Understanding Electrical Terms

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Powerlite
Power for Australians since '66
Understanding Electrical Terms

In today's computer-intensive work environments, a critical issue is clean, reliable power. Powerlite is the industry leader in diesel generator power solutions. The ability to handle any power requirement is an important component in Powerlite’s mission to completely satisfy customers’ needs.

This booklet is designed to help you become familiar with electrical terms commonly used in the contract furniture industry. You’ll find descriptions of specific Powerlite electrical products as well. Having a working knowledge of these terms and descriptions will help you understand Powerlite's furniture-based power capabilities. Remember, Powerlite field sales engineers are also always ready and available to answer specific customer inquiries. Use this booklet to become conversant in the language of power, and as a companion to the other Powerlite booklets on electrical topics.
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NOTE: Within each description, italicized type is used to denote terms that are described elsewhere in this booklet.
Industry-Common Electrical Terms

Access Flooring
A flooring system in which modular panels are raised above the floor slab, typically on 75 to 300mm high supports. Electrical conduit and data cabling are routed beneath the flooring panels and connected to floor monuments (raised or flush). This type of flooring system can provide efficient access to wires and cables and can in some instances simplify reconfiguration.

Ampacity
Ampacity refers to the maximum current, in amperes, that a conductor can carry three hours or more without exceeding the temperature rating of the electrical insulation.

Amperage, Ampere, Amp
Amperage is the volume (or quantity) of electrical current flowing through a circuit. This volume is measured in amperes, otherwise referred to as amps. The amount of amps required by an electrical device to operate is usually listed on the equipment’s electrical nameplate.

Balancing, Load Balancing
A planning practice in which the total amperage requirements of the electrical equipment in a shared-neutral installation is distributed equally among the number of available electrical circuits servicing the installation. For shared-neutral three-phase circuits, this refers to matching the current of circuits 1, 2, and 3 with respect to each other.

Load Balancing in a Shared-Neutral Office Installation

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**Ballast**
A device in fluorescent lamps that regulates the level (amps) of electrical current and voltage flowing through the fluorescent lamp tube. Ballasts may be magnetic or electronic, with electronic being slightly more energy efficient.

**Branch Circuit**
A single circuit carrying electrical current (usually limited to 10 amps) to office furniture and equipment. It consists of conductors (wires) connected between the building’s electrical service panel (circuit breakers) and the electrical outlets (power receptacles).

**Circuit**
A complete path for electrical current flowing from the building power source to the equipment being powered and back to the power source. The “hot” conductor of a circuit carries 240-volt power to the equipment; the “neutral” conductor carries it back to the source. The “ground” conductor provides a safe escape route for power in the event of short circuits or other problems. Circuits are rated according to the number of amps they can accommodate. The total number of amps required by all of the equipment in a furniture installation will dictate the number of circuits required.

**Circuit Breaker(s)**
A safety device designed to automatically stop the flow of electricity whenever a circuit becomes overloaded, i.e. exceeds the number of amps that the wiring can accommodate. Branch circuits usually have 10-amp breakers. The maximum continuous load on a circuit breaker is permitted to be 80% (8 amps) of the rating, which prevents unnecessary power interruptions caused by operation too close to 100% capacity.
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Clean Power
Power which has a smooth waveform with no spikes, notches or other irregularities; clean power also has a voltage within a range 10% above or below the standard 240 volts. Computers and peripheral equipment operate most reliably with clean power, which is free from electrical noise (spikes, drop-outs, surges, sags, etc.) and voltage variations generated by operating equipment. Dedicated circuits and/or an isolated ground are often specified in order to obtain clean power for sensitive electronic equipment. (See Dirty Power.)

Codes, Local Electrical Codes
Various government bodies have adopted minimum safety standards, or “codes,” for the electrical wiring of furniture installations. The Australian/ NZ standards are the most widely recognized code, and it applies to most installations. Some municipalities, e.g. Sydney, Melbourne, etc., have their own codes. Since local codes are often more restrictive than the AS/NZ, it’s always important to check their requirements as well.

Common Ground
An electrical circuit that uses a variety of conductors for a ground path. Ground conductors include wire, conduit, the metal of a building, or water pipes. Because so much of a building’s structure is grounded this way, a common ground is often electrically “noisy.” Therefore, an isolated ground is more suitable for computers.

Conductor
In branch circuits and in furniture-based power systems, the conductor is more than just wire. It includes the electrical conductors (power infeed, flexible power connectors, etc.), circuit breaker, and wire nuts. All elements in a conductor should be UL tested, listed, and labeled for safety.
**Conduit**
Metal or non-metallic tubing — available in either rigid or flexible varieties — used to route and protect electrical wires and communication cables.

