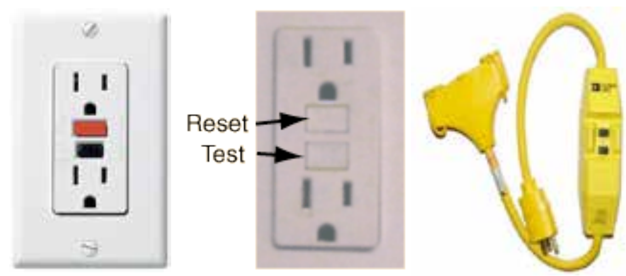
Ground Fault Circuit Interrupters

Fact:
On average, there are 400 electrical-related fatalities each year in the United States.

Effects of Electrical Current on the Body

Current	Reaction
1 milliamp	Just a faint tingle
5 milliamps	Slight shock felt, most people can let go
6-25 milliamps	Painful shock, muscular control is lost, it may not be possible to let go
50-100 milliamps	Extremely painful shock, respiratory arrest (breathing stops), severe muscle contractions, death is possible
1,000-4,300 milliamps	Ventricular fibrillation, muscles contract, death is likely
10,000 milliamps (1-4.3 amp)	Cardiac arrest and severe burns occur, death is likely
15,000 milliamps (10 amps)	This is the LOWEST over-current at which a typical fuse or circuit breaker opens to break the circuit.

Ground fault circuit interrupters (GFCI) have been used for more than 40 years. They were developed to provide protection for users of electrical equipment and have become an integral part of electrical safety. They provide protection over-and-above that of fuses or stand-alone circuit breakers. GFCIs function like a circuit breaker; however, circuit breakers are designed to protect property, while GFCIs are designed to protect people.



The circuits that require GFCI protection are designated by the National Electrical Code (NEC). The NEC typically only applies to new construction/major renovations. The coverage of GFCI protection has gradually increased over the years.

NEC GFCI requirements (and effective dates) are:

- Underwater pool lighting *(since 1968)*
- Receptacles:
  - Outdoor *(since 1973)*
  - Bathrooms *(since 1975)*
  - Garages *(since 1978)*
  - Kitchens *(since 1987)*
  - Crawl spaces and unfinished basements *(since 1990)*
  - Wet bar sinks *(since 1993)*
  - Laundry and utility sinks *(since 2005)*

They're the universally-recommended protection in wiring applications and are generally required anywhere there's a

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potential combination of electricity and wet conditions. Their use in industry and construction is mandated by OSHA.

Often electrical shocks are the result of grounding failures or "ground faults". People can be seriously injured at current flows that are well below the activation point of a circuit breaker.

When you turn on a tool or an electrical appliance, electricity begins to flow through the "hot" wire and returns to its source through a "neutral" wire. Under normal conditions, the current in both wires is the same. But if there's a defect in the wiring of the tool, appliance, or whatever else you're using, current can "leak" from the wires and will try to find the easiest path to a ground. If you're holding the tool or touching the appliance, your body becomes that point of travel. This electrical shortcut is the ground fault, and it can cause serious injury or death. GFCIs can prevent this type of injury by interrupting the flow of current before it reaches a level great enough to cause injury or death.

GFCIs are like a monitor, constantly checking the flow of current in the hot and neutral wires. The GFCI is a fast-acting circuit breaker that senses small imbalances in the circuit caused by current leakage to ground and, in a fraction of a second, shuts off the electricity. The GFCI continually matches the amount of current going to an electrical device against the amount of current returning from the device along the electrical path. Whenever the amount going differs from the amount returning by approximately 5 milliamps, the GFCI interrupts the electric power within as little as 1/40 of a second.

The GFCI won't protect you from line contact hazards (i.e., a person holding two hot wires, a hot and a neutral wire in each hand, or contacting an overhead power line). It does, however, protect against the most common form of electrical shock hazard, the ground-fault. It also protects against fires, overheating, and destruction of wire insulation.

GFCIs must be used with three-prong grounded tools, appliances, and extension cords.

Testing the GFCIs

GFCI's should be tested after installation and once a month thereafter to make sure they're working properly. An easy method to test the GFCI receptacle is to first plug a night light or lamp into the outlet. The light should be on, then, press the "TEST" button on the GFCI. The GFCI's "RESET" button should pop out, and the light should go out.

If the "RESET" button pops out but the light doesn't go out, the GFCI has been improperly wired. If the "RESET" button doesn't pop out, the GFCI is defective and should be replaced. If the GFCI is functioning properly and the lamp goes out, press the "RESET" button to restore power to the outlet.

Find more information at:

http://www.osha.gov/SLTC/etools/construction/electrical_incidents/gfci.html

http://www.cpsc.gov/cpscpub/pubs/099.pdf

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