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## GLOSSARY: TECHNICAL BATTERY TERMS

<b>AB5</b>	A metal alloy (e.g., LaNi <sub>5</sub> ) capable of undergoing a reversible hydrogen absorption/desorption reaction as the battery is charged and discharged, respectively.
<b>Absorption</b>	The taking up or retention of one material by another by chemical or molecular action.
<b>Alloy</b>	A mixture of several other metals or a metal and a non-metal.
<b>Ambient Humidity</b>	The average humidity of the surroundings.
<b>Ambient Temperature</b>	The average temperature of the surroundings.
<b>Ampere-Hour Capacity</b>	The quantity of electricity measured in ampere-hours (Ah) which may be delivered by a cell or battery under specified conditions.
<b>Anode</b>	The electrode in an electrochemical cell where oxidation takes place. During discharge, the negative electrode of the cell is the anode. During charge, the positive electrode is the anode.
<b>Battery or Pack</b>	Two or more electrochemical cells electrically interconnected in an appropriate series/parallel arrangement to provide the required operating voltage and current levels. Under common usage, the term "battery" is often also applied to a single cell.
<b>Bobbin</b>	A cylindrical cell design utilizing an internal cylindrical electrode, and an external electrode arranged as a sleeve inside the cell container.
<b>C-Rate (also see Hourly Rate)</b>	Discharge or charge current, in amperes, expressed in multiples of the rated capacity. For example, C/10 discharge current for a battery rated at 1.5 Ah is: $1.5 \text{ Ah}/10 = 150 \text{ mA}$ (A cell's capacity is not the same at all discharge rates and usually increases with decreasing rate.)
<b>Capacity</b>	The total number of ampere-hours or watt-hours that can be withdrawn from a fully charged cell or battery under specified conditions of discharge.
<b>Capacity Retention (or Charge Retention)</b>	The fraction of the full capacity available from a battery under specified conditions of discharge after it has been stored for a period of time.
<b>Cathode</b>	The electrode in an electrochemical cell where reduction takes place. During discharge, the positive electrode of the cell is the cathode. During charge in a rechargeable battery, the negative electrode is the cathode.
<b>Cell</b>	The basic electrochemical unit used to generate or store electrical energy.
<b>Charge</b>	The conversion of electrical energy, provided in the form of electrical current from an external source, to restore the chemical energy in a cell or battery.
<b>Charge Control</b>	Technique for effectively terminating the charging of a rechargeable battery.
<b>Closed-Circuit Voltage (CCV)</b>	The potential or voltage of a battery when it is discharging or charging.

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<b>Constant Current Discharge</b>	A battery discharge regime whereby the current drawn during the discharge remains constant.
<b>Constant Power Discharge</b>	A battery discharge regime whereby the current during the discharge increases as the battery voltage decreases.
<b>Constant Resistance Discharge</b>	A battery discharge regime whereby the resistance of the equipment load remains constant throughout discharge.
<b>Continuous Test</b>	A test in which a battery is discharged to a prescribed end point voltage without interruption.
<b>Coulomb</b>	The amount of electricity transported by a current of one ampere flowing for one second.
<b>Current Collector</b>	An inert structure of high electrical conductivity used to conduct current from or to an electrode during discharge or charge.
<b>Current Density</b>	The current per unit active area of the surface of an electrode.
<b>Current Drain</b>	The current withdrawn from a battery during discharge.
<b>Cutoff Voltage (also see End Voltage)</b>	The battery voltage at which the discharge is terminated. The cutoff voltage is specified by the battery manufacturer and is generally a function of discharge rate.
<b>Cycle Life</b>	The number of cycles under specified conditions which are available from a secondary battery before it fails to meet specified criteria as to performance.
<b>Depth of Discharge</b>	The ratio of the quantity of electricity (usually in ampere-hours) removed from a battery to its rated capacity.
<b>Desorption</b>	The opposite of absorption, whereby the material retained by a medium or another material is released.
<b>Discharge</b>	The conversion of the chemical energy of a battery into electrical energy, and the withdrawal of the electrical energy into a load.
<b>Discharge Rate</b>	The rate, usually expressed in amperes, at which electrical current is taken from the battery.
<b>Drain</b>	The current withdrawn from a battery during discharge.
<b>Dry Cell</b>	A cell with immobilized electrolyte. The term "dry cell" is often used to describe the Leclanche cell.
<b>Duty Cycle</b>	The operating regime of a battery including factors such as charge and discharge rates, depth of discharge, cycle duration, and length of time in the standby mode.
<b>E-Rate</b>	Discharge or charge power, in watts, expressed as a multiple of the rated capacity of a cell or battery which is expressed in watt-hours. For example, the E/10 rate for a cell or battery rated at 17.3 watt-hours is 1.73 watts. (This is similar to the method for calculating C-Rate.)
<b>Electrochemical Equivalent</b>	Weight of a substance that is deposited at an electrode when the quantity of electricity which is passed is one coulomb.
<b>Electrode</b>	The site, area or location at which electrochemical processes take place.
<b>Electrolyte</b>	The medium which provides the ion transport mechanism between the positive and negative electrodes of a cell.
<b>End Voltage (also see Cutoff Voltage)</b>	The prescribed voltage at which the discharge (or charge, if end-of-charge voltage) of a battery may be considered complete.

