

Commercial Electrical Safety

Electrical fires consistently rank among the top five causes of commercial building fires involving health clinics and hospitals, manufacturing plants, nursing homes, warehouses, farming operations, bars and restaurants, according to the National Fire Protection Association (NFPA). Fires involving electricity also regularly result in a higher percentage of property damage than those caused by many other sources, such as unattended cigarettes and candles. A study by the U.S. Fire Administration found electrical malfunction was the leading cause of 4,065 fires in medical facilities between 2004 and 2006, resulting in more than \$34 million in property losses. Warehouse fires sparked by electrical distribution or lighting resulted in \$14.9 million in property damage from 2003-2006, according to NFPA. An effective way to address life safety concerns and better protect property against electrical fires is through education. Knowledge of electrical currents and the potential hazards while working with or near electricity can help to save the lives of business owners and their employees. Electrical safety in the workplace is governed by a number of federal and state requirements that stem from the Occupational Safety and Health Act of 1970 (OSHA) and the National Electrical Code, which was developed by the NFPA.

Prepare to Stay Safe

The first step a business should take is to establish a written electrical safety program. Training and guidelines are a must for anyone working on or around electrically energized systems and equipment. If possible, work areas should be set up away from possible electrical grounds that may come into accidental contact with electricity.

Employee safety programs should address the following critical subjects:

- How to identify electrical hazards;
- What is considered a safe distance from exposed electrical conductors;
- Information about personal protective equipment for electrical safety;
- How to understand proper work practices in wet or damp locations containing electricity;
- The proper lockout/tag-out procedures for electrical equipment and systems;
- Safety requirements for electrical installations;
- How OSHA rules apply to the job and workplace and penalties for noncompliance.

Warning Signs and Solutions

It is important to note that direct contact with an electrical current is not the only way fires start. Electricity also can arc or jump through the air as a path to the ground. High voltage contact may create fires. The following examples can help promote a broader awareness among employees about the warning signs and solutions to avoid an electrical fire.

- Frequently blown fuses or tripped circuits are symptoms of electrical problems, usually overloaded outlets or circuits.
 - Consult a licensed electrician for assistance.
- Getting a shock when touching appliances can indicate a more serious problem.
 - Be sure to unplug the appliance and discontinue use.

This bulletin is intended only as a reminder and is offered solely as a guide to assist management in its responsibility of providing a safer working environment. This bulletin is not intended to cover all possible hazardous conditions or unsafe acts that may exist. Other unsafe acts or hazardous conditions should also be noted and corrective action taken

- Worn or discolored wall outlets can indicate hidden arcing, smoldering or burning; damaged or improperly installed wiring in the outlet, or a problem with the receptacle itself.
 - Avoid using the outlet or switch and contact a qualified electrician as soon as possible. Make sure faceplates are on all outlets or switches.
- Frequently flickering or dimming lights may indicate a short in the wiring, dangerous arcing, or an over-extension of electrical systems.
 - Contact a qualified electrician to discuss the problem and get an electrical system inspection.

Reducing Risks:

Following Operational Requirements and Using the Right Materials

Many electrical fires result from problems with equipment and appliances. According to NFPA statistics, the primary sources of fires involving electrical distribution equipment are lamps, light fixtures, and light bulbs (28 percent) and fixed wiring (22 percent). When it comes to injuries and fatalities linked to electrical fires, cords and plugs were involved in 39 percent of all cases involving death, while lamps, light fixtures, and light bulbs accounted for 30 percent of injuries not involving firefighters.

By becoming familiar with the proper ways to use equipment in a workplace and by understanding the importance of using the right materials and the need for regular maintenance, employees and owners can minimize the risk of electrical fire.

