Electrical Safety

ATALIAN
GLOBAL SERVICES

After completing this module, you will be able to understand how:

- Electricity acts.
- Electricity can kill you.
- To work safely with electricity.
- To prevent electrical shocks.

During this module you will answer Quick Quizzes to help you review and test your understanding; these are not scored.

There is also a short Final Quiz in addition to this module, which will be scored. It is necessary to pass the quiz with a score of 80% or better to receive credit for this module.

This module takes 20 minutes to complete.

Electricity Can Kill

Are you worried about an electric shock when you replace a light bulb? Most people have a false sense of security when it comes to electrical currents. Because electricity has become such a familiar part of our lives, it is not treated with the respect it deserves.

Electricity is the most commonly encountered hazard in this facility. Exposure to electricity can cause burns, internal hemorrhaging, and death by paralysis of the respiratory system or heart failure.

Electrical contact can cause your muscles to contract. This stimulation is so powerful that it could cause you to “stick” to the electrical circuit that you are touching. The increased time of exposure to the electrical current increases the dangers to you.

Electric shock may lead to secondary injuries where involuntary muscle reactions from the electric shock can cause bruises, bone fractures and even death from collision or falls.

How Does Electricity Work?

To handle electricity safely, it is first necessary to understand how it works. The source of electricity is a power station. The electrical current is then transferred through wires and a generator forces the flow through these wires. This current is measured is volts.

Electricity always travels in a completed circuit. When you switch on equipment, you complete the circuit. Electricity flows along power lines to the outlet, through the power cord into the equipment, then back through the cord to the outlet and out to the power lines again.

Electricity will always travel in the path of least resistance. Everything has a certain level of resistance when electricity tries to flow through it. When electricity is attempting to complete its circuit, it will always choose the path that provides the least amount of resistance.

How Does Electricity Work?

Conductors are made of materials that will allow an electrical current to flow through it, for example copper and water.

Insulators are materials that will not allow an electrical current to flow through it, for example rubber and clay.

Electricity will always try to get to the ground. If electricity is traveling through a circuit and finds something that conducts electricity and will complete the circuit, such as metal, wood or water, it will try to pass through the conductor directly to ground.

True or False

Unlike wood and metal, rubber is not a conductor of electricity.

A. True
B. False

True or False

Unlike wood and metal, rubber is not a conductor of electricity.

A. **True**
B. False

How Does A Shock Occur?

Water is one of the best conductors of electricity. Because your body contains mostly water, you are a great conductor, too. If you touch an electric circuit and the ground at the same time, you create an easy path for electricity to travel through. Electricity traveling through your body can cause serious injuries or death.

You don’t have to be touching the ground directly to cause an electrical shock. You could be off of the ground and touch something like a tree or a ladder which completes a circuit with the ground, causing an electrical shock.

Water becomes an excellent conductor when mixed with salt and acid. Both of these elements are contained within your perspiration. When water is present on your skin or in the environment, the risk of electrical shock increases greatly and you should exercise even more caution.

“Low voltage” does not mean “low hazard.” Exposure to low voltages for long periods of time can be more dangerous than high voltages for short periods of time.

De-energize Live Parts

You can avoid electrocution by avoiding live parts:

Always try to avoid working on or near exposed live parts or equipment. These dangerous parts contain electrical currents that will cause an electrical shock. We will identify and inform you of the location of these parts and equipment.

If possible, deenergize all live parts before working in an area where contact with those parts may be made. Always treat equipment as if energized, until you are certain it is not.

To deenergize live parts, the current must be turned off at the switch box and the switch padlocked in the off position. At the same time, the switch or controls being locked out must be tagged to show what is being worked on.

After the equipment has been locked and tagged, check to see if energy is stored within the wires and release it. You can still be injured or killed by equipment that is shut down if all of the electricity is not released from the wires.

Verify that the equipment is shut down by trying to restart it. Turn the controls to the “on” position. Inform your coworkers that the power is being turned back on before you restart the equipment.

All of the following statements are true about electrical safety, **except**:

A. Water, including your sweat, is an excellent conductor of electricity.
B. Exposure to low voltage for long periods of time can be dangerous.
C. It is okay to wear your rings or bracelets when working with electricity.

All of the following statements are true about electrical safety, **except**:

A. Water, including your sweat, is an excellent conductor of electricity.
B. Exposure to low voltage for long periods of time can be dangerous.
C. **It is okay to wear your rings or bracelets when working with electricity**.

Working Safely With Overhead Lines

Half of all electrical deaths are caused from overhead power lines. Electricity can be released from exposed overhead lines even if you or your equipment is not touching them. Here's how you can work safely:

- If work is performed near overhead power lines, the owner or operator of the lines must deenergize them. If the lines cannot be deenergized, precautions must be taken to prevent touching the lines directly or indirectly through conducting materials, tools or equipment.
- You must keep yourself and the longest conductive object in your possession at least 10 feet away from overhead power lines. If voltage is over 50,000 volts, the clearance must be increased by 4 inches for each additional 10,000 volts. For example, you must distance yourself by at least 10 feet, 8 inches from a 70,000 volt line.
- Be aware of how close power lines are to equipment on the ground. Do not touch equipment that is within the above distances.

