

Before you begin

Review the statistics, websites, and documents listed in the Resources section. In 2018, there were 160 electrical fatalities, an 18% increase over the previous year and the highest number of fatalities since 2011. All electrically related fatalities were caused by electric shock; no fatalities were caused by burns. The characteristics and power that make electricity so useful in our everyday lives also make it dangerous. This is true when we are in its path or become exposed to its energy.



Introduction

To protect people from electrical hazards, codes contain strict requirements for the design, size, and installation of electrical equipment. The most widely used code is the National Fire protection Association (NFPA) National Electrical Code 70 (NEC) 2020. The NEC contains requirements such as maintaining cord insulation and enclosing live electrical components so people cannot contact electrical energy accidentally. In addition, the NFPA 70E Standard for Electrical Safety in the Workplace – 2018 outlines the requirements for safe work practices to protect workers by reducing exposure to major electrical hazards.

Regardless of our level of electrical knowledge, these codes make it possible for everyone to work safely around electricity. Manufacturing and installing components according to code allows non-electricians to work with everyday electricity.

Definitions

De-energized – free from any electrical connection to a source of potential difference and from electrical charge; not having a potential difference from that of the earth.

Qualified person – one who has received training in and has demonstrated skills and knowledge in the construction and operation of electric equipment and installations and the hazards involved.

Note 1 to the definition of qualified person: Whether an employee is considered a “qualified person” depends on various circumstances in the workplace. It is possible and, in fact, likely for an individual to be considered “qualified” with regard to certain equipment in the workplace, but “unqualified” as to other equipment. (See 1910.332(b)(3) for training requirements that specifically apply to qualified persons.)

Note 2 to the definition of qualified person: An employee who is undergoing on-the-job training and who, in the course of such training, has demonstrated an ability to perform duties safely at his or her level of training and who is under the direct supervision of a “qualified person” is considered to be a “qualified person” for the performance of those duties.

Discussion

OSHA

The Occupational Safety and Health Administration (OSHA) creates rules to protect workers in their workplaces. To help with this, OSHA adopted parts of the NEC and made them workplace laws. The same design and installation requirements that protect us in our homes also enable workers who are not electricians to work safely with electricity in the workplace.

However, what happens when the installation codes no longer provide protection? For example, once you remove an electrical panel, you expose anyone in the area to the electrical energy inside. Under these circumstances, a different set of OSHA rules apply — the Electrical Safety Related Work Practices. These rules require training, proper protective equipment, and procedures allowing people to work safely around exposed electrical energy.

When it comes to working around electricity, workers are either qualified or unqualified. Depending on the type of job, it is possible for a worker to be both. For example, a person who welds could be qualified to work around live welding leads, but not qualified to work on the electrical power supply for their welder.

Training

When working around live electrical parts, qualified and unqualified workers must receive training on all safety-related work practices necessary to perform their jobs.

Do you think you’re not affected? Think again. Every time you plug a cord into an outlet, or an employee works around live electrical parts you are affected. Part of the required training is to inspect the cord for defects like damaged insulation or a missing ground pin.

Employees are qualified when they receive additional training to recognize and avoid electrical hazards for those tasks you assign to them. The additional training needs to include:

- Distinguishing live parts from other parts.
- Determining the voltage of those live parts.
- Understanding the appropriate minimum clearance distances.
- Using proper protective clothing, tools, and equipment.

De-energize

OSHA regulations require you to de-energize and verify through an approved testing method that all exposed electrical components are properly de-energized before an employee works on or near them. An exception to this requirement is if de-energizing the circuit results in an increased or additional hazard, or it is not feasible. For example, this may include shutting off life-support systems, critical ventilation systems, or troubleshooting that employees must do with the power on.

A loss of production cannot justify live electrical work. If you cannot avoid working on energized electrical components, then you must wear appropriate rated protective clothing and personal protective equipment (PPE). In addition, you need to use insulated tools rated for the voltage.

Electricity can cause injury not just by direct contact (shock) but through arc flash as well. You must wear PPE to protect against both. When working on exposed equipment, you must wear PPE until you verify it is de-energized.

This includes:

- Voltage-rated gloves.
- Flame-resistant clothing.
- Eye, face, hearing, and head protection.

Conclusion

All employees need to know the legal requirements per the OSHA and NFPA standards for:

- Qualified and unqualified persons.
- Having a procedure for de-energizing electrical equipment.
- Providing proper electrical tools and PPE.
- Requirements for reducing exposure to electrical hazards such as shock, electrocution, arc flash, and arc blast.

Group activity

Who are the qualified and unqualified workers in your shop per the OSHA standards?

Only qualified persons with training may work on electrical systems. Determine who is a qualified person or persons to conduct each electrical work task conducted at your work locations, per the OSHA standards.

What are the procedures used in your shop to de-energize electrical equipment?

Use the required procedures and conduct hands on training to review the steps and necessary equipment (locks and tags) to de-energize equipment.

Resources

Statistics: <https://www.esfi.org/workplace-injury-and-fatality-statistics>

Training: <https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.332>

De-energizing equipment: <https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.333>

Safeguards: <https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.335>

NFPA: <https://www.nfpa.org/Codes-and-Standards/All-Codes-and-Standards/List-of-Codes-and-Standards>