Electrical – Stats and Facts

DID YOU KNOW?

The Electrical Safety Foundation International (ESFI) is a non-profit organization dedicated exclusively to promoting electrical safety at home and in the workplace. Founded in 1994 as a cooperative effort by the National Electrical Manufacturers Association (NEMA), Underwriters Laboratories (UL), and the U.S. Consumer Product Safety Commission (CPSC), ESFI is funded by voluntary contributions from electrical manufacturers, distributors, independent testing laboratories, retailers, insurers, utilities, safety organizations, and trade and labor associations.

To better promote electrical safety in the workplace, ESFI provides statistical data on occupational electrical injuries and fatalities to help decision-makers better allocate safety resources for maximum impact. Our work builds on earlier work by the National Institute for Occupational Safety and Health (NIOSH), providing new information on electrical incidents as it becomes available. The data in our reports cover U.S. occupational electrical accidents, including the total number of electrical injuries and fatalities, the industries and occupations in which they occurred, and the rates of electrical injury and fatality for selected industries.

The Electrical Safety Foundation International (ESFI) uses the U.S. Bureau of Labor Statistics' (BLS) Census of Fatal Occupational Injuries (CFOI) and Survey of Occupational Injuries (SOII) to distill information specifically pertaining to fatal and nonfatal occupational electrical injuries. Each year the ESFI publishes electrical injury information in tabular and graphical form on our website. The most recent data covers the 24 year period from 1992-2018, but mainly focuses on 2003-2018 data.

Fatal Electrical Injuries

- There were 160 electrical fatalities in 2018. An 18% increase over the previous year and the highest number of fatalities since 2011.
    - Fatality rates per 100,000 workers were 0.11 in 2018, compared to 0.13 in 2011.
- Contact with / Exposure to electric current accounted for 3% of all fatalities in 2018. In 2017, they accounted for 2.6%, in 2016 2.9%, 2015 2.7% and 3.1% in 2014.
- All electrically related fatalities were caused by electric shock, no fatalities were caused by burns.
- Construction industry accounted for 54% of all electrical fatalities, the same percentages as in 2017. Professional and business services accounted for 28% of

electrical fatalities.

- The construction industry had the highest rate of fatal electrical injuries (0.8 / 100,000) followed by utility (0.55 / 100,000).
- In 2018, 9% of all electrical injuries were fatal.
- Good producing private industries (natural resources and mining, construction, manufacturing) accounted for 71% of fatal electrical injuries compared to 28% fatal injuries from service-providing private industries.
- The number of electrical fatalities varies between ages
    - 6% of electrical fatalities occurred in workers aged 20 – 24
    - 31% of electrical fatalities occurred in workers aged 25 – 34
    - 30% of electrical fatalities occurred in workers aged 34 – 44
    - 14% of electrical fatalities occurred in workers aged 45 – 54
    - 14% of electrical fatalities occurred in workers aged 55 – 64
    - 4% of electrical fatalities occurred in workers aged 65+
- Leading primary Source of Fatal Electrical Injury
    - Parts and Materials: 41%
        - Machine Tool and Electric Parts: 36%
    - Tool, Instruments and Equipment: 17%
    - Machinery: 14%
    - Vehicles: 14%
- “Constructing, Repairing, Cleaning” accounted for the leading worker activity for electrical fatalities at 63%. “Using or Operating Tools, Machinery” accounted for 23% of electrical fatalities.
- 35% of electrical fatalities occurred in Private Residences, 26% occurred in Industrial Place and Premises, and 13% in Street and Highway.
- The Construction and Extraction Occupations accounted for 47% of electrical fatalities, Installation, Maintenance, and Repair Occupations accounted for 21% and Building and Grounds Cleaning and Maintenance Occupations 15%.

Nonfatal Electrical Injuries

- There were a record low number of nonfatal electrical injuries in 2018, 1,560. A 29% decrease over 2017. There was an 8% decrease over 2016, the year with the previous lowest number of nonfatal electrical injuries.
- 17% of all nonfatal injuries resulting in days away from work could be attributed to electricity during 2018. In 2017, 0.25% could be attributed to electricity.
- The median number of days away from work for nonfatal electrical injuries was 4 in 2018, a 60% drop from 2017, returning to 2014 levels.
- The industries with the leading number of nonfatal electrical injuries:
    - Construction: 20%
    - Manufacturing: 16%
    - Leisure and Hospitality: 13%
    - Education and Health Services: 11%
    - Accommodation and Food Services: 10%
- Electrical shocks accounted for 1,080 of the non-fatal electrical injuries while burns accounted for 490.

