



Safety

New Tech, Revised Rules Rewire Electrical Safety on the Job

James Langford | Mar 14, 2024

Electricity is the lifeblood of 21st century industry, powering everything from automated production lines to ATMs and artificial intelligence.

When it's not used correctly, however, it can prove deadly to workers.

Electrical shock is among the leading causes of job-related injuries and fatalities in the U.S. each year, according to the *Electrical Safety Foundation*. In the 12 years through 2022, the U.S. Occupational Safety and Health Administration recorded **1,322 workers** killed in such cases, with 70 percent employed in non-electrical jobs.

The numbers have prompted not only scrutiny from government regulators but also progressively tighter rules governing employee safety and the development of state-of-the-art *virtual reality training programs*.

"The unique physical properties of electrical energy that allow it to power our world also make it extremely dangerous," a *report* collected by the National Library of Medicine says, a situation complicated by the fact that many workers are unaware of potential electrical hazards.

Fatal Exposure: NFPA 70E

The combination of relatively high electrical energy levels in many environments with the human body's comparatively low resistance "poses significant risks for any person who comes in contact," the report explains.

While a person exposed to one milliamp of electrical current might barely perceive it, he or she would experience muscle paralysis when exposed to 20 milliamps and might be killed by 100 milliamps, the report explains.

The heart stops beating at 2 amps, but roughly 10 times that amount—20 amps—is required to trip many fuse breakers, underscoring the risk of workplace electrical exposure, the report says.

Among the latest steps to address that risk is the **2024 update** to the National Fire Protection

Association's Standard 70E, a consensus guideline on electrical safety practices referred to by the *U.S. Occupational Safety and Health Administration*.

Alterations to the standard, which is revised every three years, include a requirement that job safety plans—already mandated—contain an emergency response procedure that lists steps to be taken in cases of electric shock or arc flashes, according to *SEAM Group*, a firm that advises businesses on electrical safety.

'I Could Have Been a Statistic'

The association's guideline already called for job safety plans to be developed by a qualified person with expertise in electrical safety and to be thoroughly documented. They must also have a description of the job and individual tasks, identification of electrical hazards, an electric shock risk assessment, an arc flash risk assessment, and list work procedures, special precautions and energy source controls.

Other changes to NFPA 70E include:

- Deletion of the word "leather" from descriptions of personal protective equipment for electrical workers, allowing companies to use gear made of other materials.
- Addition of a seventh item to the list of requirements for normal operating conditions of electrical equipment. The new requirement is that the equipment be rated for the available fault current, meaning it could withstand the current flowing to it during a short-circuit. The fault current should be listed on the manufacturer's information label.
- Specifying that a "qualified person" must determine whether it's safe to re-energize a circuit shut down by a protective device.

"Employers need to audit their existing electrical safety programs and update them" to reflect the revised standard, Terry Becker, an electrical engineering and safety expert, said in a Grace Technologies *webinar*.

That helps to ensure regulatory compliance as well as to protect employees.

Analysis of work-related electrical deaths has shown that the five most common causes are direct contact with a live powerline, direct contact with live equipment, vehicular contact with a powerline, poorly placed or damaged equipment, and indirect contact with a live powerline via conductive equipment, according to the National Library of Medicine report.

Most of the workers who died over the past 12 years worked as electricians or construction laborers, the Electrical Safety Foundation says. Other common occupations included heating, ventilation and air conditioning technicians; and heavy truck drivers.

Whether on the job or at home, education and training are key to making smart choices about electrical safety, Corey Hannahs, who worked as an electrician for 30 years, wrote in a *blog post* for the National Fire Protection Association.

"There are certainly some things I should have done differently when it came to making choices around electrical safety," he wrote. "I like to use the phrase, 'I could have been a statistic; I *should* have been a statistic,' when relaying some of those stories to others."

Reducing those kinds of risks is made easier, however, by the virtual reality training that's among the innovations of Industry 4.0, digital technology deployed to streamline manufacturing operations.

Virtual Reality Safety Training

Virtual reality systems, which typically use a visual headset to immerse workers in a digital environment, provide “a completely participatory and repeatable experience without the safety risks, which assists in improving retention and recall,” according to a ***National Safety Council report***.

That’s the premise of safety training apps that Digital Engineering and Magic, a Ukrainian firm, has developed for Facebook parent Meta’s Quest headset—including one on ***electrical hazards***.

It touches on topics from energy isolation to distribution panel operations, premises wiring, hazard identification and PPE, according to a ***video*** on Meta’s website, offering “comprehensive lifelike training to high-risk workers.”

Practicing such tasks—which is difficult in the real world because of the cost as well as the potential danger—and experiencing what real-life consequences might be heightens users’ abilities to recognize and avoid hazards in the field, the National Safety Council report says.

While virtual safety training has more often been employed in the aerospace, military, transportation and medical fields, it’s “increasingly being piloted and rolled out in a host of industrial settings,” the report adds. It’s not yet a widespread workplace technology, but it shows “strong potential to improve the effectiveness of training for hazardous work.”

How could virtual reality systems improve electrical safety training in your workplace? Tell us in the comments below.

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