

Electrical Safety Issues.

Most home owners have no understanding of Electricity or Electrical Safety. With a little time spent reading the following material and acting on the information you can PREVENT and AVOID serious injury and damage from fires started by unsafe Electrical conditions.

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Home Electricity 101

Breaker Panels

The **Breaker or Service Entrance Panel** is the box in your basement or garage that contains the circuit breakers that shut off power in the event of an overloaded circuit.

All the outlets and switches and lamps in your house are connected to multiple circuits that terminate in the Service Entrance Panel. A few things may be hard wired directly to the Panel, such as Electric Stoves and Ovens, Central Air Conditioning, Electrical Heating, Oil and Gas heating systems, saunas, hot-tubs, whirlpools, and anything else that is electrical but you don't plug into an outlet.

Old Breaker Panels

If you have a **Federal Pacific** Breaker Panel you must replace it immediately! These panels and their breakers are notoriously unreliable and are old. You can easily recognize this type of panel, because the breaker tips are RED. You should have any other Breaker Panel that's more than 40 years old replaced as well. Replacing a Service Entrance Panel costs about \$1000, and can be done in one day by a Licensed Electrician. Do not allow a handyman to do this job! At the same time you can upgrade the amount of current supplying your house to today's recommended 200AMPS. This is all done at the same time, except that PSEG has to come and drop a new line from the Utility Pole to your house.

Upgrading Circuit Breakers

In the last few years a new type of circuit breaker has been introduced and is required in all new bedroom construction. This breaker is called an **Arc Fault Circuit Interrupter (AFCI)** and detects erratic current flow, such as is presented when arcing (sparking) occurs. Homes with older wiring can benefit from upgrading existing breakers to an AFCI. A more detailed discussion is available on the [US Consumer Product Safety Commission](#) web site or by downloading a document on [AFCI](#).

Overloading

Overloaded circuits allow heat to build up in the wires and anything attached to them to the point of igniting surrounding flammable materials. The breakers protect the wiring preventing them from heating up by opening or "breaking" the circuit when the current flowing through them exceeds the rating of the Breaker. Most breakers in your panel are rated 15 or 20 Amps are marked as such on the breaker itself.

Other breakers, such as for Electric Stove, Electric Drier, and Central Air are usually in the 30 – 70 AMP range. The Main Breaker that shuts off all power to your house will be in the 100-200 AMP range. Thus, **if your breakers fail to trip, you will have a fire!** You need to have your breakers tested for proper operation.

However, it's still possible to have a fire created by other conditions.

Overheating

An appliance or lighting circuit usually has multiple outlets and lighting fixtures controlled by switches. All residential circuits are protected by either 15 or 20 AMP breakers, depending on the thickness of the wire in the circuit. These circuits are safe to be continuously loaded to 80% of their rated capacity.

As long as the total simultaneous load on the circuit (add up the current draw of every device attached to the circuit) does not exceed its rated capacity, the breaker will not trip.

How do I determine the load created by a particular device?

Every electrical device that you plug in to an outlet has a Rating Label with the UL seal from Underwrites Laboratory. This label tells you the require voltage and current load required by the device. The label is usually found on the outside of the device, but in some cases is on the inside, such as appliances like Refrigerators, Freezers, Washing Machines. Electronics such as computers, tv's, stereos, etc., usually have these labels on the outside back or bottom of the device.

The rating may be listed in several formats. The Voltage required is listed first, then the Current load, then the Frequency of the AC supply. The number with the letter **A** after it is the number you are looking for.

115 V ~ 3A 60hz The load here is 3 AMPS
110-240V ~ 1.8A 50-60Hz The load here is 1.8 AMPS

Vacuum cleaners, hair dryers, toasters, microwaves, portable heaters, window air conditioners are all high load devices and typically draw at least 10 AMPS.

If you have old outlets and loose connections *anywhere* along the same circuit from the Panel to a particular outlet, you will have a significant increase in heating of the outlet and the connections along the way under such heavy continuous loads.

This heating can and does cause fires, without actually creating an overload condition that will trip the breaker!

If you have breakers that trip frequently, you have too much stuff on the same circuit, and the circuit must be split. That means you have to run a new circuit from the Panel to supply some of the outlets that were on the old circuit. The only alternative is to not use some of the device at the same time on this circuit.

Problem: You plug in your hair dryer and the breaker trips. At the same time, someone was using the vacuum.

Solution: don't use both of these devices at the same time, or, have a licensed electrician split the circuits to give you more capacity in this part of the house.

Things to check for that are easy

Outlets

1. **If your outlets do not have 3 pins, they are most likely more than 40 years old, are worn out and should be replaced.**
2. Check for outlets that do not hold plugs tightly. It should require some effort to push and pull a plug out of a good outlet. If the plug is loose in the outlet, it can overheat and lead to fire. This is particularly true of vacuum cleaners.
3. Replace any missing or broken wall plates.
4. Make sure there are safety covers on all unused outlets that are accessible to children.

Appliance and Lamp Cords

1. Make sure cords are in good condition—not frayed, cracked or dried out.
2. Make sure they are placed out of traffic areas.
3. Cords should never be nailed or stapled to the wall, baseboard or to another object.
4. Do not place cords under carpets or rugs or rest any furniture on them.
5. Check the rating of the cord. Each cord comes with a label defining the maximum load it can supply.

Extension Cords

1. Check to see that cords are not overloaded. Check the current rating of the cord before you plug in any high load device.
2. Do not use zip cord (flat brown, white or black plastic extension) with vacuum cleaners, hair dryers, toasters, heating plates, laundry irons, portable heaters. You must use an extension rated at 15 AMPs for these devices.
3. Additionally, extension cords should only be used on a temporary basis; they are not intended as permanent household wiring.

4. Make sure extension cords have safety closures to help prevent young children from shock hazards and mouth burn injuries.

Plugs

1. Make sure your plugs fit your outlets.
2. Never remove the ground pin (the third prong) to make a three-prong fit a two-conductor outlet; this could lead to an electrical shock.
3. Don't use 2 pin – 3 pin adapters which defeat the purpose of the ground pin. Have the outlet replaced!
4. **NEVER FORCE A PLUG INTO AN OUTLET IF IT DOESN'T FIT.**
5. Plugs should fit securely into outlets.
6. Do not use inexpensive rubber molded multiple outlet adapters. Always look for the current rating on the adapter.
7. Avoid overloading outlets with too many appliances.

For more information check the following links

Electrical Safety Foundation International Home Electrical Safety Tips

<http://www.nesf.org/hs/isub.php?l0=hs&l1=hest>

Home Safety FAQ

<http://www.nesf.org/hs/isub.php?l0=hs&l1=faq#stats>

US Consumer Product Safety Commission / Electrical Safety

http://www.cpsc.gov/cpscpub/pubs/elec_sfy.html

For teaching Kids about Electrical Safety

A Fun tutorial for kids and parents on Electrical Safety.

<http://www.smud.org/safety/world/index.html>

When they complete all the sections you can print the following certificate!

<http://www.smud.org/safety/world/certificate/index.html>

Things not to do!

<http://www.miamisci.org/af/sln/frankenstein/safety.html>