



Electrical Safety Training Program



Goal

Improve hazard recognition and the importance of following proper electrical safety procedures.

Objective

Workers shall be able to identify and maintain safe conditions in the workplace to protect all personnel from electrical shock, arc-flash, and fire hazards of electrical origin. The program is also intended to ensure compliance with the Occupational Safety and Health Administration's (OSHA) electrical safety requirements published as Federal Law in the 29 Code of Federal Regulations (CFR) 1910.

Background

Electricity and electrical devices are vital to businesses and their success. However, if not used or maintained correctly, electricity poses serious risks. Lack of training and respect for the dangers of electricity often result in fatal electrocutions each year. While

electrical hazards are not the leading cause of on-the-job injuries and accidents, they are disproportionately fatal and costly. These injuries disrupt the lives of workers and their families and impact the productivity of employers. Even lower-voltage shocks can be severe enough to kill when the electric current travels through the body, especially near the heart.

Electric shock can also cause long-term effects, such as:

- severe pain;
- damage to nerves, muscles, or tissues;
- internal bleeding;
- loss of muscle control and coordination; and
- cardiac arrest.

Hazards

Electricity flows along the path of least resistance. The human body poses little resistance to the electric current because of its high water and electrolyte content. The following conditions take advantage of the body's conductive properties and may cause electrocution:

- contact with wires not correctly insulated;
- direct contact with electrical conductors such as power lines; and
- touching an electrically charged appliance with wet hands or while standing in water.

Electric current flowing through the body can cause severe internal or external burns. Direct contact with equipment overheated by the electrical current can result in severe external thermal burns. Overloaded circuits or equipment may cause fires or explosions, especially if they occur in areas where flammable or explosive substances are stored.

Regulations

OSHA's General Industry [29 CFR 1910.301-399](#) contains electrical safety regulations involving electrical installations. The detailed Electrical Safety-Related Work Practices Standards ([1910.331-335](#)) limit specific tasks to "qualified" employees. "Qualified" is defined as "those persons having training in avoiding the electrical hazards of working in or near exposed energized parts." Qualified employees must have the ability to distinguish exposed live electrical parts, their voltage, the clearance distances, and the corresponding voltages to which they may be exposed.

Unqualified workers exposed to overhead electrical lines must maintain a minimum

distance of ten feet from any unguarded equipment. Vehicles and mechanical equipment must also maintain this distance.

Procedures

Creating a safe work environment includes identifying common hazards and following safety practices. These procedures can help prevent electric shock:

- Use trained workers in lockout/tagout procedures to work on electrical circuits and equipment.
- Avoid working around electrical sources when the surrounding worksite, tools, or clothing are wet.
- Keep a towel or rag handy to keep hands dry.
- Stop all electrical work if the area becomes wet from other sources of water.
- Ventilate the work area to reduce atmospheric hazards like dust, flammable vapors, or excess oxygen.
- Maintain a clean, orderly, hazard-free environment.
- Arrange tools and equipment neatly, returning everything to its proper place after each use.
- Keep the work area free of rags, trash, and other debris.
- Clean spills promptly and keep floors dry.
- Use waterproof electrical cords outdoors.

- Ensure that all extension cords have their three-pronged plugs intact.
- Secure all electrical cords when used in or around walkways.
- Avoid using electrical cords near heat, water, or flammable/explosive materials.
- Never use an extension cord with damaged insulation or if the plug's grounding pin is missing.

Safe Operation

Power tools must meet National Electric Code standards for double-insulated casings or third-wire power cord grounding. Hand tools should also have factory-installed insulated grips. Follow these suggestions when using electrical tools:

- Inspect tools for wear or defects before starting the job.
- Ensure all safety guards or shields are in place.
- Never modify tools or electrical equipment.
- Inspect power cords and switches for cuts, frayed insulation, exposed terminals, loose connections, and an intact grounding pin.
- Clean and dry tools, and ensure they are free of oily film or carbon deposits.
- Never carry, store, or hang a power tool by its power cord.
- Stop using tools immediately if they smoke, spark, or shock.



- Do not overload wall plugs or extension cords.
- Ensure the extension cord is the right size and rating for the tool being used.
- Never remove the grounding post from a three-pronged plug to make it fit into a two-pronged wall socket.