- Use caution when moving televisions and computer or video monitors, which contain two areas that have the greatest electrical dangers: the non-isolated line power supply and the CRT high voltage.
 - Major parts of nearly all modern TVs and many computer monitors are directly connected to the AC line, so there is no power transformer to provide the essential barrier for safety. Additionally, in some TVs the entire chassis is live.
 - This is why the equipment should only be serviced by a professional.
 - In addition to electrical risks, there is a chance of CRT implosion that could result in toxic chemicals being released and dangerous shards of glass injuring anyone standing nearby. The risk of implosion significantly increases if the CRT is damaged, such as if the TV or monitor is dropped or impacted in another manner.
- Microwave ovens use the chassis as ground return for the high voltage. Do not assume that the chassis is a suitable ground for test equipment.
 - Only a professional should attempt to service or repair a microwave.
 - According to OSHA safety code requirements (ANSI/IEEE-C95.1-1991) the power density should not exceed 1.6 mW/cm² at 2450 MHz (microwave oven frequency) for human exposure in uncontrolled environments.
- Plugs and cords must be maintained and monitored.
 - Use appliances, tools, lighting, and extension cords approved by a nationally recognized testing laboratory, such as Underwriters Laboratories (UL).
 - Unplug equipment and appliances if they will not be used for a prolonged period.
 - Connect/disconnect any test leads with the equipment unpowered and unplugged. Use clip leads or solder temporary wires to reach cramped locations or difficult to access locations.
 - If a test must be performed, try to do so with the power off and the equipment unplugged. For example, the semiconductors in the power supply section of a monitor can be tested for short circuits with an ohmmeter.
 - Frequently inspect cords and plugs to be sure they are not cracked or frayed, and keep cords out of high-traffic areas in the workplace.
 - When unplugging equipment pull the plug, not the cord. Check for loose fitting plugs as they may overheat and create a fire.
 - Make sure plugs fit outlets and never force a plug to fit the outlet.
 - Extension cords should be used only temporarily.
 - Do not staple or nail extension cords to walls or baseboards.
 - To prevent overloading an extension cord, limit the amount of equipment plugged into each outlet.
- When handling static sensitive components, an anti-static wrist strap is recommended.

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- Unplug tools and equipment before cleaning, adjusting, or repairing them.
 - Lock the power switch in the "off" position and pull fuses to prevent a person or a time clock from starting equipment under repair.
 - Replace guards over augers, chains and belts before unlocking or re-fusing the power switch.
 - Always follow the lockout, tag-out and grounding procedures appropriate for the work environment.
- Use the recommended wattage when replacing light bulbs or the recommended amperage when replacing fuses.
- If circuit boards need to be removed from their mountings, put insulating material between the boards and anything to which they may short. Hold them in place with string or electrical tape. Prop them up with insulation sticks -- plastic or wood.
- Do not use portable space heaters near combustibles such as curtains or newspapers.
 - For more information about space heaters, download a copy of the IBHS guide to Alternative Heating Sources.
- Use Ground Fault Circuit Interrupters (GFCI) in any area where water and electricity can come into contact. Outdoor outlets should have waterproof covers, and be GFCI protected.
- Upgrade electrical systems as needed.
 - As a business adds or replaces electrical equipment, it is important that the electrical system is capable of safely handling increased demands.
- Farm operations should pay special attention to grounding. Insufficient or improper grounding, unbalanced electrical loads or faulty electrical equipment may cause stray voltage.
 - Have a licensed electrician test the wiring and connections in farm buildings and equipment. Stray voltage may also be caused by sources outside of the farm.
 - If a licensed electrician confirms that the neutral-to-earth voltage problem is being caused by an outside source, contact the local power company.

Preparation, safety, training, and continuous education are the most important practices a business owner should implement to minimize or eliminate potential losses related to electrical safety and maintenance. If appropriate, hire a professional electrician to perform new installations, repairs or maintenance. Read more in the IBHS guide, *Hiring a Professional Electrical Contractor*.

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IBHS is an independent, nonprofit, scientific and educational organization supported by the property insurance industry. The organization works to reduce the social and economic effects of natural disasters and other risks to residential and commercial property by conducting research and advocating improved construction, maintenance and preparation practices. Visit <http://www.disastersafety.org> for additional information.



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