



Office of Compliance Safety and Health FAST FACTS

Ground-Fault Circuit Interrupters

At a young age, we are taught of the potential danger of using an appliance in a wet area such as a kitchen or bathroom. Using an appliance while touching a wet surface may cause the appliance to “ground,” sending dangerous electrical current through the body and leading to possible injury or death. A ground-fault circuit interrupter (GFCI), as seen in Figure 1, is a device that can prevent this type of accident.



Figure 1: Outlet with GFCI protection

CODE

The National Electrical Code (*NFPA 70*) defines a GFCI as a device that “functions to de-energize a circuit or portion thereof within an established period of time when a current to ground exceeds the values established for a Class A device.” A GFCI is installed in electrical outlets to break the circuit when the current exceeds a range of approximately 4-6 mA, shutting down the circuit before the current becomes high enough to cause injury.

“RESET” AND “TEST”

In the 109th Congress Biennial Safety and Health Inspections conducted by the Office of Compliance (OOC), inspectors found 74 cases of an outlet near a sink or other wet area without GFCI protection. Examples of these violations are pictured in Figures 2 and 3. To help prevent the injuries that these types of hazards cause, GFCIs are required in all outlets and receptacles in wet areas. GFCI outlets are recognizable by the red and black “reset” and “test” buttons as shown in Figure 1.



Figure 2: Outlet in a bathroom without necessary GFCI protection.



Figure 3: Outlet near a sink without necessary GFCI protection.

When an electrical appliance malfunctions and too much current is present, the GFCI interrupts the circuit and the red reset button pops out. When this happens, unplug the appliance and press the reset button. If you try to plug in the appliance and the GFCI pops out again, repair the appliance before attempting to use it again. Similarly, to test a GFCI, push the test button. If the red reset button pops out, the GFCI is functioning correctly. Press the reset button to reset the outlet. This type of preventative maintenance should be conducted at least once a year.

CONSTRUCTION SITES

GFCIs are mainly used to protect individuals from malfunctioning electrical appliances, but are also becoming popular on construction sites. Much construction takes place outdoors, as in Figure 4, where conditions may be wet and workers may be using extension cords because no permanent wiring system is in place. GFCIs protect workers from ground-faults when using hand-held electric tools in these types of environments. (29 CFR 1926.404(b)(1)(ii))

KITCHENS, BATHROOMS, AND WET AREAS

Electrical outlets in kitchens and bathrooms are the most common locations for ground-fault circuit interrupters, but they are useful in any wet area where electrical devices are used. Article 647 of the National Electrical Code, published by the National Fire Protection Association (NFPA), describes where GFCIs should be used: All 125-volt single-phase, 15- and 20-ampere receptacles installed in bathrooms, wet areas, and commercial and institutional kitchens shall have ground-fault circuit-interrupter protection for personnel. (NFPA 70 Section 210.8(B))



Figure 4: Wet construction site

SAVING LIVES

Aside from savings millions of dollars in property damage each year, GFCIs also save hundreds of lives. GFCIs are a safe, reliable way to reduce the number of fires and injuries that occur because of employees using electrical devices in wet environments.

FAST STATS

- The U.S. Department of Labor Bureau of Labor Statistics reported that contact with electric current caused 253 workplace deaths and 2,650 injuries in 2004.
- The National Fire Protection Association reported that wiring, switches and outlets caused an annual average of 280 electrical fires and \$11 million in direct office property damage between 1999 and 2002.

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