
Electrical Properties

Resistance: size matters

You have probably already learned that metals conduct electricity, but non-metals do not, except for graphite (carbon). That's why electric wiring is made of metal covered with plastic. The insulation stops the wires touching each other. Switches, plugs and sockets are also made of plastic to prevent you getting a shock when you touch them.

All metals conduct electricity, but some conduct less well than others. Or, put another way, some resist the flow of electricity more than others. This is just as well, because it's resistance that makes a wire get hot when electricity flows through it. Sometimes we want it to glow hot – the element in an electric fire, or the filament in a light bulb, for instance. On the other hand, the electrical wiring that carries electricity to the fire and lights must not get hot!

The amount of heat generated depends on the resistance, which varies from metal to metal. The better it conducts, the lower the resistance, and the less heat. Imagine trying to walk through thick snow or mud, or across a sandy beach. It's hard work, takes a lot of energy, and you get hot. Similarly, if a metal has a higher resistance, the electricity has a struggle to get through, and heat is generated.

Resistance also depends on the size and shape. The longer and thinner the piece of metal, the more difficult it is for the electricity to get through – that is, its resistance is higher.

You can use the following procedures to investigate how resistance varies with the type of metal, and with size and shape.

- [SP 0009:2005](#) Method for measuring the resistance of metal wires
- [SP 0010:2005](#) Method for measuring changes in resistance with size