Working With Portable Electrical Equipment

Portable electrical equipment must be handled in a manner that will not damage the cord. Working with damaged cords can cause shocks and fires. Three activities to avoid are:

- Lifting equipment by the electric cord.
- Pulling at a cord to remove it from an outlet.
- Fastening cords with staples or hanging cords in a fashion that could damage the outer jacket or insulation

If there is a defect or evidence of damage to the cord, the damaged equipment must be removed from service, and no one may use the equipment until tested to be safe.

Never use portable equipment if you or the environment is wet. Water is a conductor and creates a risk of shock, even if the cord and equipment are safe.

Working Safely With Extension Cords

Unsafe use of extension cords is one of the most frequently violated electrical standards. There is a definite need and place for cords, but there is a temptation to misuse them because they seem to offer a quick and easy way to to carry electricity. Extension cords are only a temporary solution.

The problem with extension cords is that they are more vulnerable than fixed wiring and are more likely to be damaged by doors, window edges, staples or aging.

Before use on any shift, extension cords must be visually inspected for exposed parts. Never use damaged extension cords. Cords with exposed parts may cause shocks, burns and fires.

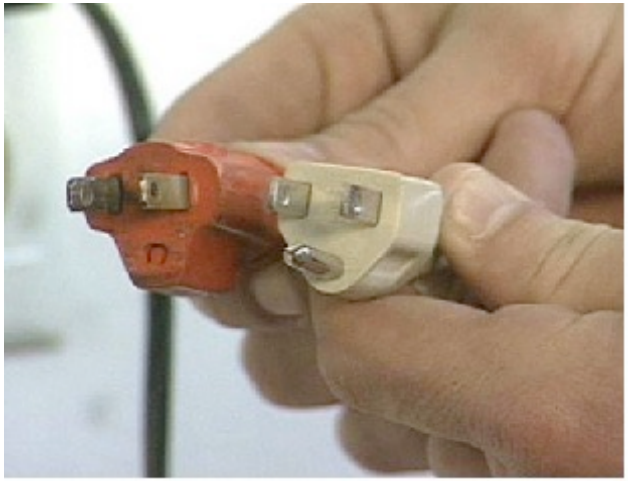
Personal Protective Equipment (PPE) Will Save Your Life

Here are some examples of PPE that will protect you from dangerous electrical currents:

- Nonconductive, industrial protective helmets provide head protection when there is danger of head injury from electric shock or burns due to contact with exposed energized parts.
- Protective equipment for the eyes or face protect you from flashes or flying objects resulting from electrical explosion.
- Rubber insulated gloves provide protection by not allowing electricity to go through your body if you touch it.
- Rubber shoes and matting increase resistance by making it difficult for the electrical current to reach the ground.

Grounding Prevents Injuries

A ground wire is a safety wire connected to the earth. This wire does not carry electricity under normal operations. Its purpose is to provide an alternate path for the electrical current during a malfunction. This alternative path prevents dangerous currents from traveling through your body, causing shock.



A three prong plug is an example of equipment that uses a ground wire. It provides a path to ground for any electricity that strays or leaks from the equipment. This helps protect the equipment and can help protect you from an electrical shock. Never cut off the third prong to fit a two-prong receptacle. This will eliminate the ground path and leave you open to be shocked.

An equipment ground provides additional protection by creating another path from the tool or machine through which the current can flow to the ground. This additional ground prevents the metal frame of the tool or machine from becoming energized and harming you.

True or False

When using portable electrical equipment, you should always inspect the cords.

A. True
B. False

True or False

When using portable electrical equipment, you should always inspect the cords.

A. **True**
B. False

Circuit Protecting Devices Prevent Injuries

Circuit protecting devices are designed to automatically limit or shut off the flow of electricity in the event of a ground fault, overload or short circuit in the wiring. Fuses, circuit breakers and ground fault circuit interrupters are three examples.

Fuses and circuit breakers are devices that are placed in circuits to protect equipment and wiring from being damaged by too much electrical current. They open or break the circuit when the amount of current flow becomes excessive and therefore unsafe.

A Ground Fault Circuit Interrupter (GFCI) is designed to shut off electric power within as little as 1/40 of a second. It works by comparing the amount of current going to electric equipment against the amount of current returning. If the current difference exceeds 6 milliamperes, the GFCI interrupts the current quickly enough to prevent electrocution.

After a circuit is deenergized by a circuit protective device, do not turn on the circuit until it has been determined that this can be done safely.

Summary

Electricity is the most commonly encountered hazard in this facility. Exposure to electricity can cause burns, internal hemorrhaging, and death by paralysis of the respiratory system or heart failure.

Your body is a great conductor of electricity. If you touch an electric circuit and the ground at the same time, you create an easy path for electricity to travel through. Electricity traveling through your body can cause serious injuries or death.

Do not work on or near exposed live parts or equipment. If possible, deenergize all live parts before working in an area where contact with those parts may be made. Always treat equipment as if energized, until you are certain it is not.

Treat electricity with the respect it deserves. It is a significant hazard and is always around you. There are simple things you can do to prevent shocks such as:

- Checking wires for damage before every shift.
- Not entering a confined space where you cannot see the live parts.
- Not wearing conductive jewelry when working with live parts.

Congratulations!
You have completed the Electrical Safety module.
Click on this **link** to access the final quiz.