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<b>Energy</b>	The output capability of a cell or battery, usually expressed in watt-hours.
<b>Energy Density</b>	The ratio of the energy available from a battery to its volume (Wh/L) or weight (Wh/kg).
<b>Forced Discharge</b>	Discharging a cell in a battery, by the other cells or an external power source, below zero volts into voltage reversal.
<b>Fuse</b>	Device used for cutting off an electrical current in the event of an abusive condition.
<b>Gassing</b>	The evolution of gas from one or more of the electrodes in a cell. Gassing commonly results from local action (self-discharge) or from the electrolysis of water in the electrolyte during charging.
<b>Gravimetric Energy Density</b>	The ratio of the energy output of a cell or battery to its weight (Wh/kg). This term is used interchangeably with specific energy.
<b>Hazardous Waste</b>	Waste which is classified as "hazardous" (i.e., potentially harmful to the environment) by the government.
<b>Hertz</b>	The standard unit of frequency. A frequency of one complete cycle per second is a frequency of one hertz.
<b>Hourly Rate (also see C-Rate)</b>	A discharge rate, in amperes, of a battery which will deliver the specified hours of service to a given cutoff voltage.
<b>Intermittent Test</b>	A test during which a battery is subjected to alternate periods of discharge and rest according to a specified discharge regime.
<b>Internal Impedance</b>	The opposition exhibited by a circuit element (cell or battery) to the flow of an alternating current (a.c.) of a particular frequency as a result of resistance, induction and capacitance.
<b>Internal Resistance (IR)</b>	The opposition exhibited by a circuit element to the flow of direct current (d.c.). In a cell, the internal resistance is the sum of the ionic and electronic resistances of the cell components.
<b>IR Drop</b>	A voltage drop associated with the electrical resistance (R) of a battery or current flow (I). The voltage drop is the product of the current (in amperes) and the resistance (in ohms).
<b>Limiting Current</b>	The maximum current drain under which the particular battery will perform adequately under a continuous drain. The rate is based on whatever drain rate reduces the running voltage to 1.1 volts.
<b>Memory Effect</b>	A phenomenon in which a cell or battery operated in successive cycles to the same, but less than full, depth of discharge temporarily loses the rest of its capacity at normal voltage levels.
<b>Metal Hydride</b>	An intermetallic compound or alloy in which hydrogen has been absorbed; also, the negative electrode in a nickel-metal hydride battery.
<b>Midpoint Voltage</b>	The voltage of a battery midway in the discharge between the start of the discharge and the end voltage.
<b>Nominal Voltage</b>	The characteristic operating voltage or rated voltage of a battery.
<b>Open-Circuit Voltage (OCV)</b>	The difference in potential between the terminals of a cell when the circuit is open (no-load condition).
<b>Overcharge</b>	The forcing of current through a cell after all the active material has been converted to the charged state, that is, continued charging after reaching 100 percent state-of-charge.