Recent data from the U.S. Consumer Product Safety Commission shows that, on average, there are more than 400 electrocutions in the United States each year. Of these, about 180 are related to consumer products.

- Of the approximate 180 related to consumer products, large appliances are responsible for 10 percent.
- Electrocutions from wiring hazards, including damaged or exposed wiring and household wiring, totaled about 20 percent.

- Ladders contacting power lines caused nine percent of electrocutions; in another five percent of deaths, victims contacted the high power lines.
- Power tools were responsible for another nine percent of deaths.
- Landscaping, gardening, and farming equipment cause 67 percent of electrocutions each year.
- Data from the National Safety Council indicates that electrical hazards in the workplace cause nearly one fatality every day.
- Annually, electrical hazards are listed as the cause of about 4,000 injuries.
- While only a small portion of electrical incidents occur on the job, they're far more likely to be fatal.
- Electricity ranks sixth among all causes of occupational injury in the United States.
- Before the installation of Ground Fault Circuit Interrupters (GFCIs), which de-energize a circuit when they detect a ground fault, nearly 800 people died annually from household electrocutions. Now, less than 200 people die annually from household electrocutions.
- Twenty-five percent of U.S. consumers don't understand the purpose of their GFCIs.
- More than 25 percent of consumers don't know that GFCIs can help prevent electrocution.
- Nearly one-half of U.S. families never test their GFCIs.
- Among those who routinely test their GFCIs, none do so according to safety recommendations—at least one per month and after storms.

Electrocutions don't tell the entire story. Electricity is the cause of more than 140,000 fires each year, resulting in 400 deaths, 4,000 injuries, and $1.6 billion in property damage. Total economic losses due to electrical hazards are estimated to exceed $4 billion annually.

Although Electrical Safety Month only happens once per year, remember we're exposed to electricity every day so respect it, stay safe, and stay alive.

Report highlights

- 739 died from exposure to electricity.
- By occupation, workers in construction and extraction occupations (47%) and installation, maintenance, and repair occupations (22%) accounted for the largest number of deaths.
- 80% of fatal injuries from direct exposure to electricity occurred while workers were engaged in constructing, repairing, or cleaning activities.
- Workers who were fatally injured as a result of indirect exposure to electricity were most often engaged in construction, repairing, or cleaning activities (37%) or were using or operating tools or machinery (32%) at the time of injury.

It's been reported by Electrical Safety Foundation International that there are over 400 electrocutions in the United States each year. Of these, approximately 180 are related to consumer products. 10% of those were cause by large appliances.

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deaths, 4,000 injuries and $1.6 billion in property damage.
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In the workplace, Electrical Safety is especially important. Some workers are exposed to much more powerful electrical sources than at home. The dangers are compounded when procedures are not followed and the proper Personal Protective Equipment is not used.

Once specific area that needs focused attention is guarding against **arc flash**. An arc flash is the light and heat produced from an electric arc supplied with sufficient electrical energy to cause substantial damage, harm, fire, or injury. Electrical arcs experience negative resistance, which causes the electrical resistance to decrease as the arc temperature increases.

According to the Bureau of Labor Statistics (BLS):

- Arc flash injuries are not counted in the Electrical shock statistics (they are noted under burns), meaning that the true rates are even higher;
- 2,000 workers are treated in specialized burn trauma centers each year as a result of arc flash injuries;
- Every 30 minutes a worker suffers an electrical injury that requires time off;

What this means to the employer in terms of cost

- Equipment, Litigation, & Medical Cost Associated with Electrical Hazards
- Monetary cost can easily exceed $1 million, which includes the costs of equipment replacement, downtime, and insurance
- Medical costs for severe electrical burns can exceed $4 million per person
- Work-related injuries can cost businesses well over $30 million in fines, medical costs, litigation, lost business and equipment costs

Morale Impact Associated with Electrical Hazard

- About 80% of electrically related accidents and fatalities involving “Qualified Workers” are caused by arc flash / arc blast. Even trained experts get hurt!
- 21% of electrical injuries (including arc flash) tended to be permanent.
- S. Department of Labor’s Bureau of Labor Statistics determined arc flash injuries accounted for 77% of all recorded electrical injuries.

Training and the use of proper personal protective equipment (PPE) is crucial in protecting employees from injury. Training should cover the care and use of the PPE, giving the qualified worker the empowerment to make life safety decisions. A good rule of thumb for Arc Flash protection is to use PPE that has an arc rating equal to or greater than the calculated incident energy.

