



# COMMERCIAL ELECTRIC FIRES: SIMPLE MEASURES TO PREVENT ELECTRICAL FIRES


Electrical fires consistently rank among the leading causes of commercial and residential fires, often resulting in death, injury, and significant property loss to businesses. Yet, many electrical fires can be prevented or easily contained through proper installation and maintenance of fixtures, location of equipment, training for employees, and greater awareness overall of the potential hazards of working with or near electricity. This article is intended to help businesses identify potential electrical hazards and discuss the necessary steps to take to reduce the likelihood of an electrical fire and potential resulting loss. Specific product standards and safety procedures relating to these points are set forth in various federal and state requirements stemming from the Occupational Safety and Health Act of 1970 (OSHA) and the National Electrical Code, which was developed by the National Fire Protection Association (NFPA).

## ELECTRICAL DISTRIBUTION SYSTEMS


Electricity for commercial buildings typically enters through an electrical distribution system, which varies in size and complexity depending on the business's operations. An electrical distribution system is typically comprised of a network of circuits, including wiring, circuit breakers, fuses, and possibly additional step-down transformers for lower voltage equipment. Transformers in the electrical distribution system will pull power from the main local power grid and reduce the level of necessary power and distribute it throughout the electrical distribution system in the building.


## IDENTIFYING SIGNS OF TROUBLE

Electrical distribution systems are comprised of many complex components that can expose a commercial building to fire risks. Specific areas of concern include:

 **Corroded Wiring:** Old or defective wiring is a major source of electrical fires. While all wiring has the potential to break down, wiring exposed to the

outdoor environment or corrosive substances can break down more quickly than wiring in indoor, non-corrosive environments. Additionally, wiring that has deteriorated insulating sheathing can lead to a fire and should be replaced. Farms, multi-tenanted warehouses, and industrial/manufacturing facilities should pay special attention to the condition of wiring because of extreme exposure concerns.

 **Fuses and Circuits:** Frequently blown fuses or tripped circuits are usually symptoms of overloaded outlets or circuits, which can cause overheating and an electrical fire.

 **Hot Spots:** Loose connections, corroded connectors or wires, overloaded circuits, short circuits, imbalanced electrical loading, and faulty fuses, breakers, and switches will create "hot spots" due to excessive heat within an electrical panel.



“Infrared thermal imaging” using a hand-held thermal scanner pointed at the electrical panel is an effective way to identify hot spots before they cause an electrical breakdown that can result in a fire. Smaller businesses may hire a licensed electrician to perform the inspection and provide a report and photos of the panels, while larger businesses may consider purchasing their own thermal scanner and training one or more employees on how to use the scanner and interpret the results.



*Shown above is an example of what a hand-held thermal scanner could show you, with a potential hot spot circled.*

Electrical distribution equipment should be periodically thermally imaged as well as physically inspected, cleaned, and tested by a licensed professional. Electrical distribution equipment to be inspected should include, at a minimum, the following:

- ✦ switchgear, switchboards, and panel boards
- ✦ circuit breakers
- ✦ fuses
- ✦ disconnect switches
- ✦ contactors and relays
- ✦ protective relays
- ✦ motors and motor controls
- ✦ transformers
- ✦ busway and bus duct circuit breakers
- ✦ transformers (if outdoor it may be owned and the responsibility of the utility company)

For information on best practices for hiring qualified, licensed electrical contractors, please see IBHS’ “Hiring a Professional Electrical Contractor” at: [www.disastersafety.org/news/hiring-a-professional-electrical-contractor-4/](http://www.disastersafety.org/news/hiring-a-professional-electrical-contractor-4/).

## LOCATION AND MAINTENANCE OF ELECTRICAL DISTRIBUTION EQUIPMENT

Good housekeeping greatly reduces the odds for a fire. When electrical distribution equipment is in a separate dedicated room, the room should be temperature-controlled, well-ventilated, clean, and dry to prevent moisture and excessive room temperatures that can degrade electrical materials. Additionally, keeping the room properly sealed will keep it free of dirt, dust, rodents, and pesky bugs that can get into the cabinets and degrade the equipment and potentially start a fire.

It is also important to keep combustible material away from electrical distribution systems, even if the room has an overhead sprinkler system. Too often, electrical rooms become a storage area for excess inventory or supplies, such as boxes, packaging materials, or janitorial supplies. 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 and ignite combustible material in the vicinity. A carbon dioxide fire extinguisher is the proper method for extinguishing an electrical fire, however the best advice is to call the fire department and evacuate the building.

