



GENERAL ELECTRICAL SAFETY

Overview

Electrical systems and equipment are so common that we often overlook the inherent hazards associated with electricity. This SOP provides general guidance for electrical safety. Some of the most common electrical hazards are associated with misuse of extension cords and power strips, so these items are specifically addressed in this SOP.

This SOP is not a replacement for the UNL Lockout/Tagout Program. Additionally, it should be supplemented with operational procedures for specific equipment, tools, and electrical systems/components (i.e., electrophoresis, electroplating, welding, etc.).

Environmental Health and Safety encourages you to consult our web-based training module **General Electrical Safety Awareness** for more information. This training is available through the web-based training portal <https://ehs.unl.edu/web-based-training/>.

Safe Practices

- Operators of electrical equipment, tools, systems, components, etc., should read and be familiar with the contents of the owner's manual and manufacturer's recommendations and precautions for electrical safety, including maintenance and service.
- Do not disable or bypass any safety features such as ground fault circuit interrupters, interlocks, etc.
- Do not overload outlets.
- Maintain three-feet of clearance in front of electrical breaker boxes, emergency shut-offs, and electrical throw switches at all times to facilitate access in the event of an emergency.
- Be aware of overhead power lines and other conductors when working on or operating tall equipment (i.e., ladders, aerial lifts, forklifts, cranes, hoists, etc.) or working in high places (i.e., on roofs, scaffolding, trees, etc.).

- If there is sparking, smoke, or odor coming from an outlet, plug, or tool/equipment, unplug the cord and call for an electrician immediately.
- Restraint of power strips, appliance cords, etc., must be accomplished in such a manner that no tool is required to remove the restraint device. For example, non-releasable zip tie use does not meet electrical codes.
- Re-locatable power taps, power strips, etc., should be used solely for low power applications and within the manufacturer guidelines for the device. Higher power items such as microwaves, coffeepots, heat guns, etc., should be plugged directly into a permanently installed outlet.

Equipment Design, Approval and Installation

- All electrical equipment should be UL listed and/or FM approved.
- Equipment maintenance must be done by trained and knowledgeable personnel. If the equipment is a plug-in item, it should be unplugged prior to servicing. If it is hard-wired, or if the equipment has other sources of stored hazardous energy (i.e., pneumatic, hydraulic, etc.), appropriate Lockout/Tagout (LO/TO) procedures must be used prior to maintenance.
- Do not install, repair, or modify building electrical hardware or wiring unless authorized and responsible for building maintenance. All wiring and components must be installed, serviced, and repaired by a licensed electrician and in accordance with applicable electrical codes.
- Do not use/energize non-classified equipment/tools in an electrically classified location. In general, do not use unclassified electrical tools or equipment around flammable liquids, solvents, adhesives, gases, or combustible dust.
- Make sure all electrical equipment is properly grounded. Grounding of plug-in tools or equipment is generally accomplished with a three-prong plug used in a three-prong outlet. Two-prong equipment does not provide a ground and can present a shock hazard to the user unless it is double insulated. Double insulated tools have the  symbol.
- When using equipment on wet floors or near other sources of water, protection must be provided with a ground fault circuit interrupter that is built into the equipment/tool, extension cord, outlet, or circuit.

Outlets and Fuses

- Electrical outlets that are outdoors or near sinks or other sources of water must be equipped with a ground fault interrupter. A ground fault outlet is easily identified by a “test” and “reset” button on the outlet between the plug receptacles. A ground fault circuit is more difficult to identify because it usually requires visual inspection of the circuit breaker.
- Make sure fuses are properly rated.

Extension Cords

Electrical extension cords are designed to provide temporary power to tools or equipment when a conventional outlet is not nearby. Extension cords must not be used as substitutes for permanent wiring. If current electrical outlets are insufficient in number or location to accommodate desired equipment, contact the University of Nebraska-Lincoln Facilities Management and Planning (FMP) to install necessary upgrades.

1. Selection

- Select UL rated extension cords of the appropriate length and gauge of wire to accommodate the amp rating of the equipment to which it is supplying power. Remember, if the gauge of the wire remains the same, the amperage rating will decrease with increasing cord length.
- Always use 3-wire extension cords for tools with 3-prong plugs. Never remove the ground prong.

2. Use

- Inspect extension cords for damage prior to each use.
- Remove damaged extension cords from service. Examples of damage include detachment of the plug from the sheath, cracked or worn insulation or plug, etc.
- Extension cords must be restricted to temporary use and plugged directly into a permanently installed electrical outlet.
- When using extension cords outdoors, use only extension cords labeled for outdoor use and in combination with protection provided by a Ground Fault Interrupter (GFI) (either built into the cord, the outlet, or the circuit).

- Do not use multiple extension cords in series (plugged end-to-end). Use one cord of the proper cord length.
- Do not run extension cords through open doorways or windows, holes in walls, underneath carpet, on overhead piping or other structures, or suspended over counter tops. If absolutely necessary to run a cord temporarily along the floor, use a runner or tape the cord down so that it does not become a trip hazard.
- Never use nails or staples to attach or hang an extension cord.

After using an extension cord, inspect the cord for damage. If there is no damage, neatly coil the cord and store it in a designated area.

Power Strips and Surge Protectors

When selecting a power strip to provide power to multiple appliances from a single outlet:

- Select a device that is equipped with surge protection to protect sensitive devices from power spikes.
- Select a device with a built-in fuse or circuit breaker that will shut off power if the device is overloaded.
- Do not use in wet locations.
- Do not use multiple devices in series or in combination extension cords.
- Select devices that are Underwriters Laboratories (UL) approved.
- Power strips/surge suppressors must be plugged directly into a permanently installed electrical outlet.
- Ensure that plugs are firmly and fully seated to avoid exposure of the metal prongs.
- Do not use damaged strips. Strips equipped with indicator lights are recommended because they provide the only visual indication that a strip has reached its voltage absorbing capacity and is no longer functioning to protect the equipment that is plugged into it.
- Keep cords neatly organized and in a manner that they do not present a trip or entanglement hazard.