Machines are prone to issues and unpredictability. Common sense tells us that workers need to wear protective gear when working in close proximity to potentially dangerous electrical equipment. Why then is it that many workers (even very qualified and experienced ones) aren’t more vigilant in donning PPE. We’ve heard the excuses that they feel that PPE slows them down and that they think the repair will be quicker without. **Don’t allow your employees to spend the rest of their lives regretting that decision.**

KEEP IN MIND

Electrical safety is a general practice of workers who are exposed to handling and

maintaining electrically powered equipment. It is a set of guidelines they follow to mitigate electrical hazards and prevent its dangerous effects in case of an incident. Unable to adhere to electrical safety can lead to accidents, near misses, or even fatalities.

Working with electricity can be dangerous. 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.

Electricity has long been recognized as a serious workplace hazard. OSHA’s electrical standards are designed to protect employees exposed to dangers such as electric shock, electrocution, fires, and explosions.

Electricity provides heat, light and energy, but, as useful as electricity is, we must never forget it is also dangerous.

Almost any kind of job you can think of today involves using electricity. That is why it is important for everyone to understand how to avoid electrical shock and electrical arcs.

Electricity exposes us to three primary hazards – shocks, arc flashes and arc blasts.

According to the National Fire Protection Association, a shock hazard is a dangerous condition associated with the possible release of energy caused by contact or approach to live parts.

The NFPA defines an arc flash hazard as a dangerous condition associated with the release of energy caused by an electric arc.

An arc blast is best defined as the rapid buildup of pressure which causes an explosion. Nearby material, such as copper, is melted, vaporized and thrown into the air, which is also superheated.

Each of these hazards can be deadly.

There are many different kinds of electrical hazards, depending on where you work.

Whether the electrical shock comes from an overhead transmission line or an incorrectly grounded power tool, the results can be equally fatal.

In addition to the electrical shock hazard resulting from direct contact of live conductors with body parts, there exists a possibility of electric arcs.

An electric arc, or an arcing fault, is a flashover of electric current through air in electrical equipment from one exposed live conductor to another or to ground.

Arc flash hazard is the danger of excessive heat exposure and serious burn injury due to arcing faults in electrical power systems.

Electric arcs produce intense heat, sound blast and pressure waves. They have extremely high temperatures, radiate intense heat, can ignite clothes and cause severe burns that can be fatal.

Electric arcs produce some of the highest temperatures known to occur on earth – up to 35,000 degrees Fahrenheit, according to the NFPA. This is four times the surface temperature of the sun.

Electrocution remains the fourth highest cause of industrial fatalities, according to the National Institute for Occupational Safety and Health. The top three causes are traffic accidents, homicide and construction accidents.

Of those killed while working on voltages below 600 volts, almost half were working on energized equipment.

Most of these injuries and deaths, over 75 percent, could have been avoided according to the NIOSH.

Over 30,000 non-fatal electrical shock accidents occur each year; 600 to 1000 persons die each year from electrocution.

The extreme danger of working around electricity is this: There is no room for minimizing the effect once contact has been made. And the effect is instantaneous.

All it takes is one slip of the hand, a slight wrong move, or careless disregard for one seemingly small safety measure.

THE LEADING CAUSES OF ELECTRICAL ACCIDENTS, ACCORDING TO THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH:

- Drilling and cutting through cables
- Using defective tools, cables and equipment
- Failure to maintain clearance distances
- Failure to de-energize circuits and follow lockout/tagout procedures
- Failure to guard live parts from accidental worker contact
- Unqualified personnel working with electricity
- Improper installation/use of temporary electrical systems and equipment
- By-passing electrical protective devices

ARMY ELECTRICAL SAFETY REGULATION

The U.S. Army’s Electrical Safety Regulation is 385-26. It prescribes Army guidelines for protecting Army personnel, facilities and equipment from electrical hazards. It applies to all Department of the Army personnel, including military, civilian and contractors for safeguarding against the hazards associated with electrical energy.

