

9. Glossary

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Active suppression: The use of an electrical device that senses neutral-to reference-ground voltage and produces a voltage to null or cancel the unwanted voltage.

Alternating current (ac): Electric current that changes direction with time. Often a sinusoidal variation, as generated by electric power suppliers.

AWG: American wire gauge.

Behavioral change: Changes in behavior that can be associated with novel or objectionable stimuli or events. Changes range from mild or moderate (e.g., flinching or becoming vocal) to distinct (e.g., raising a leg or kicking).

Bonding: Low-electrical-resistance connection of two conductive materials.

Capacitance: Measure of the charge-storing property resulting when two conductive materials are separated by a nonconductive material.

Capacitive discharge: Current flow resulting from the discharge of an electric potential across a capacitor.

Capacitive reactance (X_C): The electrical impedance (in ohms) at a particular frequency resulting from a capacitor.

Catecholamines: A class of structurally similar hormones. *See* Epinephrine, Norepinephrine, Hormone.

Circuit: An electrical pathway, consisting of conductors, loads, and source, through which electric current flows.

Conductive: Material that will conduct an electric current.

Contact impedance: Electric circuit impedance at the area of contact, such as between an animal's hoof and the floor.

Current (I): The flow of electrons through a pathway, due to a difference in electric potential (voltage).

Delta connected transformers: Three-phase transformer system with three transformer windings connected end to end and three line conductors connected to the three junctions between transformers.

Direct current (dc): Electric current that flows only in one direction. Most commonly the magnitude of the current does not vary with time, as when a battery is connected to a circuit.

Distribution neutral: The grounded load-carrying conductor on the power supplier side of the distribution transformer.

Distribution transformer: The transformer that is located at the point of customer use of electrical energy and that reduces the voltage from distribution levels to use levels.

Endocrine hormones: Hormones released from ductless glands. *See* Hormone.

Epinephrine: Hormone released into the blood by the adrenal medulla. Increased epinephrine can inhibit milk removal. Also known as adrenaline.

Equipotential plane: A surface with zero or near-zero electric potential (voltage) between all points on the surface.

Exocrine hormones: Hormones released from glands that have ducts. *See* Hormone.

Fault: A pathway for current to flow outside the normal circuit pathway.

Fault current: The current flow through an electric fault.

Gradient control: The installation and electrical bonding of materials to limit voltage between contact surfaces to acceptable levels.

Grounded: Connected to earth or to a conducting body that connects to earth.

Grounded conductor: A conductor that carries current during normal circuit operation and that is connected to earth through the grounding electrode system. Identified by white, gray, or neutral color. The neutral conductor is usually a grounded conductor.

Grounding conductor, equipment: The conductor that connects non-current-carrying metallic parts of the wiring system and electrically powered equipment to the grounding electrode conductor at the service equipment. Bare, green, or green with yellow stripe.

Grounding electrode conductor: Conductor that connects the grounded conductors and/or equipment grounding conductors to the grounding electrode system at the service equipment.

Grounding electrode system: Metal-underground water pipes, concrete-encased conductors, ground rods, etc., that provide low-resistance electrical contact to the earth as specified by the National Electrical Code, article 250-H.

Half-wave rectified sinusoid: The direct current obtained when only the positive half or negative half of a sinusoidal waveform is present.

Herringbone parlor: Milking parlor designed so that cows stand facing away at approximately a 45-degree angle from the area of the milking machine operator.

Hertz (Hz): A unit of frequency. One hertz equals one cycle per second.

Hormone: A chemical substance formed in one organ or part of the body and transported, usually in the blood, to another organ or part of the body. Depending on specific effects, hormones can alter the structure and/or function of one or many organs or body parts.

Hot conductor: An ungrounded conductor.

Impedance (Z): Combination of electrical resistance, inductance, and capacitance that impedes the flow of current in an electrical pathway.

Induced voltage: Voltage resulting from a current that is induced in a conductor by a changing magnetic field about the conductor.

Inductance: The electrical property of a conductor due to its length or when it is coiled as in a transformer winding or motor winding.

Inductive reactance (X_L): The electrical impedance (in ohms) at a particular frequency resulting from an inductor.

Isolated transformer: A transformer used to separate the grounded primary side from the grounded secondary side, enabling the establishment of an isolated grounded-neutral system for a farmstead.

Isolation: Separation of all or part of a farmstead's grounded conductors from the grounded conductor of the distribution systems.

Joule (J): Unit of energy.

Line-to-line voltage: The electric potential between two ungrounded electrical conductors.

Line-to-neutral voltage: The electric potential between an ungrounded conductor and a grounded neutral conductor.

Mastitis: Inflammation of the mammary gland. Inflammation can be caused by injury and/or infection.

National Electrical Code (NEC): Publication of the National Fire Protection Association, Quincy, MA (NFPA 70). Contains provisions necessary for safety in the installation of electrical conductors and equipment within and on public and private buildings and property, including agricultural buildings.

