

Electrical hazards

Protect yourself and your home



Electricity means much more than an ever-growing variety of conveniences. The dangers it presents are very real. For example, a sudden electrical surge could silently damage many of your appliances. An arc fault could spark an electrical fire—in fact, electricity is the fourth-highest cause of home fires every year! Or lightning could strike your home, causing extensive damage. So take time to review some steps you can take to help protect yourself and your property.

Whole-house surge protection

Where do electrical surges come from?

An electrical surge is a sudden increase in voltage that can damage your home's electrical components. A surge can happen when:

- Your electric utility switches power from one area of the grid to another.
- Air conditioning units, furnaces, refrigerators, or vacuum cleaners turn on or off.
- Electric utility lines touch one another.
- Nearby lightning strikes occur.

Surges can travel down power, telephone, and cable TV lines. When there is a surge, unprotected electronics and appliances can be damaged. The damage builds up over time, until the appliance components fail.

Properly installed Surge Protection Devices (SPDs), combined with a good grounding system, should help protect your electronics and appliances from all but the most severe electrical surges. An SPD diverts the surge to the ground around your home, where the surge dissipates. That's why a good grounding system is important for surge protection.

A step-by-step surge protection plan

Step 1: Make sure your home's grounding system is in working order. You can do this yourself (if qualified) with a circuit tester, available at your local hardware store. Otherwise, a qualified electrician should do it for you.

Step 2: Plug your electronics and appliances into point-of-use SPDs. Use single-port SPDs for appliances that only have a power cord and multi-port SPDs for appliances that have antenna, cable, telephone, and power cords.

Step 3: Consider installing a whole-house surge protection system to absorb larger surges that come from outside your home. This device can be installed on the electrical meter by the utility company, or next to the electric service panel by an electrician.

When looking for surge protection devices...

- The SPD should be listed and labeled to UL Standard 1449.
- The SPD must be capable of protecting all power and signal lines that are connected to the protected equipment. Signal lines include phone lines and coaxial cable from satellite, cable TV, or external antenna.
- Select an SPD that has an indicating light and/or audible alarm to show when it needs to be replaced.
- Look for SPDs that come with a manufacturer's warranty. Some warranties cover only the device; others also cover the damaged equipment.

Lightning protection systems

When lightning strikes, the resulting electrical surge can travel through utility transmission lines to nearby homes. And, of course, a direct lightning strike on your home can cause serious damage. But if your home has a lightning protection system, a surge caused by lightning may more often be safely deflected into the ground.

What does a lightning protection system look like?

Lightning protection key

1. Minimum of two ground rods (electrodes) at least 10 feet deep
2. Down conductors
3. Connect gutters or other grounded metals as required
4. Dormers protected
5. Antenna mast connected to roof conductor
6. Air terminals (lightning rods) spaced 20 feet apart along the ridges and within two feet of ridge ends
7. Air terminals (lightning rods) located within two feet of outside corners of chimney
8. Roof projections, such as weather vanes or satellite dishes, should be connected to lightning protection system
9. Surge protection devices installed at main electrical panel or meter
10. Surge protection devices installed on electronics in house



These systems should be designed and installed by a qualified lightning protection system contractor.

When lightning is nearby

- Seek shelter immediately. An enclosed building offers the best protection. If there are no sturdy buildings nearby, get into a vehicle and close the windows.
- If you cannot find any shelter, go to a low-lying area, crouch down with your feet together and hands on your knees, and wait until the storm has passed.
- Keep away from utility poles, towers, isolated trees, or bodies of water.
- Don't use a corded phone except in an emergency. Cordless and cell phones are safe to use.
- Keep away from electrical appliances, TVs, fireplaces, metal objects, windows, or doors.
- If someone has been struck by lightning, call 9-1-1 or your local ambulance service. Give first aid if you are qualified. Lightning victims are safe to touch and need medical attention immediately.

General prevention tips

Never underestimate common household currents—they can injure and even kill. Electrical equipment should be treated with respect and properly maintained to reduce the chance of physical harm or property damage. The following tips can help you recognize potential electrical hazards.

