ABT®
Advanced Battery Technology

VALVE-REGULATED
SEALED LEAD
ACID BATTERY

Enduro
EHP Series

Products Guide

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Introduction

The ABT Enduro EHP range of VRLA lead acid batteries have been designed specifically for use in applications which demand the highest levels of security reliability. With proven compliance to the most rigorous international standards. Enduro EHP is recognized as premium battery for Telecom/ Utilities applications. Enduro's reputation for long service life combined with excellent high rate performance also makes it the number one choice for high intergrity, high specification UPS systems.

- pb_Ca_Sn alloy grids designed to resist corrosion and prolong life
- Low resistance microporous glass fibre separator
- Low specific acid density
- High integrity pillar seal
- Main tenance-Free Operation
- Low Pressure Venting System
- Low Self Discharge
- U.L.Component Recognition
- Six months shelf life at 20°C
- Design life 12+ years

Enduro EHP Valve Regulated Lead Acid batteries are the ideal energy source for many different standby applications.

Technical Features

- **Sealed Construction**

ABT' s unique multiple sealing construction and sealing technique ensures that no electrolyte leakage should occur from the terminals or case of any Enduro EHP. This feature provides for safe and effective operation of Enduro EHP in any orientation.

- **Electrolyte Suspension System**

Enduro EHP utilize an electrolyte suspension system consisting of high microporous glass fibre separator. This suspension system helps to achieve maximum service life, by fully retaining the electrolyte and preventing its escape from the separator material.

- **Gas Generation**

Enduro EHP incorporates a unique design that effectively recombines over 99% of the gas generated during normal usage.

- **Low Maintenance Operation**

During the life of Enduro EHP, there is no need to check their specific gravity or add water etc.

- **Operation In Any Orientation**

The combination of sealed construction and electrolyte suspension system permits operation of Enduro EHP in any orientation (excluding continuous inverted use) without loss of capacity, service life, or leakage of electrolyte.

- **Long Float Service Life**

The expected service life of the standard model Enduro EHP when used in standby applications is typically 12+ years.

- **Low Self Discharge - Long Shelf Life**

At temperatures of between 20 & 25°C, the self discharge rate of Enduro EHP is approximately 3% per month of their rated capacity. This low self discharge rate permits storage for up to one year without any deterioration of battery performance.

- **Wide operating Temperature Range**

Enduro EHP can be used over a wide range of ambient temperatures: -15°C~45°C, allowing considerable flexibility in system design and location.

- **High Recovery Capability**

Enduro EHP have excellent charge acceptance and recovery capability, even after very deep discharge.

APPLICATIONS

Telecommunication Systems
Power supply system
UPS
Power plant generation and distribution
High power back-up power sources.
Cable Television
Solar/Wind Powered Systems

STANDARDS

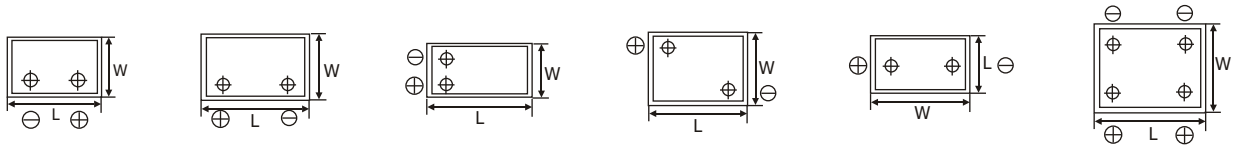
Eurobat Guide -12 years and longer “long life”
BS 6290-4
IEC 60896 Part 21-22
UL Recognized
CE Recognized