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<b>Overdischarge</b>	The process of discharging a cell or battery beyond its cutoff voltage and possibly into voltage reversal.
<b>Parallel</b>	Term used to describe the interconnection of cells or batteries in which all the like terminals are connected together. Results in increased capacity.
<b>Passivation</b>	The phenomenon by which a metal, although in conditions of thermodynamic instability, remains indefinitely unattacked because of modified or altered surface conditions.
<b>Polarity</b>	In electricity, the condition of being positive or negative.
<b>Polarization</b>	The lowering of the potential of a cell or electrode from its equilibrium value caused by the passage of an electric current.
<b>Positive Temperature Coefficient (PTC)</b>	A thermally reactive device which becomes highly resistive at a specific temperature or current.
<b>Primary Battery</b>	A battery which is not intended to be recharged and is discarded when the battery has delivered all of its electrical energy.
<b>Pulse Current</b>	A periodic current drain of higher than normal drain rates.
<b>Rated Capacity</b>	The number of ampere-hours a battery can deliver under specific conditions (e.g., rate of discharge, end voltage, temperature); usually specified by the battery manufacturer.
<b>Rechargeable (or "Secondary") Battery</b>	A galvanic battery which, after discharge, may be restored to the fully charged state by the passage of an electrical current through the cell in the opposite direction to that of discharge.
<b>Reversal</b>	The changing of the normal polarity of a battery due to overdischarge.
<b>Safety Vent</b>	A venting mechanism designed into a cell which activates under specific conditions of abuse to relieve internal pressure.
<b>Secure Waste Landfill</b>	A landfill designed for disposal of normal household trash but which meets government standards designed to protect the environment.
<b>Self-Discharge</b>	The loss of useful capacity of a battery on storage due to internal chemical action (local action).
<b>Separator</b>	An ionic permeable electronically nonconductive spacer or material which prevents electronic contact between electrodes of opposite polarity in the same cell.
<b>Series</b>	The interconnection of cells in such a manner that the positive terminal of the first is connected to the negative terminal of the second, and so on, resulting in increased voltage.
<b>Service Life</b>	The period of useful life of a battery before a predetermined end-point voltage is reached.
<b>Shelf Life</b>	The duration of storage under specified conditions at the end of which the battery still retains the ability to give a specified performance.
<b>Short-Circuit Current (SCC)</b>	The initial value of the current obtained from a battery in a circuit of negligible resistance.
<b>Specific Energy</b>	The ratio of the energy output of a cell or battery to its weight (Wh/kg). This term is used interchangeably with gravimetric energy density.

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Spiral Wound	An electrode structure of high surface area created by winding the electrodes and separator into a spiral-wound, jelly-roll configuration.
Temperature Cutoff (TCO)	A protective or safety device (e.g., thermostat, PTC, etc.) which senses temperature (e.g., in a battery) and opens or cuts off the electrical circuit if the specified temperature is exceeded, thus preventing a further rise in temperature due to the charge or discharge of a battery.
Thermistor	A temperature sensitive resistor, usually made from specially processed oxides.
Thermostat	A temperature sensitive switch.
Top -Up Charge	A low rate charge following the main charge, designed to ensure maximum capacity.
Trickle Charge	A charge at a low rate, balancing losses through local action and/or periodic discharge, to maintain a cell or battery in a fully charged condition.
Voltage Depression	An abnormal drop in voltage below expected values during the discharge of a battery.
Voltage Delay	Time delay for a battery to deliver the required operating voltage after it is placed under load.
Voltage -Keyed	A system which incorporates a mechanical identifier on batteries and devices to ensure only batteries of the correct voltage are connected to the device.
Voltage Reversal	The changing of the normal polarity of a battery due to overdischarge.
Volumetric Energy Density	The ratio of the energy output of a cell or battery to its volume (Wh/L).
Wall -less Design	A battery design where the structural support for the cells is formed by an open plastic framework.
Working Voltage	The typical voltage or range of voltage of a battery during discharge (also called operating voltage or running voltage).

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