

Rechargeable Battery Comparisons

	NiCd	NiMH	SLA – Std	SLA - Hawker	Li-Ion	Li-Ion Polymer
Run Time vs Size & Weight	B	A	C	C	AA	AA
Cycle Life (100% to 80%)	AA – C ¹	B – C ¹	B – C ^{2,6}	A – B ^{2,6}	AA – B ^{2,3}	AA – B ^{2,3}
Charge Time	AA	A	C	AA	A	A
Overcharge Tolerance	B	C	A	A	AA ⁴	AA ⁴
Deep Discharge Tolerance	B	B	C	C	AA ⁴	AA ⁴
Short Circuit Tolerance	A	C	C	B	AA ⁴	AA ⁴
Internal Impedance	AA – A ⁵	A – B ⁵	C	AA	A-AA	A-AA
Self-discharge	B	C	A	A	A	A
Cell Voltage (nominal)	C	C	B	B	AA	AA
Load Current (continuous)	AA	A	C	A	A	A
Operating Temperature	A	A	A	AA	AA	A
Maintenance Requirement	C	B	A	A	AA	AA
Typical Battery Cost	A	B	AA	AA	B	B – C
Flexibility	B	B	B	B	A	A
Service Life – intensive use	A	B	C	B	A	A
Service Life – occasional use	B	B	AA	AA	A-AA	A-AA
Service Life – store-and-use⁸	A	A	B	B	B - A	B - A
Temperature Range	A	B	A	AA	AA – A	A
Outgassing	B	B	C	B	AA	AA
Personal Safety	A	B	B	B	A	A
Environmental Safety	C	A	C	C	AA	AA
Solar Chargeable	C	C	A	A	AA ⁷	AA ⁷

AA – Clearly excels; A – Very good; B – Good; C – Below average

1 Cycle life is dramatically reduced if battery is not properly maintained by fully discharging the battery occasionally.

2 Cycle life is dependent on depth of discharge – Shallow discharge provides more cycles than deep discharges.

3 Cycle life depends on specific chemistry – generally, there is a trade-off between high capacity and high cycle life.

4 Protect circuits required by this chemistry effectively prevent overcharge, deep discharge, and short circuit damage significantly better than other chemistry cells without the protect circuits.

5 Ultra-high capacity cells have higher internal impedance than standard cells.

6 CLA does not tolerate partial charging; cycle life is dramatically reduced if battery is not fully charged after being discharged.

7 NEW! Solar Charge regulator built into some pack protect boards.

8 NEW! Continuous cell balancing (SWE patent pending) balances pack during storage so it is ready for use immediately without multiple charge – discharge cycles.

Matching Customer Needs



	Best For:	Not Recommended For:
NiCd	<ul style="list-style-type: none"> • Intensive use over many years (provides several thousand cycles if properly maintained) • Very high discharge currents (very low internal resistance and tolerant of high current discharges) • Very fast charge cycle (tolerates high current charging) • Store-and-use (long-term storage is not critical but recharge is needed before use) 	<ul style="list-style-type: none"> • Applications requiring long runtime between recharge (NiCd has a moderate energy density) • Repeated topping charging or uncontrolled charging without periodic full discharge (NiCd is a high-maintenance battery) • Occasional Use (high self-discharge)
NiMH	<ul style="list-style-type: none"> • Intensive use (provides up to 500 cycles) • Applications requiring long runtime between recharge (NiMH has high energy density) • Store-and-use (long-term storage is not critical but recharge is needed before use) 	<ul style="list-style-type: none"> • Uncontrolled charging without periodic full discharge (NiMH is a high-maintenance battery) • Occasional Use (high self-discharge) • Very high discharge currents (except for specialty cells, NiMH is not tolerant of high current discharge)
Li-Ion	<ul style="list-style-type: none"> • Intensive or occasional use (provides 400 to 1,000 or more cycles & low self discharge) • Applications requiring long runtime between recharge (Li-Ion has highest energy density) • Routine applications with uncontrolled charging or repeated topping charging (Li-Ion is maintenance free and has increased cycling life with topping charge) • Very high discharge currents (achievable with high current or paralleled cells and custom pack protect circuit) • Multi-year Long-Term Use (Multi-series packs expected to be used more than 3 years require cell balancing circuit.) • Sealed Batteries –No outgassing during charge or discharge 	
Li-Ion Polymer	<ul style="list-style-type: none"> • Intensive or occasional use (Provides up to 1,000 cycles & low self discharge) • Applications requiring long runtime between recharge (Li-Ion Polymer has high energy density) • Routine applications with uncontrolled charging or repeated topping charging (Li-Ion polymer is maintenance free and has increased cycling life with topping charge) • Applications requiring very thin cells (cells are inherently thin) • Very high discharge currents (achievable with high current or paralleled cells and custom pack protect circuit) • Multi-year Long Term Use (Multi-series packs expected to be used more than 3 years require cell balancing circuit.) • Sealed Batteries – No outgassing during charge or discharge 	