If a dedicated electrical room is not available, electrical distribution panels or equipment may be located on a wall in a shared space. In these situations, combustible material should not be permitted within three feet of the equipment. Placing a yellow or red line on the floor is a simple way to remind and warn employees and visitors to keep their distance and not place combustible materials in this area. If distribution panels are located in an area where there may be moving vehicles such as forklift trucks or personnel carts, the equipment should be blocked by posts so it cannot accidentally be struck.

## LOCKOUT/TAGOUT

Any time electrical equipment is being repaired, removed, or replaced, proper safety procedures for electrical equipment systems, motors or other equipment should ALWAYS be implemented in order to prevent accidental reenergizing that could result in injury. Locking out and tagging electrical switchgear – placing a strictly controlled lock and tag on the main circuit breaker or disconnect switch controlling the disengaged equipment – should always be implemented when disabling electrical machinery of any kind. OSHA has specific lockout/tagout standard operating procedures including “The Control of Hazardous Energy (Lockout/Tagout),” Title 29 Code of Federal Regulations (CFR) Part 1910.147. In addition, 29 CFR 1910.333 provides requirements to protect employees working on electric circuits and equipment.

## LIGHTING

An often overlooked and common source for electrical fires is in lighting systems. When installing or replacing light bulbs or light fixtures, it is always recommended to use the wattage specified on the socket. In addition, fixtures should be placed away from high traffic areas where bulbs may be broken, and away from combustible materials. Unprotected light bulbs can be hit and broken, and may create sparks potentially causing a fire. Light bulbs can be protected by a simple plastic bulb cage. For large combustible storage, flammable liquids, or potentially explosive areas, explosion-proof lights are a prudent investment.

Additionally, it is important to look for visible signs of underlying fire hazards. Contact a qualified licensed electrician for an electrical system inspection if the following indicators are observed:

- ✦ Flickering or dimming lights may indicate a short in the wiring, dangerous arcing, or an over-extension of electrical systems.
- ✦ Multiple dimmed lights can also be a symptom of an overloaded circuit.

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## CONCLUSION

Periodic inspection and maintenance of electrical equipment can prevent breakdowns of vital power sources that control and light nearly all businesses. Employee safety, training, and knowledge of electrical equipment can ensure worker safety and prevent fires and other losses that can cause significant property damage and interrupt business operations. Additionally, as part of an established written electrical safety program, OSHA lockout/tagout standard operating procedures should be consistently followed by employees and contractors to help ensure personnel safety.

Taking care of your equipment and employees is not expensive or complicated, but, over the long term, it is vital for keeping the lights on and your facility open for business.



## A BRIGHT IDEA

On January 1, 2014, the federal government mandated that compact fluorescent lamps (CFL) replace incandescent bulbs due to increased efficiency. CFLs do not pose a fire threat when they fail since they are designed to fail safely. CFLs begin to dim as they approach the end of their useful life. As the CFLs age, so do their ballasts (sockets), and the ballast is the first to go. It will overheat and cause a voltage-dependent resistor to act like a fuse and shut off the circuit. When this happens, there is a small amount of plastic, fire-retardant material that connects the bulb to the ballast, and melts to release heat as intended. When CFLs fail, there may be a “pop”, small amount of smoke when the heat is released, an odor, and charring of the ballast, but they do so by design and do not create a fire hazard.

While the CFL bulbs are more energy efficient than incandescent bulbs, they contain hazardous and toxic mercury vapors. Mercury levels contained in CFL continue to be reduced by their manufacturers, however its presence raises health concerns. If a bulb breaks, extreme care should be taken to avoid inhaling vapors or touching any liquid. OSHA and the EPA have specific guidelines on how to address clean-up and how to create a clean-up plan. CFL bulbs should not be thrown into the trash where they can be broken and/or sent to an incinerator; they should be recycled in a proper manner. CFL bulbs can typically be returned to local home improvement recycling centers as well as other local recycling centers. Business owners and consumers can contact their local municipal solid waste agency directly, or go to [epa.gov/cfl/cflrecycling.html](http://epa.gov/cfl/cflrecycling.html) or [www.earth911.org](http://www.earth911.org) to identify local recycling options.