Glossary

Electrical Foundations Course Glossary

This glossary provides key terms and definitions used throughout the TC3 Electrical Foundations course across all seven modules. It is designed to support learners in understanding essential concepts and reinforce consistent terminology.

- **Affected Employee** - A person who operates equipment that is being serviced under lockout/tagout or works in an area where that equipment is being serviced.
- **Alternating Current (AC)** - Electric current that periodically changes direction, creating a repeating waveform. It is commonly used to deliver electrical power over long distances and power large equipment.
- **Ampere (A) / Amps (Amperes)** - The unit used to measure current. It indicates how much electric charge is flowing through a circuit.
- **Arc Flash Boundary** - The distance from energized equipment where arc flash burns may occur; anyone crossing this boundary must wear appropriate arc-rated PPE.
- **Arc Rating** - A measurement of how much thermal energy protective clothing can withstand during an arc flash event, typically expressed in calories per square centimeter (cal/cm²).
- **Arcing (Electrical Arcing)** - The flow of electricity through the air between conductors or from a conductor to another surface. Arcing can produce an arc flash.
- **Arc Flash –** An intense burst of heat, light, and pressure that can cause severe burns or injuries.
- **Atoms** - The tiny building blocks of matter that make up everything around us. All materials, including wires and electrical components, are made of atoms.
- **Authorized Employee** - A person who locks out or tags out equipment to perform servicing or maintenance.
- **Block Diagram** - A diagram that uses blocks and lines to show the main parts of a system and their relationships.
- **Capacitor** - A device that stores energy in an electric field.

- **Circuit** - A complete, unbroken loop that allows electrons to flow from a power source, through components, and back to the source.

- **Circuit Breaker** - A protective device that interrupts current when it exceeds safe levels and can be reset after the fault is cleared.

- **Circuit Protection** - Safeguards built into an electrical system to detect and prevent faults.

- **Clamp Ammeter** - An electrical tool that measures current by clamping around a single conductor without disconnecting the circuit.

- **Conductor** - A material that allows electrons to move easily. Copper and aluminum are common conductors used in wiring and electrical systems.

- **Converter** - A device that changes electrical power from one form to another, such as AC to DC, DC to AC, or DC to DC.

- **Current** - The flow of electric charge through a conductor. It describes how many electrons are moving through a circuit at a given time.

- **Current Electricity** - The continuous movement of electrons through a conductor along a complete circuit. This is the type of electricity used to power everyday devices.

- **Diode** - A semiconductor device that allows current to flow in one direction and blocks it in the opposite direction. When the diode is forward biase, current flows normally. When it is reverse biased, the diode blocks current to protect and control how electricity moves.

- **Direct Current (DC)** - Electric current that flows in one direction. It is commonly used in batteries, electronics, and systems that require stable power.

- **Electric Field** - An invisible region around a charged object where other charges experience a force. Electric fields are what actually push charges through a conductor. In electromagnetic induction, a changing magnetic field creates an electric field, and that electric field causes current to flow.

- **Electric Grid** - A large, interconnected system that delivers electricity from power plants to homes, businesses, and transit systems.

- **Electric Shock** - An injury that occurs when a person contacts energized electrical parts and becomes part of an electrical circuit, allowing current to pass through the body. Electric shock can cause burns, nerve damage, muscle contractions, or other internal injuries, even when there are no visible signs of damage.

- **Electrical Circuit** - A complete, unbroken loop of conductive material that allows electrons to flow continuously.

- **Electrical Tools** - Tools used to create connections that are mechanically secure, electrically reliable, and protected from damage.

- **Electricity** - The movement of electrons through a complete path. It occurs when a power source pushes electrons to move.

- **Electromagnetism** - The interaction between electricity and magnetism, where electric current creates a magnetic field and that field can produce force or motion.

- **Electromagnets** - Magnets created when electric current flows through a coil of wire. The magnetic field only exists while current is flowing, which allows it to be turned on and off.

- **Electrocution** - Death caused by exposure to electrical energy. Electrocution occurs when a person becomes part of an active electrical circuit and enough current flows through the body to stop the heart, disrupt the nervous system, or cause fatal internal injuries.

- **Electrons** - Small, negatively charged particles that move around the outside of an atom's nucleus. Electrons are the only particles in an atom that can move from one atom to another, and their movement through a circuit is what we call electricity.

- **Equipment Nameplates** - Labels that provide key information about how equipment is designed to operate, including voltage, current, frequency, and phase.

