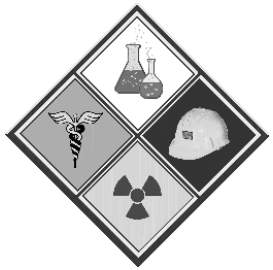
What services does EHS&EM provide for this Program?

- Monitors the overall effectiveness of VT's Electrical Safety Program.
- Provides centralized record keeping for training.
- Provides awareness level and qualified person safety training.
- Conducts electrical inspections.
- Assists with developing work practices.
- Provides project monitoring.

Who may I contact to find out more?

You may contact the Environmental, Health Safety & Emergency Management Office at (434) 395-2940, or on our website at http://www.longwood.edu/safety/index.html.



E N V I R O N M E N T A L
H E A L T H A N D
S A F E T Y S E R V I C E S

Environmental, Health Safety & Emergency Management Office
201 High Street, Iler 106
Farmville, VA 23901

Phone: 434-395-2940
Fax: 434-395-2635
Web: www.longwood.edu/safety/index.html

LONGWOOD UNIVERSITY

Ground Fault Circuit Interrupters

Environmental, Health Safety & Emergency Management

What are the hazards?

Electric shock can occur when you are exposed to energized circuits or parts. Effects of electricity include:

- painful sensation
- muscular contractions
- breathing difficulties
- ventricular fibrillation (rapid, ineffective heartbeat)
- burns at entry and exit points
- internal bleeding and organ damage

The effect depends upon the amount of current and voltage, the amount of resistance your body produces, the path the electricity takes through your body, and the duration of the shock. There can also be indirect effects of electrical shock, for example, an unexpected shock can cause you to fall off of a ladder.

In most cases, proper insulation and effective grounding are used to prevent injury from electrical wiring systems or equipment. However, there are instances when these methods do not provide the degree of protection required.

Here are some examples where ground-fault circuit-interrupters would provide additional protection:

⇒ When using double-insulated hand tools in wet or damp locations where water could possibly enter the tool housing.

⇒ Using double-insulated equipment or equipment with non-metallic housings around sinks or in situations where the equipment could accidentally be dropped into water. The initial human response is to grab for the equipment. If a person's hand is placed in the water and another portion of their body is in contact with a conductive surface, a serious or deadly electric shock can occur.

⇒ Using extension cords with portable equipment. Extension cords used in these situations are regularly exposed to physical damage. Most often the damage is only to the cord insulation, where energized conductors may be exposed, putting you at risk due to frequent handling of the cord.

Ground-fault circuit-interrupter's will also provide protection from electric shock from the following:

⇒ Contact with faulty appliances.

⇒ Ungrounded circuits.

⇒ Ground faults (i.e. short circuits).

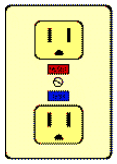
⇒ Automatic startup of electrical systems and/or machinery after a power outage.

* GFCI's do **not** guard against shock resulting from contact with both circuit conductors.

Ground-fault circuit-interrupter's are not overcurrent devices like fuses or circuit breakers. They sense an imbalance in current flow over the normal path. If the current flowing in the hot wire is more than 5 milliamperes of the current flowing in the neutral wire at any given time, the GFCI will quickly open the circuit (in about 1/40 of a second), cutting off the power flow. The GFCI "assumes" the leaking current is flowing in an abnormal path (i.e. ground fault). In other words, it assumes the current is flowing through you.

There are three basic types of GFCI, and although all types will provide ground-fault protection, one type may be more appropriate than another.

- **Circuit-Breaker Type.** These circuit-breakers function as a standard circuit-breaker, with the additional functions of a GFCI. They are direct replacements for standard circuit- breakers of the same rating.
- **Receptacle Type.** One or more receptacle outlets are protected by the GFCI. They are popular due to their low cost.
- **Portable Type.** Portable type GFCI's, or "pigtails", are designed to be easily transported from one location to another, such as use with extension cords and power tools.



There are also two classes of ground-fault circuit-interrupters.

- Class A devices are designed to trip when current flow, in other than the normal path, is 6 milliamperes (the specification is 5 milliamperes +/- 1 milliampere) or greater.
- Class B devices are approved from use on underwater swimming pool lighting installed prior to the adoption of the 1965 National Electric Code.

When should I use a GFCI?

GFCI's are required to be used in the following situations:

- wet or damp locations,
- on construction and renovation projects.

Always plug the GFCI directly into the building wiring, so that everything "downstream" will be protected (i.e. the extension cord, the equipment cord and tool, and you).

What maintenance and care is required?

Due to the complexity of a GFCI, it is necessary to test the device on a regular basis.

- For permanently wired devices, such as GFCI circuit breakers and receptacles, a monthly test is recommended.
- Portable type GFCIs should be tested before each use.

Ground-fault circuit-interrupter's have a built-in test circuit which imposes an artificial ground-fault on the load circuit to assure that the ground-fault protection is still functioning. You should follow the manufacturer's instructions for the type of GFCI you have for testing and resetting.

Whereas circuit-breakers and fuses protect property, ground-fault circuit-interrupters are the only device designed to protect people. As with any safety device, it can only protect you if it's working properly and if you use it!