General Specifications

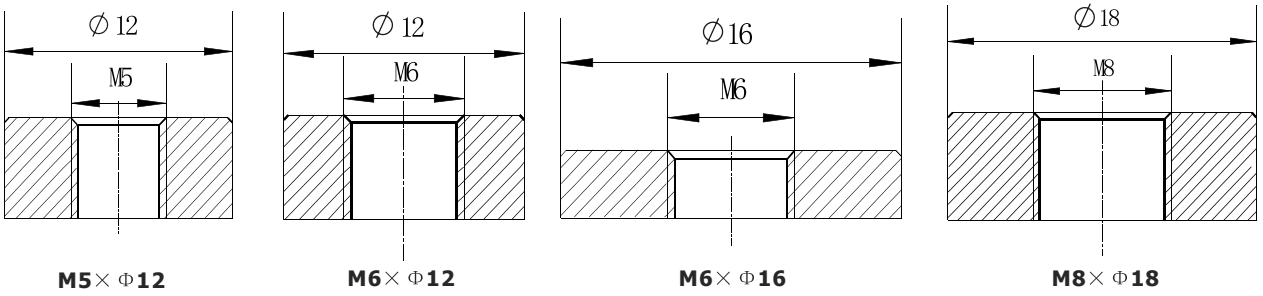
Battery Type	Nominal Voltage (V)	Nominal Capacity (20°C)		Length	Width	Height	Overall Height with Poles	Weight	Maximum Current (20°C)		Internal Impedance	Terminal Types	Terminal layout
		1.75V/c Ah/8h*	1.80V/c Ah/10h*	mm	mm	mm	mm	kg	in 1 min (A)	in 1 sec (A)	mOhm 20°C		
EHP12-14	12	13.6	14	181	76	166	166	5.85	120	600	13.65	M5× ϕ12	A
EHP12-23	12	22.4	23	166	125	175	175	9.76	150	800	9.35	M6× ϕ12	B
EHP12-32	12	30.4	32	197	165	170	170	14.00	150	800	7.14	M6× ϕ16	A
EHP12-45	12	43.2	45	229	138	208	213	18.50	200	1000	5.25	M6× ϕ16	B
EHP12-55	12	52.8	55	261	173	221	224	24.00	200	1000	4.94	M6× ϕ16	B
EHP12-70	12	67.2	70	304	168	208	213	28.50	500	1200	4.62	M6× ϕ16	B
EHP12-80	12	75.6	80	329	172	216	223.5	31.0	500	1500	4.41	M8× ϕ18	B
EHP12-180	12	168	180	521	269	220	225	71.6	750	2200	3.99	M8× ϕ18	C
EHP6-105	12	103.2	105	195	206	222	240	22.4	500	1500	2.73	M8× ϕ18	D
EHP6-125	6	122.4	125	278	178	238	258	25.5	500	1500	2.63	M8× ϕ18	D
EHP6-150	6	147.2	150	278	178	238	258	29.0	750	1600	2.47	M8× ϕ18	D
EHP6-160	6	156.8	160	278	178	238	258	30.6	750	1600	2.47	M8× ϕ18	D
EHP2-200	2	196	200	110	208	242	260	13.5	1000	1800	0.58	M8× ϕ18	E
EHP2-225	2	220.8	225	142	205	242	260	15.5	1200	2500	0.58	M8× ϕ18	E
EHP2-250	2	244.8	250	142	205	242	260	17.1	1200	2500	0.53	M8× ϕ18	E
EHP2-275	2	269.6	275	142	205	242	260	18.3	1200	2500	0.50	M8× ϕ18	E
EHP2-300	2	289.6	300	195	208	252	260	20.9	1400	3800	0.46	M8× ϕ18	F
EHP2-320	2	308.8	320	195	206	222	240	22.8	1400	3800	0.46	M8× ϕ18	F
EHP2-400	2	392	400	195	208	252	260	26.2	1400	3800	0.42	M8× ϕ18	F
EHP2-405	2	397.6	405	296	203	222	240	31.2	1200	2600	0.58	M8× ϕ18	F
EHP2-455	2	446.4	455	296	203	222	240	32.6	1300	3000	0.44	M8× ϕ18	F
EHP2-515	2	504.8	515	296	203	222	240	35.1	1350	3200	0.43	M8× ϕ18	F
EHP2-560	2	549.6	560	296	203	222	240	36.5	1400	4000	0.38	M8× ϕ18	F

All data may be subject to variations

Terminal Layouts



Terminals



M5× Φ12 **M6× Φ12** **M6× Φ16** **M8× Φ18**

Technology

How gas recombination works

When a charge current flows through a fully charged conventional lead acid cell, electrolysis of water occurs to produce hydrogen from the negative electrode and oxygen from the positive electrode. This means that water is lost from the cell and regular topping up is needed.

However, evolution of oxygen and hydrogen gases does not occur simultaneously, because the recharge of the positive electrode is not as efficient as the negative. This means that oxygen is evolved from the positive plate before hydrogen is evolved from the negative plate.

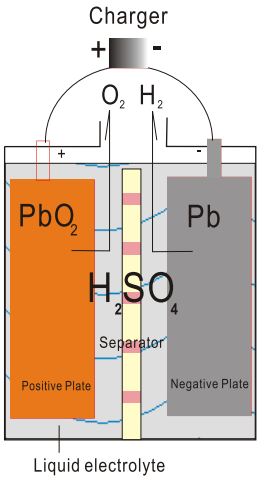
At the same time that oxygen is evolved from the positive electrode, a substantial amount of highly active spongy lead exists on the negative electrode before it commences hydrogen evolution. Therefore, providing oxygen can be transported to the negative electrode, conditions are ideal for a rapid reaction between lead and oxygen: i.e. oxygen is electrochemically reduced on the negative electrode according to the following formula,

$$2e^- + 2H^+ + {}^1/2O_2 \longrightarrow H_2O$$

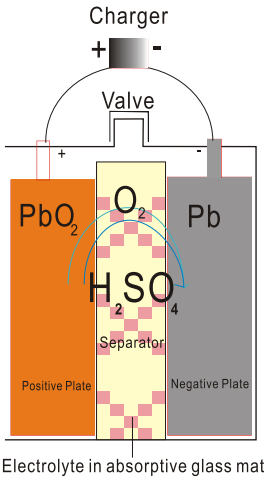
and the final product is water.

The current flowing through the negative electrode drives this reaction instead of hydrogen generation which would occur in a flooded cell.

This process is called gas recombination. If this process was 100% efficient no water would be lost from the cell. By careful design and selection of cell components, gas recombination between 95% and 99% is achieved.