National Electrical Safety Code (NEC): A publication of the American National Standards Institute, New York, NY (ANSI C2). Covers electrical utility facilities and functions from the point of generation to the point of delivery to the customers' facilities.

Neutral (N): The common (shared) conductor in a wiring system. For example, the conductors connected to the transformer center tap in a dual-voltage, single-phase wiring system or the conductors from the common point (center) of a three-phase, wye-connected transformer system.

Neutral-to-earth voltage: The actual voltage between a grounded conductor of an electrical wiring system and earth. *See also* Neutral-to-reference-ground voltage.

Neutral-to-reference-ground voltage: The voltage measured between a grounded conductor of an electrical wiring system and a remote ground rod. A measure of the neutral-to-earth voltage.

Norepinephrine: Hormone released by the adrenal medulla and by some nerve endings. Also known as noradrenaline.

Open Delta connected transformers: Three-phase transformer system in which two transformers windings are connected in series. The three-phase conductors are separately connected to the two ends and to the midpoint junction between the transformers windings.

Overcurrent device: Fuse or circuit breaker designed to open the ungrounded circuit conductors when an overload or short circuit condition exists.

Oxytocin: Hormone released by the pituitary in responses to teat stimulation. Some oxytocin is necessary for normal milk removal. *See* Hormone.

Parallel: Connection of electrical loads or circuit elements between two conductors so that the same voltage is across each load.

Perception: An awareness of. It is impossible to determine when animals first become aware of an object or event; therefore, visible signs of perception are measured by looking at changes in behavior, e.g., leg lifting, or training animals to perform a specific task, such as pressing a lever, in response to stimulus.

Physiological effects: Measurable changes in the normal body functions of an animal. Measured variables commonly include levels of hormones in blood, heart rate, and other indices of normal functioning.

Primary: In reference to the complete electric system, the electrical wiring on the electric-power-supplier's side of the distribution transformer. In reference to a transformer, the input or source side of the transformer.

Primary neutral conductor: The grounded neutral conductor on the power supplier side of the distribution transformer.

Resistance (R): The properties of a material that impedes the flow of current in an electric circuit. For a more technical definition, see "IEEE Standard Dictionary of Electrical and Electronics Terms," John Wiley & Sons, Inc., New York.

Root mean square (rms): The square root of the average of the square of the value of the function taken throughout one complete cycle of the function. A measure of the effective magnitude of a function, e.g., the effective magnitude of a voltage.

Secondary: In reference to the complete electric system, the electrical wiring on the customer side of the distribution transformer. In reference to a transformer, the output or load side of the transformer.

Secondary neutral conductor: The grounded neutral conductor on the customer side of the distribution transformer.

- Series:** Connection of electrical loads or circuit elements end to end so that only one path exists for electric current.
- Service drop:** Overhead conductors between the distribution transformer and the building served.
- Service:** The electrical conductors and equipment that carry electrical energy from the distribution transformer to the wiring system of facility served. Includes service drop or lateral, service entrance conductors, and service equipment.
- Service entrance conductors:** Conductors between the service drop or service lateral conductors and the service entrance equipment.
- Service equipment:** Disconnecting means, over-current protection and associated equipment for the control and cutoff of the electrical supply to a facility.
- Service lateral:** Underground conductors between the distribution transformer and the building served.
- Single-phase:** Electrical system with a single sinusoidal-voltage source.
- Sinusoidal:** The waveform of the alternating voltage and current supplied by electric power suppliers.
- Somatic cell count:** The concentration of somatic cells in milk. Somatic cell counts increase with disease of the mammary gland. Increases are primarily due to an increase in neutrophils, a type of white blood cell. An elevated somatic cell count is often used as an indicator of subclinical mastitis.
- Step potential:** The voltage between hooves as an animal stands or moves on a surface.
- Stray current:** The electric current that flows through an animal when it makes simultaneous contact with two surfaces that are at different electric potentials.
- Stray voltage:** A difference in voltage measured between two surfaces that may be contacted simultaneously by an animal.
- Three-phase:** Electrical system of three sinusoidal voltages spaced one-third cycle between each phase voltage.
- Tingle voltage filter:** A device installed at the distribution transformer or at the service equipment to limit the current flow between the grounded and grounding conductors.
- Transient:** A voltage or current impulse of short duration.
- Transition ramp:** An area of gradual change in voltage; used to reduce step potential as an animal moves between areas that are at different voltages.
- Ungrounded conductor:** Electrical conductor that is not connected to earth (grounded); sometimes referred to as a "hot conductor."
- Voltage (E or V):** A difference in electric potential between two points. *Unless otherwise indicated, voltages referred to in this handbook are assumed to be 60-Hz alternating sinusoidal voltages and are reported as root mean square values.*
- Voltage drop:** The difference in electric potential (voltage) between two points in a circuit. For example, the voltage difference between the supply end and load end of a conductor is the voltage drop in the conductor.
- Wye connected transformers:** Three-phase transformer system in which three transformer windings are connected at a common point (usually grounded) and a line conductor is connected to the other end of each transformer winding.