# Keys to Electrical Safety




## WHAT'S AT STAKE?

Working with electricity can be dangerous. The key is that not all electrical hazards are created equal. Although each use of electricity creates a potential exposure to a hazard, the dangers vary.

## WHAT'S THE DANGER?

Engineers, electricians, and other professionals work with electricity directly, including working on overhead lines, cable harnesses, and circuit assemblies. Others, such as office workers and sales people, work with electricity indirectly and may also be exposed to electrical hazards.

**There are four main types of electrical injuries:**

- Electrocution (fatal)
- Electric shock
- Burns
- Falls caused as a result of contact with electrical energy

Wherever you work, electricity is probably present – and presents a hazard.

**Perilous Power Lines**

According to ESFI, 36% of all fatal work-related electrical injuries recorded between 2011 and 2017 involved overhead power lines. Workers situated near power lines need to be constantly cognizant of the present hazard. Consider all power lines to be live and dangerous, the organization advises. Instruct co-workers to stay away from downed lines as well as any vehicles or objects in contact with them.

**Common Mis-Steps**

The following are common mis-steps and sometimes deadly consequences have occurred in the following situations with workers.

1. Failure to use electrical lockout devices
2. Overloading circuits
3. Careless employees
4. Outlets too close to conductors
5. Torn or frayed cords and wires

**ARC FLASH**

An electrical arc flash is a potentially deadly event where electrical current leaves the intended path and travels through the air. It goes from the electrical cable it was supposed to travel on to another or to a nearby ground. The result is quite violent and can destroy even large objects or throw them significant distances. If a person is in the area, he is at risk of serious injury caused by the energy released.

An arc flash can result in very serious injury and damage to the facility. Serious arc flash explosions commonly result in the following:

- Severe Burns
- Fire
- Flying Objects
- Molten Metal
- Blast Pressure
- Sound

# HOW TO PROTECT YOURSELF

## GENERAL

Most electrical accidents result from one of the following three factors:

- Unsafe equipment or installation
- Unsafe environment or
- Unsafe work practices

## PREVENTION

Accidents can be prevented with the use and implementation of the following:

**1. Safe Equipment**

All electrical workplace conductors and equipment must be deemed "**acceptable**" by OSHA. To be deemed acceptable, equipment must be marked as tested by a Nationally Recognized Testing Laboratory (NRTL), such as Underwriters Laboratory (UL) or Factory Mutual (FM). OSHA will look for these markings on the equipment to deem it safe. The equipment must be installed and used within its labeled capacity so as to not exceed the limitations of the equipment (e.g., putting the wrong switch for too much load, causing it to overheat).

**Examples:**

- Watertight devices
- Ground fault circuit interrupters (GFCIs)
- Temporary power devices
- Modular power devices
- Motor control devices
- Wire management: strain relief, conduit, tubing
- Arc flash devices
- Lockout devices: plug locks, switch locks
- Cable protection systems

**2. Guarding**

Guarding involves locating or enclosing electrical equipment to make sure people

don’t accidentally come into contact with its live parts. Effective guarding requires equipment with exposed parts operating at 50 volts or more to be placed where it is accessible only to authorized people qualified to work on it.

**3. Grounding**

Grounding intentionally creates a low-resistance path that connects to the earth. This will prevent the buildup of voltages that could cause an electrical accident that could result from a worker being in the ground path. A properly designed grounding system creates a low-resistance path away from workers. When designed correctly, grounding substantially reduces the risk of an electrical accident if combined with safe work practices.

**4. Circuit Protection Devices**

These devices limit or stop the flow of current automatically in the event of a ground fault, overload, or short circuit in the wiring system. Common examples include fuses, circuit breakers and GFCIs.

Fuses and circuit breakers open or break the circuit automatically when too much current flows through them, and will melt or trip to open the circuit. These are slow acting devices that are used primarily for protection of conductors and equipment. They typically do not open fast enough to prevent shock or further injury. They prevent overheating situations from occurring that result in damage to the conductors or equipment.

GFCIs are used typically in wet locations, construction sites, factory maintenance, and other high-risk areas to protect the equipment user. These devices react much faster than fuses and circuit breakers to interrupt the flow of current before shock and injury results.

**5. Lockout/Tagout**

Lack of lockout/tagout procedures and use of proper isolation equipment is a leading cause of unsafe work practices. The first step before beginning any inspection, repair or maintenance of any equipment is to follow the written procedure to isolate all energy sources to prevent accidental startup of the equipment.

**FINAL WORD**

Electricity can be a friend or foe. At all times, electricity must be treated with respect. Electricity has changed the world with its many applications in every aspect of our lives.