Conventional cell
Oxygen and hydrogen escape to the atmosphere



Enduro EHP
Oxygen from the positive plate transfers to the negative and recombines to form water

Recombination efficiency

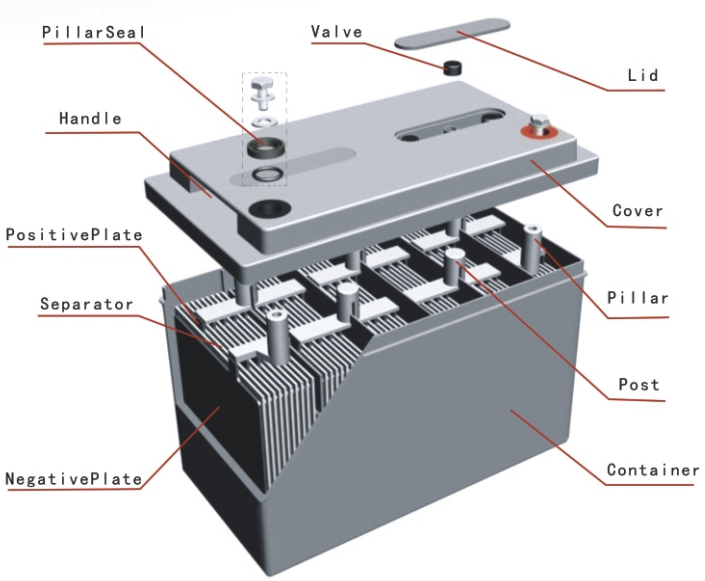
Recombination efficiency is determined under specific conditions by measuring the volume of hydrogen emitted from the battery and converting this into its ampere hour equivalent. This equivalent value is then subtracted from the total ampere hours taken by the battery during the test period, and the remainder is the battery's recombination efficiency and is usually expressed as a percentage.

As recombination is never 100%, some hydrogen gas is emitted from **Enduro EHP** cells and batteries through the self-regulating valve. The volume of gas emitted is very small and typical average values on constant potential float at 20°C are as follows:

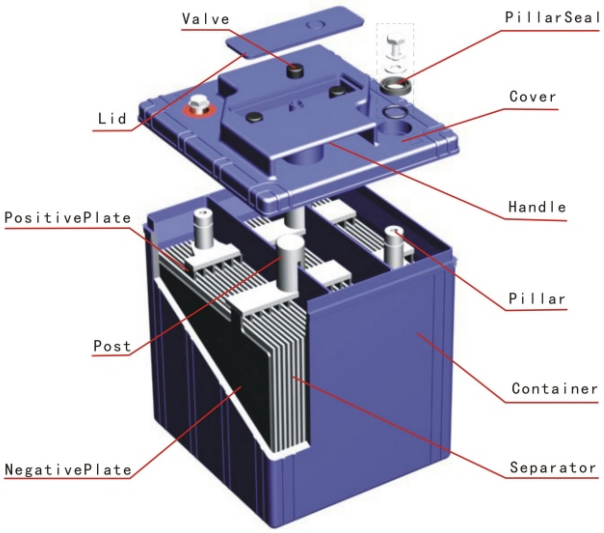
Enduro EHP hydrogen emissions	
Float voltage (Volt per cell)	Volume of gas emitted (ml per cell per C3Ah per month)
2.26	3.7
2.36	24.0

Construction

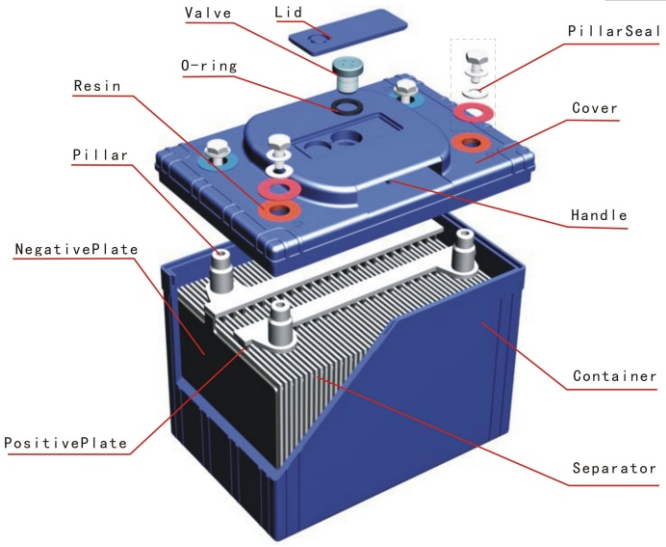
EHP12-80 12V80Ah



EHP6-105 6V105Ah



EHP2-560 2V560Ah



1 High conductivity pillars
Threaded terminals with brass inserts allow high conductivity and maximum torque retention.

2 High integrity pillar seal
Compression grommet designed for long life.

3 Self-regulating relief valve
Enduro EHP are equipped with a safe, low pressure venting system, which is designed to release excess gas and reseal automatically as the internal gas pressure rising to an unacceptable level. This low pressure venting system, coupled with the significantly high recombination efficiency, make Enduro EHP one of the safest valve regulated lead acid batteries available.

4 Rugged super-thick positive plates
Thick plates with grids cast from high purity Lead-Calcium-Tin alloy to ensure a long and reliability life.

5 Balanced negative plates
Ensure optimum gas recombination efficiency.

6 Containers and lid
Made from thick-walled ABS standard plastic, designed for unsurpassed mechanical strength (flame retardancy standard IEC 707 FV0 and UL 94 V0 optional).

7 Separators
Low resistance microporous glass fibre.
The electrolyte is absorbed within this material.

8 Handle
Most size have handles integrated into the battery covers to facilitate ease of handling, installation and removal of the batteries.

Selection of Battery Size

The following examples are designed to illustrate the method of determining which Enduro EHP cell type will support your required duty load.

Constant current discharge

EXAMPLE A. To demonstrate constant current calculation and also the effect of temperature.