- **Faraday's Law of Induction** - A principle stating that a changing magnetic field near a conductor induces voltage. Greater changes in magnetic flux produce higher induced voltage.

- **Fixed Resistor** - A resistor with a set or constant resistance value that does not change during normal operation. It provides a consistent and predictable amount of resistance to control current.

- **Frequency** - The number of times AC completes a full cycle in one second, measured in Hertz (Hz). It determines how fast the current changes direction.

- **Fuse** - A one-time safety device that breaks the circuit when current exceeds a safe level, protecting equipment.

- **Grounding** - The process of connecting an electrical system to the earth to provide a low-resistance path for fault current. This allows electricity to flow safely to the ground.

- **Hierarchy of Controls** - A safety framework that prioritizes hazard control methods from most effective to least effective: elimination, substitution, engineering controls, administrative controls, and personal protective equipment (PPE).

- **High Voltage** - Electrical systems operating above 1,000 volts (1 kV). These systems present serious hazards such as electric shock, burns, arc flash, and electrocution.

- **Inductor** - A device that stores energy in a magnetic field.

- **Insulation** - A protective material that covers electrical conductors and keeps electricity on its intended path. If insulation is damaged or missing, electricity may travel through unintended paths, such as a person's body.

- **Insulator** - A material that resists the flow of electrons and keeps electricity confined to a conductor. Rubber, plastic, and glass are common insulators.

- **Intermediate Voltage** - Electrical systems operating above 50 volts and below 1,000 volts (AC or DC). These systems present a significant shock hazard and require proper PPE and safety procedures.

- **Inverter** - A device that converts direct current (DC) into alternating current (AC).

- **Kirchhoff's Current Law (KCL)** - States that the current going into a node (or junction) is equal to the current coming out. In other words, the current flowing into the circuit is equal to the current flowing out of the circuit.

- **Kirchhoff's Voltage Law (KVL)** - States that the sum of all voltages around a closed loop is equal to zero.

- **Limited Approach Boundary** - The minimum distance an unqualified person can approach energized equipment without supervision, unless escorted by a qualified worker and additional precautions are taken.

- **Load** - Any component within a circuit that uses electricity to perform work.

- **Lockout/Tagout (LOTO)** - A safety procedure used to isolate hazardous electrical energy during maintenance or servicing by locking and tagging equipment to prevent it from being energized. It involves placing a **lockout device** to physically prevent the equipment from being energized and a **tagout device** to warn others that the equipment must not be operated until maintenance is complete.

- **Low Voltage** - Electrical systems operating at 50 volts or less (AC or DC). Even at these levels, electricity can still cause injury under certain conditions.

- **Magnetic Field** - An invisible area of influence around a magnet or a current-carrying wire. A magnetic field applies force to magnetic materials like iron or steel and is strongest near the magnetic poles.

- **Magnetic Flux** - A measure of how much magnetic field passes through a surface, such as a loop of wire. Magnetic flux depends on the strength of the magnetic field, the area of the loop, and the angle between them. A change in magnetic flux is required to induce voltage.

- **Magnetic Poles** - The two ends of a magnet, called north and south. Opposite poles attract each other, and like poles repel.

- **Magnetism** - A fundamental force of nature that causes certain materials to attract or repel each other. Magnetism occurs because of the motion of electric charges, especially moving electrons.

- **Megohmmeter (Megger)** - An electrical test instrument that applies high DC voltage to measure insulation resistance.

- **Multimeter** - An electrical tool that confirms circuit conditions by measuring voltage, resistance, and current.

- **NFPA 70E** - A widely used electrical safety standard that provides guidelines for protecting workers from electrical hazards such as shock and arc flash.

- **Neutrons** - Particles inside the nucleus of an atom that have no electrical charge. They add mass but do not affect electrical behavior.

- **Nucleus** - The dense center of an atom that contains protons and neutrons and remains fixed in place.

- **Ohm (Ω)** - The unit used to measure resistance. Higher ohms indicate greater opposition to current flow.

- **Ohm's Law** - The relationship between voltage, current, and resistance in a circuit. It explains how changes in one value affect the others.

- **One-Line Diagram** - A simplified diagram that uses single lines and symbols to represent system components and connections.

- **OSHA 29 CFR 1910.333** – Selection and Use of Work Practices - An OSHA standard that requires workers to follow safe work practices when working on or near electrical equipment.

- **OSHA 29 CFR 1910.335** – Safeguards for Personnel Protection - An OSHA standard that requires workers exposed to electrical hazards to use appropriate personal protective equipment (PPE) and protective tools.

