The Basics of Electricity

What’s at Stake?

Electricity is the movement of electrons between atoms. In their normal state, electrons in a conductor such as copper, freely and randomly move from atom to atom.

To get them to move in the same direction they need a push. The technical term for this push is electromotive force, abbreviated EMF, or sometimes simply E. But you know it more commonly as voltage.

1. ***Voltage*** is the force that causes electrical current to flow.
2. ***Current***, or amperage, refers to the rate electricity is flowing.
3. ***Resistance*** is a material’s tendency to resist the flow of the current.
4. ***Conductivity*** refers to how mobile the electrons can be within a certain material.
    1. Materials with high electron mobility are called **conductors**.
    2. Materials with low electron mobility are called **insulators**.

Conductors	Insulators
Silver	Glass, rubber, oil, asphalt
Copper	Fiberglass, porcelain, ceramic, quartz
Gold	Dry cotton, paper, wood
Aluminum, iron, steel	Plastic, diamond
Dirty Water	Air
Concrete	Pure water

What’s the Danger?

You get an electrical shock when a part of your body completes a path, or circuit, between two conductors or a grounding source. An electrical ground is a connection between a circuit and the earth or some other major conducting body.

The amount of current (amps) that flows through your body, how long the current flows, and where the current flows through your body are what determine how badly you are injured.

But don’t disregard volts. As a general rule, the higher the voltage, the greater the amount of current. Some people can survive shocks of several thousand volts, but others die from as low as 12 volts – car battery levels, because of the amperage present.

How to Protect Yourself

It is likely you’ve heard these before, but electricity continues to maim and kill so a refresher can’t hurt.

- If you use a portable electrically powered hand tool it must be an approved double-insulated type unless you are certain the non-current-carrying part of it is grounded.
    - If your double-insulated tool needs repairs, the manufacturer must do them.
    - Never use a power tool that is wet.
- Check electrical cords regularly for fraying, cracking or exposure of wires.
    - Make sure any electrical equipment you use is in top condition with no damage to plugs, insulation or connections.
    - If you see any defects, take the item out of service and tag it to prevent another person from using it.
    - If you find a three-prong plug that has the third prong broken off, don’t use the tool.
- Damaged tools and cords must be repaired by an authorized person before returning to service or replaced with safe

equipment.

- Don’t do electrical work you’re not qualified to do, even if someone requests it.
    - Not only would you put yourself in danger, incorrect repairs could endanger someone else much later.
    - Electric work isn’t any place to use ingenuity – makeshift repairs kill.
- Report any sign of electrical malfunction. Malfunctions can cause shocks and fires.

Final Word

While we’ve only covered the basics in this talk, there is nothing basic about the dangers of electricity. Know the hazards, respect electricity’s power, and always work safely.