A nominal 50V telecommunications system using a 24 cell battery and requiring 102 amps constant current will operate satisfactorily at a minimum battery terminal volts level of 42 volts.

Calculate the battery type required for 2 hours standby duration on the basis of:
(a) 20°C operating temperature

(b) 5°C operating temperature

METHOD

(1) Minimum allowable volts per cell

$$\frac{42 \text{ volts}}{24 \text{ cells}} = 1.75\text{Vpc}$$

(2) Hence, cell performance requirement is 102 amps constant current to 1.75Vpc

(3) By reference to constant current performance table relating to 1.75 volts per cell level (see page 10):

(a) at 20°C

2V275 cell size is smallest available size to use (103 amps available).

Conclusion: Use 24 - 2V275 cells.

(b) at 5°C
by reference to the table on page 27 of this product guide, available current output at 20°C is reduced by factor 0.9.

Therefore at 5°C - 2 hours output is reduced to,

on 2V275 size, 103 amps x 0.9 = 92.7 amps.

Hence 2V275 cell size too small!

Try the next largest cell size - 2V320. At 5°C available

current output is 117.8 amps x 0.9 = 106.02 amps.

Conclusion: Use 24-2V320 cells.

Constant power discharge

EXAMPLE B. To demonstrate constant power calculation.

An inverter system requires a D.C. constant power input of 33.3 kW in the voltage range 486 volts maximum, 383 volts minimum.

Calculate the optimum battery size required for 20°C operation for a 1 hour standby period.

METHOD

(1) Number of cells = 486/2.26Vpc = 215 cells.

(2) Minimum volt per cell 383/215 = 1.781 1.80Vpc.

(3) Watts per cell = 33300 watts / 215 cells = 154.88 watts per cell.

(4) Hence cell performance requirement is 154.88 watts to 1.80Vpc at 20°C.

(5) By reference to the constant power performance table (see page 15) relating to 1.80 volts per cell level, 6V150 monobloc is the smallest available size to use.

Performance Data

Constant Current Discharge performance

Discharge Currents (Amperes) at 20°C to 1.60 volts per cell																									
Cell Type	Standby Time (Minutes)											Standby Time (Hours)													
	5	10	15	20	25	30	35	40	45	50	55	1	1.5	2	2.5	3	4	5	6	7	8	9	10	12	24
EHP12-14	50.0	39.0	28.0	23.0	20.0	17.0	15.5	14.1	12.6	11.7	10.8	9.90	8.00	6.10	5.25	4.40	3.55	2.70	2.40	2.10	1.80	1.65	1.50	1.33	0.75
EHP12-23	85.0	64.0	48.0	38.6	33.3	28.0	25.3	22.7	20.0	18.6	17.2	15.8	12.7	9.60	8.40	7.20	5.90	4.60	4.07	3.53	3.00	2.75	2.50	2.21	1.25
EHP12-32	115.2	85.0	65.0	51.0	44.3	37.5	34.0	30.5	27.0	25.1	23.3	21.4	17.2	12.9	11.2	9.50	7.80	6.10	5.37	4.63	3.90	3.60	3.30	2.92	1.65
EHP12-45	135.0	103.5	92.5	69.9	62.1	53.6	43.7	41.1	36.4	34.3	32.6	30.9	25.5	20.0	16.6	14.3	11.0	9.02	7.67	6.70	5.70	5.22	4.80	4.10	2.11