**Connector, Terminal**
Devices used to terminate or join two conductors. Connectors must be tested and labeled for safety. The amp rating of a power system is dictated by its connector or terminal ampacity, not the gauge of conductors within the system.

**Continuous Load**
See Maximum Continuous Load.

**Dedicated Circuit**
A circuit with three conductors — consisting of hot, neutral, and ground — between the circuit breaker protecting the branch circuit and the outlet that is dedicated only for use with specific equipment. (Dedicated circuits are sometimes incorrectly referred to as isolated circuits.)

**Designated Branch Circuit**
A branch circuit with three conductors — consisting of hot, neutral, and ground — that is designated by the user for use with specific equipment. Either the neutral and ground, or both, may be shared with another branch circuit.
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Dirty Power
Unlike clean power, dirty power flows outside a range 10% above or below the standard 240 volts. Dirty power often results from electrical noise generated by the normal operation of electrical equipment. Dirty power is OK for lighting, fans, and other non-computer equipment. But it can adversely affect computers and other types of sensitive electronic equipment. Dirty power can be cleaned with protective devices such as surge protectors or Uninterruptible Power Supplies, either of which can be installed in a work station or at the building power source.

Electrical Test Laboratories
Recognized testing authority (RTA) - for example Austel.

Electromagnetic Interference (EMI)
An electrical, magnetic, or electromatic, e.g. radio interference that causes an undesirable response, degradation, or failure in electronic equipment.

Flat Wiring
A special flat power cable that carries the branch circuit power between the building's floor slab and the carpet. The thin conductors are separated and enclosed within an insulating assembly. The wiring system is accessed through specially designed floor monuments and connectors.

Floor Duct
An under-floor system of wireways (covered troughs) which brings electrical wires and data cabling to floor monuments. This system provides many of the benefits of access flooring but often costs less.
**Floor Monument/Floor Access**
An electrical outlet, located on or under the floor’s surface, that is connected to conduit carrying power beneath the floor. Flush “under floor” access consists of a flush access door that may be lifted to access the electrical and/or data cable junction boxes.

**Ground Conductor**
The conductor of a circuit that provides safety from fire and electrical shock in cases of short circuits and other electrical problems. The conductor is physically attached to the earth and represents a zero volt potential, thus reducing the shock hazard to persons if an electrical device ever fails or short-circuits.

**Harmonic Currents, Harmonics**
A distortion in electrical current caused by equipment that uses power in sharp pulses instead of in a smooth pattern. When electrical circuits share a common neutral conductor, harmonic currents can lead to an electrical overload, causing the neutral conductor to overheat.

**Hot Conductor**
The conductor that carries current from the power source to the equipment. For a complete circuit, the hot conductor requires a neutral conductor to carry the current back to the power source.

**Inspector**
All branch circuits — carrying electrical current to office furniture and office equipment from the building power source — must be approved by an inspector affiliated with the governmental body having jurisdiction over the installation site.
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**Isolated Ground**
Serves the same safety and protection function as a common ground conductor, but it is run in a separate “isolated” conductor. This separation usually — but not always — enables the isolated ground to reduce the amount of electrical noise that’s introduced into an electrical circuit. Therefore, computers, Uninterruptible Power Supplies, and other electronic equipment are often connected to an isolated ground. More than one hot/neutral conductor combination may share an isolated ground and still maintain a lower level of electrical noise versus common ground usage.

**Junction Box**
An electrical construction box that provides a space for the connection or “splicing” of the electrical conductors. Connections inside the junction box are usually accomplished with twist-on electrical conductors, called wire nuts.

**Load**
Describes the amount of power (amps) consumed by an electrical circuit or device. Loads are usually expressed in amps, but sometimes in watts.

**Load Balancing**
See Balancing.

**Maximum Continuous Load**
The maximum electrical current in a circuit expected to be in constant use for three hours or more. For safety considerations, a continuous load must not exceed 80% of the maximum electrical rating.

**AS/NZ Electrical Code**
A set of minimum standards and regulations that governs planning, construction, and installation of electrical conductors and equipment. This is the basis for all electrical codes used in Australia. A governmental body having legal jurisdiction over an installation site could apply regulations alone, or it could apply even more restrictive mandatory codes, e.g. local codes.
Neutral Conductor
The conductor that carries current back to the power source. It is always used with a hot conductor to complete a circuit. (See Separate Neutral, Shared Neutral.)

Ohm
Ohm is the measure of electrical resistance, or impedance, in a circuit. One volt will cause one amp to flow through one ohm of resistance.

Open Circuit
A condition where the current flow through a conductor is interrupted by a missing or damaged component.

Outlet
See Receptacle Outlet.