- **Parallel Circuit** - An electrical circuit that has multiple paths for current to flow. Components are connected across the same voltage source in separate branches.

- **Permanent Magnets** - Magnets made from materials such as iron, cobalt, or nickel that produce a constant magnetic field without needing electricity.

- **Phase** - Phase refers to the timing and relationship of electrical waveforms in an AC system. It is used to describe how power is distributed across circuits, especially in multi-phase systems.

- **Power Conversion** - The process of changing electricity from one form to another so it can be used by different types of equipment. Examples include converting AC to DC or adjusting voltage levels.

- **Power Rating** - The maximum amount of electrical power, measured in watts (W), that a component can safely handle.

- **Power Source** - The component that generates electrical energy and pushes it through a circuit.

- **Primary Electrical Risks** - Hazards caused directly by electrical energy, such as electric shock, electrocution, burns, arc flash, or arc blast.

- **Protons** - Positively charged particles located inside the nucleus of an atom. They help determine the atom's identity and overall charge.

- **Rectifier** - A device that converts alternating current (AC) into direct current (DC).

- **Relay** - An electromechanical switch operated by an electromagnet, which can allow low-power circuits to control high-power circuits.

- **Resistance (R)** - The opposition to the flow of electrical current in a circuit, measured in ohms (Ω). Electricity always seeks the path of least resistance back to the source.

- **Resistor** - A passive electrical component with two terminals that limits and controls current by providing resistance and converting electrical energy into heat.

- **Restricted Approach Boundary** - A shock protection zone closer to energized parts that only qualified workers may enter using proper PPE and insulated tools.

- **Secondary Electrical Risks** - Injuries that occur as a result of an electrical incident but are not caused directly by electrical energy, such as falls, cuts, or injuries from fires or explosions.

- **Schematic** - A diagram of a system that uses standard symbols to show connections between components.

- **Sensor** - A device that detects changes in conditions such as motion, temperature, pressure, light, or electrical fields and converts that change into a usable electrical signal.

- **Series Circuit** - An electrical circuit that has only one path for current to travel, so the same current flows through each component.

- **Series-Parallel Circuit** - An electrical circuit that contains a combination of both series and parallel connections.

- **Shrink Tubing** - A material that shrinks when heated to insulate and protect electrical connections.

- **Single-Phase Power** - Single-phase power uses one alternating waveform and is commonly used in smaller electrical loads such as lighting, household appliances, and light-duty equipment.

- **Static Electricity** - A buildup of electric charge on the surface of an object that remains in place until it is suddenly released.

- **Switch** - A device that completes or breaks a circuit by allowing or preventing the flow of electrical current.

- **Test Light** - An electrical tool that checks for the presence of voltage with a simple yes/no indication.

- **Three-Phase Power** - Three-phase power uses three alternating waveforms spaced apart in time to deliver consistent and efficient power. It is commonly used in large motors and heavy equipment.

- **Tolerance** - The allowable variation between a component's actual value and its labeled value, typically expressed as a percentage (e.g., ±5%).

- **Transformer** - An electrical device that that increases or decreases AC voltage levels without changing the type of current. Transformers are commonly used in power distribution systems.

- **Transistor** - A semiconductor device used to amplify or switch electronic signals.

- **Variable Resistor** - A resistor with multiple terminals which allow for the resistance to be adjusted in the electrical circuit. They are used to fine-tune circuit behavior.

- **Voltage** - The force that pushes electrons through a circuit. It provides the energy needed for current to flow.

- **Volts (V)** - The unit used to measure voltage. Higher voltage means a stronger push on electrical current.

- **Watts (W)** - The unit used to measure electrical power. It represents how much electrical energy is used or produced in a circuit.

- **Wire** - A flexible cable that serves as the pathway to carry electrical current and allows flow between components in a circuit.
    - **Wire Connector** - A device used to join wires together.
    - **Wire Diameter** - The cross-sectional width (thickness) of a wire, typically measured in inches or millimeters.
    - **Wire Gauge** - The size of a wire's diameter which determines how much current a wire can safely handle.
    - **Wire Length** - The distance of wire from one end to the other.
    - **Wire Terminal** - A device used to attach a wire to equipment or a connection point

- **Wire Crimper** - An electrical tool that compresses a connector or terminal onto a wire to create a secure connection.

- **Wire Cutter** - *An electrical tool that cuts electrical wire cleanly.*

- **Wire Stripper** - An electrical tool that removes insulation from a wire without damaging the conductor.