EHP12-55	165.5	126.8	103.7	85.4	76.0	65.5	53.4	50.3	44.5	41.9	39.8	37.7	25.5	20.0	16.6	14.3	11.0	9.02	7.67	6.70	6.80	6.45	5.80	4.10	2.61
EHP12-70	210.7	161.3	132.0	108.7	96.7	83.3	68.0	64.0	56.7	53.3	50.7	48.0	37.9	29.8	24.7	21.2	16.4	13.4	11.4	10.0	8.60	7.92	7.20	6.11	3.14
EHP12-80	215.6	168.5	138.5	115.2	100.9	86.9	76.5	69.5	62.9	57.7	52.2	49.9	39.0	30.5	26.4	22.6	17.3	14.1	12.2	10.2	9.54	8.46	8.40	6.84	3.74
EHP12-180	485.0	379.1	311.6	259.2	226.9	195.5	172.0	156.4	141.5	129.8	117.5	112.3	77.4	67.0	51.5	47.8	35.1	31.6	27.4	22.9	21.5	19.0	18.9	15.4	8.42
EHP6-105	316.0	242.0	198.0	163.0	145.0	125.0	102.0	96.0	85.0	80.0	76.0	73.5	47.0	41.2	31.6	29.4	21.7	19.4	16.7	14.0	13.2	11.5	11.0	8.90	4.60
EHP6-125	351.6	293.8	231.3	196.1	171.1	146.1	128.9	117.2	106.3	97.7	91.4	85.9	62.1	50.8	41.8	36.7	28.9	24.5	20.1	17.3	16.0	13.7	12.9	11.3	5.63
EHP6-150	402.0	335.0	265.0	235.3	205.3	175.3	154.7	140.6	127.5	117.2	109.7	103.1	74.5	60.9	50.2	44.1	34.7	29.3	24.1	20.8	19.2	16.4	15.5	13.5	6.75
EHP6-160	450.0	376.0	296.0	251.0	219.0	187.0	165.0	150.0	136.0	125.0	117.0	110.0	79.5	65.0	53.5	47.0	37.0	31.3	25.7	22.2	20.5	17.5	16.5	14.4	7.20
EHP2-200	586.0	477.0	380.0	315.0	276.0	238.0	207.0	188.0	171.0	160.0	145.0	140.0	91.0	79.0	60.5	56.0	42.0	37.5	32.0	25.8	25.5	21.5	20.4	17.0	9.30
EHP2-225	630.0	507.3	413.2	343.6	302.7	261.8	230.7	210.3	192.3	178.4	163.6	157.1	104.7	90.0	69.5	63.8	46.6	41.7	36.0	29.5	28.5	23.7	22.7	19.1	10.4
EHP2-250	698.0	563.6	459.1	381.8	336.4	290.9	256.4	233.6	213.6	198.2	181.8	174.5	116.4	100.0	77.3	70.9	51.8	46.4	40.0	32.7	31.6	26.4	25.2	21.2	11.5
EHP2-275	802.0	620.0	505.0	420.0	370.0	320.0	282.0	257.0	235.0	218.0	200.0	192.0	128.0	110.0	85.0	78.0	57.0	51.0	44.0	36.0	34.8	29.0	27.7	23.3	12.7
EHP2-300	860.0	665.0	541.0	450.0	394.0	343.0	305.0	280.4	256.4	237.8	217.5	208.0	138.8	120.0	92.3	84.8	62.3	55.5	48.0	39.0	36.5	31.7	31.5	25.7	13.9
EHP2-320	948.0	726.0	594.0	489.0	435.0	375.0	306.0	288.0	255.0	240.0	228.0	220.5	160.0	123.6	98.0	88.2	70.0	58.2	50.1	42.0	39.6	34.5	33.0	27.2	14.2
EHP2-400	1123	905.0	735.0	622.0	546.0	473.0	410.0	375.0	345.0	315.0	290.0	280.0	185.0	160.0	123.0	113.0	83.0	74.0	64.0	52.0	50.5	42.3	42.0	34.2	18.5
EHP2-405	1170	914.6	764.4	633.1	559.1	476.6	395.6	361.7	327.1	300.4	279.2	271.3	193.5	159.6	130.5	112.5	90.4	75.1	64.5	53.1	50.0	42.4	40.6	37.3	18.8
EHP2-455	1315	1028	858.8	711.2	628.2	535.4	444.4	406.4	367.5	337.5	313.6	304.8	217.3	179.3	146.7	126.3	101.6	84.4	72.4	59.6	56.2	47.6	45.6	41.9	20.1
EHP2-515	1488	1163	972.0	805.0	711.0	606.0	503.0	460.0	416.0	382.0	355.0	345.0	246.0	203.0	166.0	143.0	115.0	95.5	82.0	67.5	63.6	53.9	51.6	47.4	22.6
EHP2-560	1618	1265	1057	875.3	773.1	659.0	547.0	500.2	452.3	415.4	386.0	375.1	267.5	220.7	180.5	155.5	125.0	103.8	89.2	73.4	69.2	58.6	56.1	51.5	24.6