Clothing

- Wear comfortable, nonrestrictive, natural-fiber (usually cotton) clothing and underwear. Do not wear synthetic fibers such as nylon or polyester because they may melt and adhere to the skin, resulting in secondary burns.
- Wear a good pair of oil- and slip-resistance Electrical Hazard (EH) safety shoes with non-conductive, electrical shock-resistant soles and heels.
- Avoid loose clothing which can get caught in electrically energized equipment.
- Remove neckties, jewelry, scarves, and wristwatches.
- Secure long hair in a hat, hair tie, or hair net.
- Avoid belts with large metal buckles.
- When wearing a tool belt, do not allow tools to hang out of their holders or dangle from the belt.



Personal Protective Equipment (PPE)

The following PPE is recommended to prevent a worker's body from becoming an electrical conductor:

- a Class E electrical hard hat, if working near overhead electrical lines;
- non-conductive eye and face protection;
- rubber gloves; and
- rubber-soled boots or shoes.

All PPE must fit properly, be cleaned, and stored correctly when not in use. All electrical PPE and devices must be tested for functional soundness at regular intervals, as specified by [29 CFR 1910.137](#).

First Aid

Follow these procedures in case of **electrical accidents**:

- Do not touch the victim.

- Call for immediate, professional medical help.
- Turn off the power if it can be done safely.
- Use a dry pole (or anything that does not conduct electricity) to push the person away from the electrical source.
- Once the victim is separated from the power source, treat them for shock and cover them lightly until help arrives.
- Administer artificial respiration if breathing has stopped.
- Administer CPR if the heart has stopped.
- Cover electrical burns with a clean, dry cloth.

For **electrical fires**:

- Notify the local fire department or call 911 immediately.
- Do not touch the burning object.
- Do not use water on an electrical fire.
- Use a Class C fire extinguisher, such as carbon dioxide or multipurpose ABC extinguisher, to put out small fires.

Keep all workers clear of the area and wait for the professionals unless the workers present are qualified to fight electrical fires.

Summary

Working on energized electrical systems presents added hazards to unqualified workers. By following the procedures outlined above, accidents and injuries can be avoided.

Review

1. According to OSHA, what is a “qualified” employee?
 - a. an individual who is a licensed journeyman or master electrician;
 - b. an individual who knows how to use electrical testing equipment and PPE properly;
 - c. an individual who has training in avoiding the electrical hazards of working on or near exposed energized parts; or
 - d. a licensed electrical contractor.

2. What precautions should be taken before using electrical equipment?
 - a. Inspect the electrical tools before use for visible damage or defects.
 - b. Ventilate the work area to eliminate a potentially explosive atmosphere.
 - c. Use lockout/tagout procedures on all affected electrical components.
 - d. All of the above.

3. The steps that should be taken when an electrical accident occurs are _____?
 - a. Call for emergency response help, apply wet compresses to burned skin, keep the victim mobile, and turn off the power.
 - b. Call for emergency response help, pull the victim off the electrical source, give CPR, and secure the accident scene.
 - c. Call for emergency response help, turn off the power, push the victim off of the electrical source using a non-conductive stick, and give first aid as needed.
 - d. None of the above.

4. What are the environmental conditions that promote electric shock?
 - a. dry hands, dusty surroundings, using defective electrical equipment, and failure to follow electrical safety workplace practices;
 - b. using defective electrical equipment, wet hands, failure to follow electrical safety workplace practices, and wet surroundings;
 - c. wet hands, insulated hand tools, using repaired electrical equipment, and wet surroundings; or
 - d. dry surroundings, dry skin, using defective electrical equipment, and failure to follow electrical safety workplace practices, and wet surroundings.

5. The three causes of electrical accidents are _____?
 - a. defective PPE, contact with improperly insulated wires, and indirect contact with electrical conductors;
 - b. touching an electrically-charged appliance with dry hands, contact with improperly insulated wires, and indirect contact with electrical conductors;
 - c. failure to observe proper safety procedures, defective PPE, and direct contact with electrical conductors; or
 - d. touching an electrically charged appliance with wet hands, contact with improperly insulated wires, and direct contact with electrical conductors.

Answers 1. (c); 2. (d); 3. (c); 4. (b); 5. (d)



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