HOMEOWNER REPAIR GUIDE

ARC FAULT CIRCUIT INTERRUPTERS

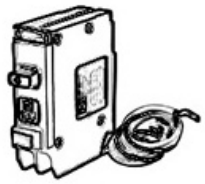
Electrical fires are often caused by loose connections (like worn-out outlets), broken wires, or shorted wires in the distribution system. Arcing at the point of faulty contact may cause sparks that can jump several inches to ignite combustible material. Heat generated by loose contacts can burn wire insulation and ignite combustible materials, as well.

ELECTRICAL FIRES BY THE NUMBERS

Fires cause over $600 million in property damage and 370 lives to be lost annually. More than 40,000 fires a year are due to problems with electrical equipment, such as fixed wiring, plugs and cords, and lamp and light fixtures. Fires can start in any area of a house, but bedrooms are the most common site, followed by living rooms, kitchens, closet/storage areas, garages, bathrooms, laundries, hallways, and dining rooms (in descending order of occurrence).

PROTECTING AGAINST ARC FAULTS

According to a 1994 insurance industry survey, more than one-third of the electrical fires examined were due to arcing conditions. *These arcs may not be sensed by fuses or circuit breakers*, which normally protect against overload and short circuit conditions, because the current fluctuations that occur with arcing may not be high enough to exceed the fuse rating of the breaker and cause it to trip. **Arc Fault Circuit Interrupters (AFCIs)**, on the other hand, are able to detect differences between normal current and intermittent arc current. When a hazardous condition is sensed, the AFCI interrupts the circuit, thus significantly increasing electrical safety.

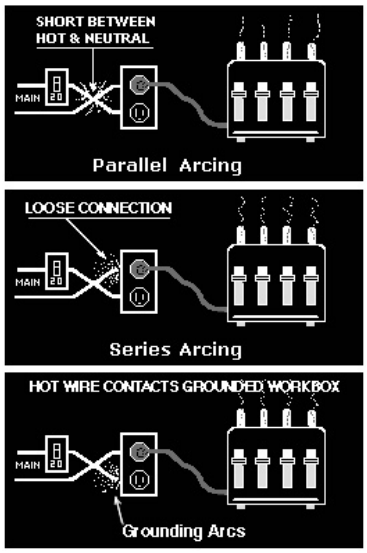


Arc Fault Circuit Interrupter (AFCI)

Arc fault circuit interrupter technology was originally developed to protect areas near downed utility lines. As circuit boards were miniaturized, arc fault protection was applied to residential circuits. AFCIs are now commonly designed to protect 15- and 20-amp circuits in single and multi-family homes. The modern AFCI comes in a compact package that looks like a circuit breaker and will fit in most circuit breaker panels.

AFCIs recognize attributes unique to arcing and shut down the circuit in a fraction of a second when an arc fault is detected. There are three basic types of arc faults that can be detected by AFCIs (see illustration):

TYPE	WHAT IT IS
Parallel arc fault	A short between the line and neutral wires in parallel with the loads in the circuit, commonly caused by damaged or melted insulation on fixed wiring.
Series arc fault	An arc fault in series with the load, usually resulting from loose connections, pierced or severed wires, damaged switches and similar situations.
Grounding arc fault	An unintentional arcing of a “hot” wire to the ground wire; it can occur, for example, when a switch or wall outlet was not installed properly, and connections become loose and make contact with the grounded workbox.



Types of arc faults

ARC FAULT VS. GROUND FAULT

Ground Fault Circuit Interrupters (GFCIs) protect people from shock, by responding more quickly than a normal fuse or circuit breaker *(see separate handout on GFCIs)*. A GFCI interrupts the circuit when it detects a minute current leakage. However, GFCIs don’t protect against all types of arcing. A GFCI can detect “hot” to ground arcs, but cannot detect series, parallel, or line to neutral arcs. Since an AFCI detects these other arcs, it gives more protection to the circuit. While an AFCI does not necessarily replace a GFCI, it will provide enhanced protection from arcing conditions that may cause a fire.

UPDATING YOUR ELECTRICAL SYSTEM WITH AFCIS

AFCIs cannot be added to an existing circuit (although you can install one into an existing service panel), so you will only be installing AFCIs when you are doing new electrical work. The 2002 **National Electric Code** requires AFCIs in all new bedroom circuit work, as the bedroom is the most likely spot for an arc fire to start. In years to come, the AFCI will almost certainly be required in other areas of the home.

Home Repair Resource center

Home Repair Resource Center empowers homeowners to maintain their homes for sustainable and diverse communities.

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