Performance Data

Constant Current Discharge performance

Discharge Currents (Amperes) at 20°C to 1.65 volts per cell																									
Cell Type	Standby Time (Minutes)											Standby Time (Hours)													
	5	10	15	20	25	30	35	40	45	50	55	1	1.5	2	2.5	3	4	5	6	7	8	9	10	12	24
EHP12-14	47.0	38.0	27.5	22.5	19.6	16.6	15.2	13.8	12.4	11.5	10.7	9.80	7.95	6.10	5.25	4.40	3.55	2.70	2.40	2.10	1.80	1.65	1.50	1.33	0.75
EHP12-23	81.0	62.0	46.0	37.6	32.5	27.3	24.8	22.3	19.8	18.4	17.0	15.6	12.6	9.50	8.30	7.10	5.80	4.50	3.97	3.43	2.90	2.65	2.40	2.12	1.20
EHP12-32	111.3	83.0	62.0	50.0	43.3	36.5	33.2	29.8	26.5	24.7	22.9	21.1	17.0	12.8	11.1	9.40	7.75	6.10	5.37	4.63	3.90	3.60	3.30	2.92	1.65
EHP12-45	123.0	98.0	86.8	68.1	60.0	51.9	42.0	39.4	35.1	33.0	31.7	30.4	25.5	20.0	16.6	14.3	11.0	9.02	7.67	6.70	5.60	5.20	4.70	4.10	2.11
EHP12-55	149.8	120.5	99.5	83.3	73.3	63.4	51.3	48.2	43.0	40.3	38.8	37.2	31.5	24.8	20.5	17.7	13.7	11.2	9.50	8.31	6.70	6.40	5.80	5.08	2.61
EHP12-70	190.7	153.3	126.7	106.0	93.3	80.7	65.3	61.3	54.7	51.3	49.3	47.3	37.9	29.8	24.7	21.2	16.4	13.4	11.4	10.0	8.50	7.92	7.20	6.11	3.14
EHP12-80	201.0	163.4	136.4	114.4	99.8	85.9	76.0	69.0	62.4	57.0	51.8	49.0	38.5	30.0	25.6	22.4	17.0	13.8	11.9	10.1	9.45	8.46	8.27	6.84	3.74
EHP12-180	452.3	367.7	307.0	257.5	224.6	193.2	170.9	155.2	140.4	128.3	116.6	110.2	76.0	64.7	50.6	46.6	34.7	31.1	26.7	22.7	21.3	19.0	18.6	15.4	8.42
EHP6-105	286.0	230.0	190.0	159.0	140.0	121.0	98.0	92.0	82.0	77.0	74.0	72.5	47.0	41.2	31.6	29.4	21.7	19.4	16.7	14.0	13.2	11.5	11.0	8.90	4.60
EHP6-125	339.8	273.4	225.8	189.8	166.8	143.8	127.3	114.8	103.9	95.3	89.8	85.2	60.2	48.4	41.0	35.5	28.5	24.3	19.8	17.2	15.8	13.7	12.8	11.3	5.55
EHP6-150	388.0	310.0	258.0	227.8	200.2	172.5	152.8	137.8	124.7	114.4	107.8	102.2	72.2	58.1	49.2	42.7	34.2	29.2	23.8	20.6	18.9	16.4	15.4	13.5	6.66
EHP6-160	435.0	350.0	289.0	243.0	213.5	184.0	163.0	147.0	133.0	122.0	115.0	109.0	77.0	62.0	52.5	45.5	36.5	31.1	25.4	22.0	20.2	17.5	16.4	14.4	7.10
EHP2-200	544.0	437.0	362.0	303.0	266.5	230.0	206.0	185.5	169.6	156.7	144.0	138.0	90.8	78.4	60.1	55.0	40.9	37.0	31.8	25.7	25.7	21.2	20.3	16.9	9.25
EHP2-225	586.0	491.7	406.6	341.2	299.9	258.5	229.5	209.0	191.3	176.7	162.4	155.5	102.7	88.4	67.9	63.0	46.5	41.6	35.8	29.1	28.4	23.7	22.7	19.1	10.4
EHP2-250	650.0	546.4	451.8	379.1	333.2	287.3	255.0	232.3	212.5	196.4	180.5	172.7	114.1	98.2	75.5	70.0	51.6	46.2	39.7	32.4	31.5	26.4	25.2	21.2	11.5
EHP2-275	748.0	601.0	497.0	417.0	366.5	316.0	280.5	255.5	233.8	216.0	198.5	190.0	125.5	108.0	83.0	77.0	56.8	50.8	43.7	35.6	34.7	29.0	27.7	23.3	12.7
EHP2-300	802.0	645.0	533.0	447.0	390.0	339.0	303.0	278.1	254.4	235.1	216.0	204.0	136.2	116.0	90.8	82.6	61.5	54.5	46.9	38.6	36.2	31.7	31.0	25.7	13.9
EHP2-320	857.0	689.0	570.0	478.0	420.0	362.0	294.0	276.0	246.0	231.0	222.0	217.0	155.0	123.5	96.0	88.2	68.0	58.2	50.1	42.0	39.6	34.5	33.0	27.0	14.2
EHP2-400	1088	874.0	723.0	606.0	533.0	460.0	407.0	371.0	339.5	313.5	288.0	276.0	182.0	157.0	121.0	112.0	82.0	73.9	63.6	51.5	50.4	42.3	42.0	34.2	18.5
EHP2-405	1102	885.0	732.0	614.0	540.0	466.0	391.6	357.8	324.0	298.0	276.8	279.0	190.3	159.0	128.2	113.0	89.7	74.8	64.4	53.0	51.0	42.3	42.5	36.6	18.8
EHP2-455	1238	995.0	823.0	690.0	606.5	523.0	440.0	402.0	364.0	334.8	311.0	314.0	213.8	178.0	144.0	127.0	100.7	84.1	72.3	59.5	57.3	47.5	47.8	41.1	20.1
EHP2-515	1401	1126	931.0	781.0	686.5	592.0	498.0	455.0	412.0	379.0	352.0	343.0	242.0	202.0	163.0	142.0	114.0	95.2	81.9	67.4	63.5	53.8	51.6	46.5	22.6
EHP2-560	1523	1224	1012	849.0	746.5	644.0	541.5	494.8	448.0	412.1	382.8	386.0	263.1	220.0	177.2	157.0	124.0	103.5	89.0	73.3	70.6	58.5	58.8	50.6	24.6