Arc faults

- An arc (similar to an electrical short) produces intensely hot sparks that can set fire to nearby combustible materials. Nearly half of home electrical fires are caused by arcs.¹
- They often happen in appliance or extension cords that have become frayed or cracked.
- To prevent arc faults, have Arc Fault Circuit Interrupters (AFCIs) installed in your home. These devices look and work like conventional circuit breakers. When an AFCI breaker trips, have an electrician determine the cause and fix it.

Note: According to the National Fire Protection Association, effective Jan. 1, 2008, the National Electric Code made AFCI installation a requirement in the majority of the circuits in new residential construction.

Service entrance lines

- Use caution around overhead lines that deliver power to your home. Contact with power lines by objects such as ladders or a child's kite could result in electrocutions.
- Contact your utility company before digging around underground service lines, and regularly check the condition of your entrance cables. When old insulation cracks, aging service entrance cables can arc. This can electrify metal portions of the system, creating electrocution hazards.

Fuse and circuit breaker boxes

- Fuses or circuit breakers should be enclosed in a panel box. Interior wiring should never be visible. Always keep the panel door closed and latched.
- Keep the area around the electrical panel free of combustible materials.
- If you notice burn marks, hear buzzing or cracking, or smell burning plastic around or inside the electrical panel, have a qualified electrician check the panel immediately.
- If you have a fuse box, keep spare fuses of the proper size for the circuit they protect. Over fusing presents a severe fire hazard as circuit wires can overheat when they carry more current than that for which they were designed.
- When screw-type fuses require replacement, S-type fuses should be used and installed by a qualified electrician.
- If fuses blow or circuit breakers trip frequently, it may be an indication that the circuits are overloaded. Have a qualified electrician inspect the circuit and make the appropriate repairs.

Electrical cords

- Extension cords are a temporary, not a permanent, wiring solution.
- Grasp the plug—not the cord—when removing cords from outlets.
- Avoid overheating by using extension cords of the proper size for the load they will carry and by using cords as short as possible.
- Regularly check cords for damage. Never repair by splicing.
- Cords should not be placed under rugs or otherwise covered since this may result in overheating or fraying. Rolling or looping cords into a bundle may also cause overheating.
- Avoid using “octopus plugs,” which allow many cords to be plugged into a single receptacle.

Receptacles and switches

- Receptacle and switch covers need to be securely fastened. Exposed wiring presents a serious shock hazard.
- Have a qualified electrician inspect any receptacle or switch that sparks, makes unusual noises, or smells like it is burning.
- Protect outside receptacles with weatherproof covers and Ground Fault Circuit Interrupters (GFCIs).
- Replace receptacles that will not hold plugs firmly. Replace aging push-button or twist switches.
- Where small children are present, install tamper-resistant outlets or tamper-resistant outlet covers.

Electrical appliances and tools

- Do not use light bulbs with a higher wattage rating than recommended on the fixture.
- Keep appliances and their power cords away from any water or dampness.
- Hire a qualified electrician to replace two-prong outlets with three-prong GFCI outlets. Never remove the grounding plug on an appliance cord.
- Keep electric heaters clear of combustible material such as drapes, bedding, furniture, and papers.
- Unplug any appliance or tool that gives even the slightest shock (i.e., tingling sensation), and have it checked by a qualified electrician or repair person.

Get plugged into safety

Be sure to take the basic preventative steps outlined here, and file this sheet away for future reference. Just by being aware of common electrical hazards and keeping an eye out for problems, you could save your home and possessions from serious damage.

For more information, contact:

Lightning Protection Institute

3335 N. Arlington Heights Rd., Suite E, Arlington Heights, IL 60004, 800-488-6864, www.lightning.org

Underwriters Laboratories

333 Pfingsten Road, Northbrook, IL 60062, 847-272-8800, www.ul.com

Underwriters Laboratories of Canada

7 Crouse Road, Toronto, ON MIR 3A9, 800-INFO-ULC, www.ulc.ca

Electrical Safety Foundation International (ESFI)

1300 North 17th St., Suite 1752, Rosslyn, VA 22209, 703-841-3229, www.esfi.org

¹Source: *U.S. Home Structure Fires*, Marty Ahrens, NFPA Fire Analysis and Research, Quincy, MA, May 2011

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