Electrical Safety for Construction: The Basics

5-Minute Talk

Overview of topic

To handle electricity safely and to communicate hazards and how to avoid them you need to understand how electricity works, how it can be directed, the hazards it presents, and how those hazards can be controlled.

How does electricity work?

When someone turns on a circular saw or throws a circuit breaker, they allow current to flow from the generating source (battery, portable generator, or electric utility), through conductors (wiring), to the area of demand or load (equipment or lighting). A complete circuit is necessary for the flow of electricity through conductor. Interrupting that circuit through a break in a con-ductor or load, i.e., a burned-out filament in a light bulb, will not allow current to flow. Opening a circuit breaker is interrupting the circuit.

Volts = Current X Resistance (or V=IR)

Volts = Current X Resistance is an equation known as Ohm's Law. The equation shows the relationship between three factors: volts, current, and resistance. This relationship makes it possible to change the qualities of an electrical current but keep an equivalent amount of power.

A force or pressure must be present before water will flow through a pipeline. Similarly, electrons flow through a conductor because an electromotive force (EMF) is exerted. The unit of measure for EMF is the volt. For electrons to move in a particular direction, a potential difference must exist between two points of the EMF source. The continuous movement of elec-trons past a given point is known as current. It is measured in amperes.

The movement of electrons along a conductor meets with some opposition. This opposition is known as resistance. Resistance to the flow of electricity is measured in Ohms. The resistance is determined by three factors: the nature, length and cross-sectional area (size), and the temperature of the substance. The amount of resistance provided by different materials varies widely.

Some substances, such as metals, offer very little resistance to the flow of electric current and are called conductors. Other substances, such as Bakelite, porcelain, pottery, and dry wood, offer such a high resistance that they can be used to prevent the flow of electric current and are called insulators.

These “basics” of electricity are important for employees to know so they know what to do when things go wrong. When insulation on a conductor breaks down; when an end terminal or splice breaks; or when a screw comes loose and leaves a wire dangling; injury and death can strike. If electrical conductors become exposed, there is a danger of shocks, burns, or fire. When a cord connector is wet, hazardous leakage can occur to the equipment grounding conductor. If a worker picks up that connector he could provide a path to ground, which could be fatal.

Remember—electricity travels in closed circuits, and its normal route is through a conductor. Shock occurs when the body becomes a part of the electric circuit. The severity of the shock received is affected by three primary factors: the amount of current, the path of the current, and the length of time the body is in the circuit.

Employee training

No specific training requirements are mentioned in the electrical standard. However, you must always, “instruct each employee in the recognition and avoidance of unsafe conditions and the regulations applicable to his work environment to control or eliminate any hazards or other exposure to illness
or injury.”

Training tips

In your overview of electrical safety basics, you may want to review the above-mentioned basic information on electricity.

Where to go for more information

Regulatory text: 29 CFR 1926.400-.449

National Electrical Code, National Fire Protection Association

Regulatory text 29 CFR 1926.21(b)(2)—Safety training and education, employer responsibility