety Committee.