WIRE COLOUR CODING

Improving electrical safety, one wire at time

Electricity powers the world. It lights up, turns on and charges nearly everything we touch, all with the flick of a switch. But behind switch plates and outlets lies a colourful, spaghetti-like network of wires: red, black, yellow, green — each designed to connect, and keep us safe.

Whether you install, repair or upgrade wires, you may have noticed, no two wiring systems are exactly the same. But most do share at least one thing in common: a way to identify each wire. And that way is with colour.

Instead of wondering … Is this wire hot? Neutral? For grounding? A quick look at a wire's colour can reveal its role in powering an appliance or circuit. It's simple. It's safe. And, it's designed to take the guesswork out of electrical work.

6 Benefits of using colour-coded wires

Colour has many benefits, especially when used with electrical wires.

1. COLOUR GRABS OUR ATTENTION

It's no mystery, colour gets our attention. When compared to non-coloured items, it's the coloured ones that command more of our visual attention. For electricians, wire colours indicate how power moves within circuits.

2. COLOUR INCREASES SAFETY

Colour alerts us to danger. In the case of electricity, recognizing a red electrical wire (hot wire) could mean lowering the risk of electrical shocks, burns, electrocution and fires. If a body encounters a high-magnitude electrical surge, it could take years to recover. Prevention, therefore, is key when it comes to electrical safety. And colour can help reduce the overall risks.

3. COLOUR CREATES BETTER MEMORY PERFORMANCE

We remember better when colours are used compared to when they're not. That's because colours play an essential role in keeping information in the memory system. Since electrical wires are coloured, it's easier to understand their purpose within a network.

4. COLOUR REDUCES DOWNTIME

Whether in a commercial, residential or industrial setting, incorrectly identifying wires could lead to accidental outages, causing unexpected downtime for both residents and workers. Coloured wires prevent outages by creating a reliable system of identification.

5. COLOUR CAN CUT COSTS

Repairs are expensive when a wrong wire is cut. Power outages can cause missed transactions and lost sales. Using coloured wires could end up saving businesses money in the long run.

6. COLOUR CAN DECREASE THE RISK OF PROPERTY DAMAGE

Electrical incidences such as overheated wires or fires can cause significant property damage. Using coloured wires can lower this risk by ensuring circuits are connected properly.

Electrical Wiring Colour Codes

The wire colour coding guidance provided below applies to electrical wiring in the United States. Though there may be exceptions (e.g., old wiring, regional differences, the wrong colour wire was installed), this section can be used as a general overview for electrical wire colour codes.

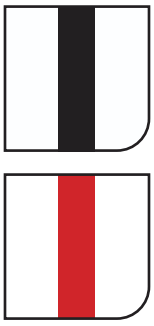
In addition to identifying a wire by its colour, always check to see that wires are de-energized. Of major concern are hot wires, which carry live electrical current from the electrical panel to outlets and light fixtures.

BLACK WIRES

Indicate a hot wire, one that carries electricity. You will need to shut off the circuit breaker before working with these wires. They go from a power source (breaker panel) to electrical outlets and switches, and connect wall switches to fans, lights, appliances and machinery.

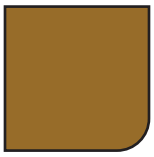
RED WIRES

Indicate a secondary hot wire, one that carries electricity. You will need to shut off the circuit breaker before working with these wires. They can be used to interconnect smoke detectors, power wall switches for ceiling fan lights, and to power outlets for a 240-volt appliance like an air conditioner, electric water heater, stove or dryer.



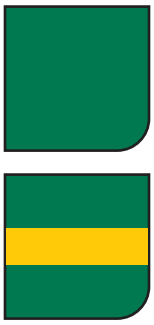
WHITE WIRES WITH BLACK OR RED TAPE

Indicate a hot wire, one that carries electricity. You will need to shut off the circuit breaker before working with these wires. When you see a modified white wire (with black or red tape wrapped around it), it signals the wire is hot, not neutral. You may see these in 240-volt outlets replacing the red wire as the second live wire.



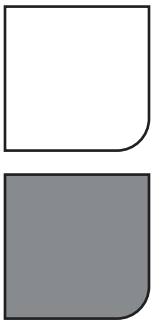
COPPER WIRES

Indicate a ground wire. These wires provide a path for an electrical current if a device shorts out or trips a breaker. These bare wires connect to outlets, switches and metal appliance frames and pass the current to the ground.



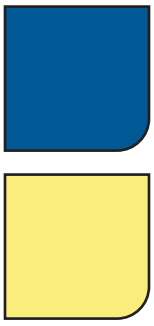
GREEN WIRES OR GREEN WITH A YELLOW STRIPE WIRES

Indicate a ground wire. These wires reduce electrical overload (which could cause fires) by redirecting excessive electricity. They ground the electrical circuit by connecting to a grounding terminal in an outlet box and connecting to a metallic strip (busbar) in an electrical panel.



WHITE WIRES OR GRAY WIRES

Indicate a neutral wire. These wires carry electricity back to the breaker box. They essentially return power from a hot wire back to a grounded portion of an electrical panel to complete the circuit.



BLUE WIRES AND YELLOW WIRES

Indicate a hot wire. These are usually found in a conduit for plug-in electrical devices. Known as travellers, blue and yellow wires allow operation of an appliance or lights from multiple locations.

3-Phase Wire Colour Codes

Whether adding a home appliance or industrial machinery, you'll need to know these electrical wiring colour codes. In the U.S., these colour-coded wires carry power from a circuit breaker to a device.

AC POWER

Alternating current (AC) is the power that comes out of outlets in homes and businesses.

Homes and offices: 120, 208 or 240 Volts

- **Phase 1 —** Black wire
- **Phase 2 —** Red wire
- **Phase 3 —** Blue wire
- **Neutral —** White wire
- **Ground —** Green, green with a yellow stripe, or bare wire

Industrial equipment: 277 or 480 Volts

- **Phase 1 —** Brown wire
- **Phase 2 —** Orange wire
- **Phase 3 —** Yellow wire
- **Neutral —** Gray wire
- **Ground —** Green, green with a yellow stripe, or bare wire

When powering higher-voltage devices, be sure you are labelling wires and cables accurately and add safety signs, where needed. This identification can be used during a lockout tagout, should the equipment need to be de-energized.

DC POWER

Direct current (DC) is used in cell phones, flashlights, cars and solar panels. It can also be used for industrial processes and to transmit large amounts of power from remote locations.

- **Positive —** Red wire
- **Negative —** Black wire
- **Ground —** White or gray wire