Performance Data

Constant Current Discharge performance

Discharge Currents (Amperes) at 20°C to 1.70 volts per cell																									
Cell Type	Standby Time (Minutes)											Standby Time (Hours)													
	5	10	15	20	25	30	35	40	45	50	55	1	1.5	2	2.5	3	4	5	6	7	8	9	10	12	24
EHP12-14	44.0	37.0	27.0	22.0	19.2	16.3	14.9	13.5	12.1	11.3	10.5	9.70	7.90	6.10	5.25	4.40	3.55	2.70	2.40	2.10	1.80	1.65	1.50	1.33	0.75
EHP12-23	76.0	60.0	45.0	36.6	31.6	26.6	24.2	21.7	19.3	18.0	16.6	15.3	12.3	9.30	8.15	7.00	5.70	4.40	3.90	3.40	2.90	2.65	2.40	2.12	1.20
EHP12-32	105.4	80.0	60.0	48.0	41.8	35.5	32.3	29.2	26.0	24.3	22.5	20.8	16.8	12.7	11.0	9.30	7.70	6.10	5.37	4.63	3.90	3.60	3.30	2.92	1.65
EHP12-45	111.0	92.6	80.2	64.7	57.4	50.1	41.4	38.0	34.8	32.6	30.9	29.1	24.9	19.6	16.3	14.0	10.9	8.84	7.52	6.58	5.50	5.16	4.70	4.03	2.09
EHP12-55	135.1	112.1	93.8	79.1	70.2	61.3	50.7	46.4	42.5	39.8	37.7	35.6	30.8	24.2	20.1	17.3	13.4	11.0	9.32	8.15	6.70	6.35	5.70	5.00	2.59
EHP12-70	172.0	142.7	119.3	100.7	89.3	78.0	64.5	59.1	54.1	50.7	48.0	45.3	37.4	29.4	24.4	21.0	16.2	13.3	11.3	9.88	8.50	7.84	7.15	6.05	3.13
EHP12-80	181.7	152.5	128.5	108.8	94.5	83.3	74.1	66.6	60.2	55.4	50.8	47.8	38.0	29.5	25.0	22.2	16.8	13.6	11.7	10.1	9.45	8.46	8.16	6.84	3.74
EHP12-180	408.9	343.1	289.2	244.8	212.5	187.5	166.8	149.9	135.5	124.6	114.2	107.5	75.2	63.1	50.4	45.9	34.7	30.6	26.4	22.7	21.2	19.0	18.4	15.4	8.42
EHP6-105	258.0	214.0	179.0	151.0	134.0	117.0	96.7	88.6	81.2	76.0	72.0	71.0	47.0	40.3	31.6	29.0	21.7	19.1	16.5	14.0	13.1	11.5	10.9	8.90	4.60
EHP6-125	307.0	254.7	212.5	180.5	160.2	139.8	125.8	113.3	101.6	93.8	88.3	84.5	59.4	48.0	39.8	34.5	28.1	22.7	19.6	17.0	15.5	13.6	12.7	11.2	5.47
EHP6-150	348.0	288.0	242.0	216.6	192.2	167.8	150.9	135.9	121.9	112.5	105.9	101.4	71.3	57.6	47.8	41.4	33.8	27.3	23.5	20.4	18.7	16.3	15.3	13.4	6.56
EHP6-160	393.0	326.0	272.0	231.0	205.0	179.0	161.0	145.0	130.0	120.0	113.0	108.2	76.0	61.4	51.0	44.2	36.0	29.1	25.1	21.8	19.9	17.4	16.3	14.3	7.00
EHP2-200	492.0	408.0	340.0	288.0	255.5	223.0	200.5	182.0	166.0	154.5	143.0	135.0	90.8	76.8	60.1	54.0	40.9	36.3	31.4	25.7	24.9	21.2	20.2	16.9	9.25
EHP2-225	528.0	459.0	382.9	324.8	288.0	251.2	223.4	205.0	187.2	174.1	161.0	152.2	102.4	86.7	67.7	62.1	46.2	40.8	35.3	29.0	28.1	23.7	22.6	19.1	10.4
EHP2-250	585.0	510.0	425.5	360.9	320.0	279.1	248.2	227.7	208.0	193.5	178.9	169.1	113.8	96.4	75.3	69.0	51.4	45.4	39.3	32.3	31.2	26.4	25.1	21.2	11.5
EHP2-275	676.0	561.0	468.0	397.0	352.0	307.0	273.0	250.5	228.8	212.8	196.8	186.0	125.2	106.0	82.8	75.9	56.5	49.9	43.2	35.5	34.3	29.0	27.6	23.3	12.7
EHP2-300	725.0	602.0	502.0	425.0	369.0	329.0	295.8	268.7	245.6	228.2	211.5	199.0	134.9	113.0	90.4	81.4	61.5	53.6	46.3	38.6	36.2	31.7	30.6	25.7	13.8
EHP2-320	774.0	643.0	536.0	454.0	403.0	352.0	290.1	265.8	243.6	228.0	216.0	213.0	150.0	121.0	94.8	86.9	65.1	57.2	49.5	42.0	39.2	34.5	32.6	26.7	14.1
EHP2-400	983.0	816.0	680.0	577.0	511.5	446.0	396.1	363.6	332.0	308.7	285.6	270.0	181.8	154.0	120.5	110.0	82.0	72.6	62.8	51.5	49.8	42.3	41.4	34.2	18.4
EHP2-405	995.0	826.0	689.0	584.0	518.0	452.0	379.8	347.6	318.5	294.9	275.2	274.0	187.2	156.0	125.8	112.0	88.1	73.5	63.6	52.8	50.5	42.2	42.0	35.4	18.6
EHP2-455	1118	928.0	774.0	656.0	582.0	508.0	426.7	390.5	357.8	331.3	309.2	308.0	210.3	175.0	141.4	126.0	99.0	82.6	71.4	59.4	56.7	47.4	47.1	39.8	18.8
EHP2-515	1266	1051	876.0	743.0	659.0	575.0	483.0	442.0	405.0	375.0	350.0	341.0	238.0	198.0	160.0	140.0	112.0	93.5	80.9	67.2	63.5	53.7	51.6	45.0	22.6
EHP2-560	1376	1142	952.0	808.0	716.5	625.0	525.2	480.6	440.4	407.8	380.6	379.0	258.8	215.0	174.0	155.0	121.8	101.7	87.9	73.1	69.8	58.4	58.0	48.9	24.6

