



APPENDIX A - USABC Goals for Advanced Batteries for PHEVs

Characteristics	Units	PHEV-20 Mile	PHEV-40 Mile	xEV-50 Mile
Commercialization Timeframe		2018	2018	2020
All Electric Range (AER)	Miles	20	40	50
Peak Discharge Pulse Power (10 sec)	kW	37	38	110
Peak Discharge Pulse Power (2 sec)	kW	45	46	120
Peak Regen Pulse Power (10 sec)	kW	25	25	65
Available Energy for CD (Charge Depleting) Mode	kWh	5.8	11.6	14.5
Available Energy for CS (Charge Sustaining) Mode	kWh	0.3	0.3	0.3
Minimum Round-trip Energy Efficiency	%	90	90	90
Cold cranking power at -30°C, 2 sec - 3 Pulses	kW	7	7	7
CD Life / Discharge Throughput	Cycles/ MWh	5000/29	5000/58	5000/72.5
CS HEV Cycle Life	Cycles	300,000	300,000	300,000
Calendar Life, 30°C	year	15	15	15
Maximum System Weight	kg	70	120	150
Maximum System Volume	Liter	47	80	100
Maximum Operating Voltage	Vdc	420	420	420
Minimum Operating Voltage	Vdc	150	153	300
Maximum Self-discharge	%/month	<1	<1	<1
System Recharge Rate at 30°C	kW	3.3 (240V/16A)	3.3 (240V/16A)	6.6 (240V/32A)
Maximum Discharge Pulse Current ($\leq 10s$)	A	300	300	400
Unassisted Operating Temp Range (10s)	°C	-30 to +52	-30 to +52	-30 to +52
30°-52°	% Power	100	100	100
i. 0°	% Power	50	50	50
-10°	% Power	30	30	30
-20°	% Power	15	15	15
-30°	% Power	10	10	10
Survival Temperature Range	°C	-46 to +66	-46 to +66	-46 to +66
Max System Production Cost @ 100k units/yr	\$	\$2,200	\$3,400	\$4,250

NOTES: i. Values correspond to End-of-Life (EOL).

- ii. xEV cell is intended for architectures that require higher power levels than PHEV-20 and PHEV-40.
- iii. The Peak Discharge Pulse Power and Peak Regen Pulse Power targets are applicable for the CS mode.
- iv. The HPPC-Current rate is used to approximate the required 10-kW rate during the Hybrid Pulse Power Characterization (HPPC) Test, Section 3.4.
- v. Maximum System Recharge Rate refers to the maximum power expected from a standard garage outlet. With the battery manufacturer's concurrence, an increase recharge rate can be used to accelerate life testing.
- vi. The minimum operating voltage (V_{min0}) shall be limited to 0.55 times the maximum charge voltage limit (V_{max100}) or higher.