

# Principal Dry Battery Systems

## Typical Characteristics

	<b>Nickel-Metal Hydride (NiMH)</b>	<b>Zinc Chloride (Zn/MnO<sub>2</sub>)</b>	<b>Alkaline Manganese Dioxide (Zn/MnO<sub>2</sub>)</b>	<b>Lithium (Li/FeS<sub>2</sub>)</b>	<b>Silver Oxide (Zn/Ag<sub>2</sub>O)</b>	<b>Zinc Air (ZnO<sub>2</sub>)</b>	<b>Lithium Coin (Li/MnO<sub>2</sub>)</b>	<b>Lithium (Li/MnO<sub>2</sub>)</b>
<b>Electrochemical System</b>	Nickel-Metal Hydride	Zinc-Manganese Dioxide	Zinc-Alkaline Manganese Dioxide	Lithium-Iron Disulfide	Zinc-Silver Oxide	Zinc-Oxygen	Lithium Manganese Dioxide	Lithium Manganese Dioxide
<b>Voltage per Cell</b>	1.2	1.5	1.5	1.5	1.5	1.4	3.0	3.0
<b>Negative Electrode</b>	Metal Hydride	Zinc	Zinc	Lithium Metal	Zinc	Zinc	Lithium Metal	Lithium Metal
<b>Positive Electrode</b>	Nickel Hydroxide	Manganese Dioxide	Manganese Dioxide	Iron Disulfide	Silver Oxide	Oxygen	Manganese Dioxide	Manganese Dioxide
<b>Electrolyte</b>	20% to 40% weight % solution of potassium hydroxide	Aqueous solution of zinc chloride (may contain some ammonium chloride)	Aqueous solution of potassium hydroxide	Lithium Salt in organic solvent	Aqueous solution of potassium hydroxide or sodium hydroxide	Aqueous solution of potassium hydroxide	Lithium Salt in organic solvent	Lithium Salt in organic solvent
<b>Recharge</b>	Yes	No	No	No	No	No	No	No
<b>Overall Reaction Equations</b>	$MH + NiOOH \rightarrow M - Ni(OH)_2$	$Zn + 2MnO_2 + 2H_2O + ZnCl_2 \rightarrow 2MnOOH + 2Zn(OH)Cl$	$3MnO_2 + 2Zn \rightarrow Mn_3O_4 + 2ZnO$	$4Li + FeS_2 \rightarrow 2Li_2S + Fe$	$Zn + Ag_2O \rightarrow ZnO + 2Ag$	$2Zn + O_2 \rightarrow 2ZnO$	$Li + Mn^{IV}O_2 \rightarrow Mn^{III}O_2(Li^+)$	$Li + Mn^{IV}O_2 \rightarrow Mn^{III}O_2(Li^+)$
<b>Typical Commercial Service Capacities</b>	850 mAh to 2500 mAh	Several Hundred mAh to 38 Ah	30 mAh to 24 Ah	25 mAh to 3000 mAh	5 mAh to 200 mAh	90 mAh to 620 mAh	30 mAh to 620 mAh	800 mAh to 1500 mAh

This document contains typical characteristics for Energizer/Eveready batteries in production at the time of preparation. Since the characteristics of batteries are sometimes modified, please visit [www.energizer.com](http://www.energizer.com) for current information. None of the information constitutes a representation or warranty by Energizer concerning the specific performance or characteristics of any battery.

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	<b>Nickel-Metal Hydride</b> (NiMH)	<b>Zinc Chloride</b> (Zn/MnO <sub>2</sub> )	<b>Alkaline Manganese Dioxide</b> (Zn/MnO <sub>2</sub> )	<b>Lithium</b> (Li/FeS <sub>2</sub> )	<b>Silver Oxide</b> (Zn/Ag <sub>2</sub> O)	<b>Zinc Air</b> (ZnO <sub>2</sub> )	<b>Lithium Coin</b> (Li/MnO <sub>2</sub> )	<b>Lithium</b> (Li/MnO <sub>2</sub> )
<b>Discharge Curve (shape)</b>	Flat	Sloping	Sloping	Flat	Flat	Flat	Flat	Flat
<b>Temperature Range (storage)</b>	-20°C to 30°C (-4°F to 86°F)	-40°C to 50°C (-40°F to 120°F)	-40°C to 50°C (-40°F to 120°F)	-40°C to 60°C (-40°F to 140°F)	-40°C to 60°C (-40°F to 140°F)	10°C to 30°C (40% to 70%RH)	-40°C to 60°C (-40°F to 140°F)	-40°C to 60°C (-40°F to 140°F)
<b>Temperature Range (operating)</b>	Discharge 0°C to 50°C (32°F to 122°F)	-18°C to 55°C (0°F to 130°F)	-18°C to 55°C (0°F to 130°F)	-40°C to 60°C (-40°F to 140°F)	-10°C to 55°C (14°F to 130°F)	-10°C to 55°C (14°F to 130°F)	-40°C to 60°C (-40°F to 140°F)	-40°C to 60°C (-40°F to 140°F)
<b>Effect of Temperature on Service Capacity</b>	Fair Low Temperature	Poor Low Temperature	Good Low Temperature	Excellent Low Temperature	Good Low Temperature	Good Low Temperature	Excellent Low Temperature	Excellent Low Temperature
<b>Shelf Life at 20°C</b>	2 to 5 Years	1 to 3 Years	5 to 10 Years	12 to 20 Years	3 to 7 Years	3 Years	5 to 8 Years	10 Years

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