EMPLOYEE SAFE WORK PRACTICES TO HELP ELIMINATE ELECTRICAL HAZARDS, ACCORDING TO AR 385-26:

- Know where the hazards are
- Properly maintain equipment
- No exposed parts or energized surfaces
- Use barriers and devices where appropriate
- No conductors to walk on or trip on
- No jewelry or other metal objects around electricity
- Never use plugs or receptacles that can alter polarity
- Properly plug all connecting plug-ins
- Install and use protective devices
- Stay away from all unguarded conductors
- Never overload a circuit or a conductor
- Inspect cords before each use
- Be sure plug and receptacle have proper mating configuration
- To unplug, never pull on the cord, pull on the plug
- Don’t use nails, staples, screws, etc. to attach or fasten a cord or plug
- Two conductor cords are illegal

- Damaged cords should never be used
- Ensure enough slack to prevent strain on plug or receptacle
- A plug-receptacle should have at least eight ounces of contact tension
- Cords should be kept clean and free of kinks and insulation breaks
- Cords crossing vehicular or personnel passageways should be protected, sign posted and used temporarily or in an emergency
- Cords should be of continuous length and without Splices
- Only approved equipment may be used in wet or damp areas. Always use ground fault circuit interrupters
- Never energize equipment when shields or Guards have been removed
- Always honor lockout/tagout situations

Why Eliminate Electrical Hazards?

On the job site, working around electricity can be very safe when workers properly identify and control hazards. But, inadequate training, lack of experience and failure to recognize potential hazards could result in electric shock or death.

The construction industry is most at danger from electrical hazards, accounting for 52% of all electrical fatalities in the US workplace. Most of these incidents and fatalities were caused by direct worker contact with overhead power lines and contact with machines, tools, and hand-carried metallic objects. So how do we protect ourselves against these dangers?

This article provides a closer look at some common electrical hazards in the workplace and how to be safe around them. We also feature a collection of electrical safety checklists which you can use to assess electrical dangers on your worksite.

Who is at Risk?

Engineers, electricians, and overhead line workers are at the top of the list of professionals who are most exposed to electrical hazards. Common tasks that put these workers at risk include electrical installation and repairs, testing of fixtures and equipment and inspection and maintenance activities. However, people who are indirectly working with electricity like office workers are also exposed to electrical hazards.

Electrical Hazards: Know Your Limits!

Electrocution is one of the most common hazards across construction sites according to OSHA. Identifying electrical hazards can help raise awareness of the risks, their severity, and how it can harm workers.

Here are 7 common electrical hazards in the workplace and tips on what you can do to mitigate these risks:

1. Overhead Power Lines

Overhead powered and energized electrical lines have high voltages which can cause major burns and electrocution to workers. Remember to maintain a minimum distance of 10 feet from overhead power lines and nearby equipment. Conduct site surveys to ensure that nothing is stored under overhead power lines. Also, safety barriers and signs must be installed to warn nearby non-electrical workers of the hazards present in the area.

2. Damaged Tools and Equipment

Exposure to damaged electrical tools and equipment can be very dangerous. Do not fix anything unless you are qualified to do so. Thoroughly check for cracks, cuts or abrasions on cables, wires, and cords. In case of any defects, have them repaired or replaced. Lock Out Tag Out (LOTO) procedures should be performed at all times before commencing electrical maintenance and repairs. LOTO procedures are there to protect all workers on a worksite.

3. Inadequate Wiring and Overloaded Circuits

Using wires with inappropriate size for the current can cause overheating and fires to occur. Use the correct wire suitable for the operation and the electrical load to work on. Use the correct extension cord designed for heavy-duty use. Also, do not overload an outlet and use proper circuit breakers. Perform regular fire risk assessments to identify areas at risk of of bad wiring and circuits.

4. Exposed Electrical Parts

Examples of exposed electrical parts include temporary lighting, open power distribution units, and detached insulation parts on electrical cords. These hazards can cause potential shocks and burns. Secure these items with proper guarding mechanisms and always check for any exposed parts to be repaired immediately.

5. Improper Grounding

The most common OSHA electrical violation is the improper grounding of equipment. Proper grounding can eliminate unwanted voltage and reduce the risk of electrocution. Never remove the metallic ground pin as it is responsible for returning unwanted voltage to the ground.

6. Damaged Insulation

Defective or inadequate insulation is a hazard. Be aware of damaged insulation and report it immediately. Turn off all power sources before replacing damaged insulation and never attempt to cover them with electrical tape.

7. Wet Conditions

Never operate electrical equipment in wet locations. Water greatly increases the risk of electrocution especially if the equipment has damaged insulation. Have a qualified electrician inspect electrical equipment that has gotten wet before energizing it.

Knowing your limits and applying the best electrical safety practices can help reduce the risk of electrical shock and death. It is safer to work within your scope of expertise instead of taking the risk of working beyond your capacity. If you are not confident to do the job, don’t hesitate to call for help from an authorized person.

Instead of relying on your memory, use a checklist when applying electrical safety practices in your workplace. A digital checklist is a powerful tool that can serve as a guide for performing work near electrical equipment and hazards.