

SECTION 11

Electrical Safety

SECTION 11: ELECTRICAL SAFETY

Overview

Unsafe equipment, unsafe acts, and working with electricity in hazardous environments can lead to electrical accidents and injuries. In this section, you will learn about electrical safety fundamentals and safe work practices to help keep you and your co-workers safe.

Why Worry About Electricity?

Electricity can be deadly. Electrocutation is one of the leading causes of workplace fatalities. Thousands of electrical contact injuries occur every year in the United States, many resulting in permanent disabilities.

Surprisingly, most of these accidents involve low voltage (600 volts or less).

What Type of Electrical Equipment is Safe to Use?

You put yourself at risk when you use unsafe equipment. Equipment with faulty insulation, improper grounding, defective parts, and loose connections is dangerous. While extension cords can be used on a temporary basis, they must meet specific criteria to be safe.

All electrical equipment used by shop employees must be Underwriters Laboratory (UL) approved and be properly grounded and bonded. Grounding ensures that electricity is directed correctly, and bonding prevents the build-up of static electricity, which can lead to sparks. All electrical plug points must have a three-pronged plug. Portable power tools must be double insulated or have a three-pronged plug.



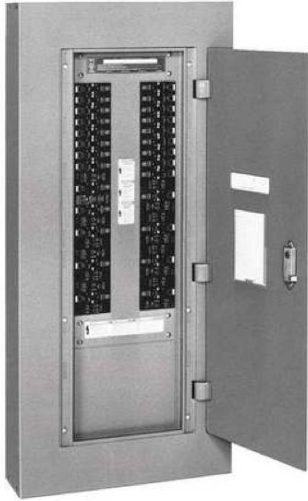
Extension cords are meant for temporary use and not as permanent installations. If you have to use one, select a UL approved #16 gauge heavy-duty extension cord.

Extension cords or long equipment cords can be mounted overhead or secured on the floor with a non-conducting bridge. They must not run along walkways, through walls, or above ceilings. Protect power strips from water or chemical spills and splashes by mounting them above ground level.

Do not daisy chain circuits. Electricity creates resistance in the form of heat. Longer wiring has greater amounts of electricity streaming through it, resulting in more resistance and heat.

Do not overload or use single to multiple outlet adapters. Overloading circuits produces excess heat. If additional electrical outlets are needed to power the equipment in your shop, contact Facilities Management to install them. Any live parts on electrically powered equipment must be guarded. Bare conductors, exposed terminals, and energized metal parts can store up to 55% of line voltage and shock you if you touch them with your bare hands or work tools.

If you use electrically powered machines, a clearly identified power or kill switch must be within arm's reach so you can quickly turn off the machine if there is an emergency. All power sources must be secured, easily accessible, and free from obstruction.



Working Safely Around Electricity

It is important to understand how electricity can potentially harm you and your coworkers. Electrical current will not flow unless it has a complete path or circuit that returns to its source (battery, transformer). Your body can serve as a path in the same way as other conductors like metals, earth, and concrete. When current flows through your body, it can cause harmful electric shock, resulting in burns, muscle damage, and heart damage. Physical injuries, such as broken bones, can result from falls that occur after being shocked.

Insulators resist the flow of electricity. Insulating materials are used to coat copper conducting wires and are used to make electrical work gloves. Insulators help protect you from coming into contact with electricity flowing through conductors.

The best way to avoid shock is to eliminate the electrical current itself. Know the location of electrical panels in your shop. This knowledge is important if an emergency power shut off is required. Label the circuit breakers with the corresponding outlets on the interior of the panel door. Do not use tape to secure any breaker in either an on or off position.

Make sure that electrical panels are visible. Do not mount posters or labels on them. The only exception to this is the use of labels to distinguish between multiple panels in a single location. Keep at least 3 feet buffer of clearance around the panel.

Keep cover plates on all electrical outlets, junction boxes, and switches. Remove or replace frayed or damaged cords and never use electrical wires as supports. There should be no exposed wiring anywhere in your shop. If there is, report it to your supervisor for repair or replacement.

Turn off all electrical equipment when not in use. Never leave electrically powered equipment unsupervised. Turn it off if you have to take a break or perform another task, even for a minute.

Always switch off the power before unplugging a piece of equipment. Be sure to report any electrical failure or excessive heating of equipment to your supervisor as soon as it occurs.

Before conducting maintenance or repair of any electrical equipment, ensure that all energy is released, power sources are disconnected, and lockout/tagout procedures are followed. Refer to Section 7 and the LOTO Program for details.

Are Some Work Environments More Dangerous Than Others?

Certain environmental conditions can increase your exposure to potential hazards when working with electricity. You must take special precautions when working around wet or damp areas. Ground fault circuit interrupters (GFCI) must be used if working around areas that have a potential for water pooling. Electric shock can result from frayed wires or cords.

Special care is also needed when working in potentially hazardous environments. An accidental static discharge can cause a fire or explosion when flammable chemicals or combustible dusts are present.

Who Can Complete Electrical Work?

Facilities electricians must approve all maintenance, repair, and modification of existing electrical systems within campus buildings or structures prior to implementation. Installation, maintenance, and repairs of existing machinery or buildings may only be conducted by **qualified personnel** (e.g., mechanics, electricians, or specially trained individuals). All electrical work must adhere to the standards of the National Electric Code.



Required PPE and Training

Employees who work directly with electricity should use the personal protective equipment required for the jobs they perform. This equipment may include rubber insulating gloves, hoods, sleeves, matting, blankets, line hose, and industrial protective helmets designed to reduce electric shock hazard.

Anyone who operates, services, or maintains electrical equipment must be appropriately trained. All employees should be trained to be thoroughly familiar with the safety procedures for their particular jobs. At a minimum, training must include instruction in power tool safety, lockout/tagout procedures, and personal protective equipment. Training records must be kept for five years.