



## USABC Goals for Advanced Batteries for 48V Hybrid Electric Vehicle Applications

### USABC Requirements of Energy Storage Systems for 48V HEV's at EOL

Characteristics	Units	Target
Peak Pulse Discharge Power (10 sec)	kW	9
Peak Pulse Discharge Power (1 sec)	kW	11
Peak Regen Pulse Power (5 sec)	kW	11
Available Energy for Cycling <sup>1</sup>	Wh	105
Minimum Round-trip Energy Efficiency	%	95
Cold cranking power at -30 °C (three 4.5-s pulses, 10s rests between pulses at min SOC)	kW	6 kW for 0.5s followed by 4 kW for 4s
Accessory Load (2.5 minute duration) <sup>1</sup>	kW	5
CS 48V HEV Cycle Life <sup>2</sup>	Cycles /MWh	75,000 / 21
Calendar Life, 30°C	year	15
Maximum System Weight	kg	≤8
Maximum System Volume	Liter	≤8
Maximum Operating Voltage	Vdc	52
Minimum Operating Voltage	Vdc	38
Minimum Voltage during Cold Crank	Vdc	26
Maximum Self-discharge	Wh/day	1
Unassisted Operating Temp Range (Power available to allow 5s charge and 1s discharge pulse) at min. and max. operating SOC and Voltage	°C	-30 to +52
30 °C - 52 °C	kW	11
0 °C	kW	5.5
-10 °C	kW	3.3
-20 °C	kW	1.7
-30 °C	kW	1.1
Survival Temperature Range	°C	-46 to +66
Max System Production Price @ 250k units/yr	\$	\$275

<sup>1</sup>Total usable energy will include cycling energy and accessory load energy. The usable energy will be 313Wh

<sup>2</sup>Each individual cycle profile includes six (6) start-stop events, for a total of 450k events over the duration of the test.