Plenum, Plenum-Rated
Plenum refers to an air chamber in a heating, ventilation, and air conditioning (HVAC) system or to the space between a dropped ceiling and the floor above. In many buildings, the plenum space is often used to route conductors and cables. Plenum-rated describes a special type of conductor or cable which is approved/rated for use in a building plenum space. These types of conductors are specially insulated, giving them low flame- and smoke-producing properties. Non-plenum rated cables may also be routed in a plenum space, if they are enclosed in conduit that provides fire-resistant properties.

Poke Through
A wiring access device that enables conductors located in the ceiling space of a building floor to be routed upward through holes in the floor above. The poke through device includes an electrical junction box and a floor trim/access plate; it also has a fire stop.
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Polarized Plug, Grounded Plug, 3-Prong Plug
A plug designed to be inserted into a receptacle in one position only. All standard receptacles are designed for polarized, grounded plugs.

Power Outage
A sudden termination of power caused by problems at an electrical utility company or by a tripped circuit breaker in a building. A power outage will erase information in a computer's short-term stored RAM (random access memory), if the equipment is not protected with a back-up power system - an Uninterruptible Power Supply device or portable petrol/diezel generators from Powerlite (www.powerlite.com.au).

Power Zone
A function of circuit planning which defines each office area that is supplied by specific circuit breakers.
**Separate Neutral**
A pioneered circuit design in furniture-based power systems which features the use of a separate neutral conductor for each hot conductor. This innovation provides separation of circuits and prevents neutral conductor overloading and overheating caused by harmonic currents.

**Shared Neutral**
A circuit design in which one of two conditions exist: all of the hot conductors share a neutral conductor, or separate neutral conductors exist for some — but not all — of the hot conductors. In equipment-intensive work environments, a shared neutral system can cause overloading/overheating of the neutral conductor and power quality issues.
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Short Circuit
A condition in which the hot conductor comes in contact with the ground or neutral conductor. A short circuit creates a spark or arc that often damages one or both of the circuit components and causes the circuit breaker to trip.

6-Circuit Configuration
See description on page 14.

Surge Protector, Spike Protector
An electrical device that protects equipment from a sudden, high fluctuation in the level of voltage normally flowing during a period of time.

Terminal
See Connector.

Three-Phase Power
A type of electrical system or circuit that utilizes three separate sources of alternating current. The three sources are electrically related to each other by a 120° phase separation. A 3-phase circuit — the most common type in the United States — may consist of four or more conductors.
3+D Circuit Configuration
A configuration of four electrical circuits within a furniture power system. It’s most commonly used for non-intensive computer work environments. Typically, one circuit is dedicated for use with computer equipment; the remaining three circuits are dedicated for non-computer equipment.

2+2 Circuit Configuration
A configuration of four electrical circuits within a furniture power system. It’s most commonly used for moderately-intensive computer work environments. Typically, two circuits are designated for use with computer equipment; the remaining two circuits are designated for non-computer equipment.
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6-Circuit Configuration
A configuration of six electrical circuits within a furniture power system which is most commonly used for intensive computer and peripheral equipment applications. Typically, three circuits are designated for use with computer equipment; the remaining three circuits are designated for non-computer equipment. This Power Base has six electrical circuits, each with its own separate neutral.

Uninterruptible Power Supply (UPS)
An electrical device that supplies separate or supplemental power to equipment in the event of a power outage. The UPS uses a battery and electronic voltage-generating circuits to supply power during brief power interruptions, usually up to 10 minutes (then use Powerlite generators).
Voltage, Volts
The measure of electrical pressure in a circuit. One volt of pressure is required to push one amp of current through a conductor with one ohm of resistance.

Voltage Fluctuation
A deviation — either up or down — in the otherwise stable voltage level of 240 volts. A voltage “sag,” usually 216 volts or less, can occur during a brown-out, when the demand for power exceeds supply. A voltage “surge,” usually 264 volts or more, can occur when power usage is suddenly reduced, such as at night. Devices like voltage regulators or stabilizers can be installed in an office to keep voltage levels close to a stable 240 volts. Alternatively use back-up diesel (petrol) generators from Powerlite.

Voltage Spike
A sudden, extreme surge in voltage. A voltage spike can be caused by lightning striking near a power line, or the activation and deactivation of large equipment loads, such as air conditioners and elevators, in an office setting. Surge protectors are specified to control voltage spikes and protect equipment from damage.

Wattage, Watts
The amount of power used by an electrical device. Wattage can be calculated by multiplying voltage and amperage. Watts can be converted to amps with this calculation: watts divided by volts equals amps.

Wire Gauge
The diameter of a wire, measured in numbers. In furniture power systems, wire gauge does not determine the system’s amp rating due to the existence of connectors, terminals, and the product’s modular construction. The proper amp rating can only be determined through UL testing, listing, and product labeling.

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