Performance Data

Constant Current Discharge performance

Discharge Currents (Amperes) at 20°C to 1.75 volts per cell																									
Cell Type	Standby Time (Minutes)											Standby Time (Hours)													
	5	10	15	20	25	30	35	40	45	50	55	1	1.5	2	2.5	3	4	5	6	7	8	9	10	12	24
EHP12-14	41.0	35.0	26.0	21.0	18.4	15.8	14.5	13.1	11.8	11.0	10.3	9.50	7.70	5.90	5.10	4.30	3.45	2.60	2.30	2.00	1.70	1.60	1.50	1.33	0.75
EHP12-23	72.0	56.0	43.0	34.5	30.2	25.8	23.5	21.2	18.9	17.6	16.4	15.1	12.2	9.20	8.05	6.90	5.60	4.30	3.80	3.30	2.80	2.60	2.40	2.12	1.20
EHP12-32	100.1	75.0	56.0	46.0	40.3	34.5	31.3	28.2	25.0	23.5	22.0	20.5	16.6	12.6	10.9	9.20	7.60	6.00	5.27	4.53	3.80	3.55	3.30	2.92	1.65
EHP12-45	99.0	86.5	74.1	60.0	53.8	47.6	41.2	37.8	34.5	31.8	29.6	27.3	24.4	19.1	16.0	13.7	10.6	8.74	7.44	6.44	5.40	5.10	4.65	3.99	2.07
EHP12-55	121.0	106.9	86.4	73.3	65.7	58.1	50.3	46.1	42.2	38.9	36.1	33.4	30.2	23.7	19.8	17.0	13.1	10.8	9.22	7.98	6.60	6.30	5.65	4.94	2.57
EHP12-70	154.0	136.0	110.0	93.3	83.7	74.0	64.1	58.7	53.7	49.5	46.0	42.5	36.3	28.4	23.8	20.4	15.8	13.0	11.1	9.59	8.40	7.69	7.10	5.94	3.08
EHP12-80	162.4	136.5	116.2	100.6	90.3	78.8	71.4	63.9	58.3	53.0	48.7	46.1	37.0	29.0	24.5	21.8	16.5	13.3	11.6	10.1	9.45	8.46	8.05	6.84	3.74
EHP12-180	365.5	307.2	261.5	226.4	203.1	177.3	160.7	143.8	131.1	119.2	109.5	103.7	72.2	61.4	48.5	45.0	33.8	29.9	26.0	22.7	21.0	19.0	18.1	15.4	8.42
EHP6-105	231.0	204.0	165.0	140.0	125.5	111.0	96.1	88.1	80.6	74.3	69.0	68.5	46.7	39.3	31.5	28.4	21.6	18.7	16.3	13.9	12.9	11.4	10.8	8.80	4.60
EHP6-125	275.0	228.1	192.2	166.4	149.2	132.0	121.1	109.4	100.0	92.2	87.5	81.5	58.6	46.7	39.1	33.8	27.3	22.3	19.4	16.8	15.3	13.5	12.7	11.2	5.39
EHP6-150	310.0	256.0	218.0	199.7	179.1	158.4	145.3	131.3	120.0	110.6	105.0	97.8	70.3	56.1	46.9	40.5	32.8	26.7	23.3	20.2	18.4	16.2	15.2	13.4	6.47
EHP6-160	352.0	292.0	246.0	213.0	191.0	169.0	155.0	140.0	128.0	118.0	112.0	104.3	75.0	59.8	50.0	43.2	35.0	28.5	24.8	21.5	19.6	17.3	16.2	14.3	6.90
EHP2-200	440.0	365.0	308.0	266.0	238.5	211.0	190.0	172.0	158.5	146.0	135.5	130.0	86.5	74.8	59.0	53.0	40.0	35.6	31.0	25.7	24.5	21.2	20.1	16.9	9.25
EHP2-225	467.0	410.7	346.9	299.5	268.4	237.3	209.1	193.7	178.5	164.5	152.6	146.5	98.2	84.3	65.5	60.8	45.0	40.1	34.9	28.9	27.6	23.7	22.6	19.1	10.4
EHP2-250	518.9	456.4	385.5	332.7	298.2	263.6	232.4	215.3	198.4	182.7	169.5	162.7	109.1	93.6	72.7	67.5	50.0	44.5	38.7	32.1	30.6	26.4	25.1	21.2	11.5
EHP2-275	604.0	502.0	424.0	366.0	328.0	290.0	255.6	236.8	218.2	201.0	186.5	179.0	120.0	103.0	80.0	74.3	55.0	49.0	42.6	35.3	33.7	29.0	27.6	23.3	12.7
EHP2-300	648.0	539.0	454.0	393.0	352.7	311.0	284.9	257.7	237.5	218.3	202.8	192.0	129.5	110.0	87.0	79.7	60.0	52.5	45.7	38.6	36.2	31.7	30.2	25.7	13.8
EHP2-320	692.0	575.0	485.0	420.0	376.0	332.0	288.3	264.3	241.8	222.9	207.0	205.0	146.0	117.8	94.5	85.1	64.8	56.1	48.8	41.7	38.6	34.2	32.3	26.4	14.1
EHP2-400	879.0	730.0	616.0	533.0	477.5	422.0	370.8	343.8	316.6	291.0	270.5	261.0	173.0	150.0	116.0	108.0	80.0	71.2	61.9	51.5	49.0	42.3	41.0	34.2	18.4
EHP2-405	890.0	740.0	624.0	539.0	483.0	427.0	373.5	338.9	314.6	292.5	272.9	264.0	184.0	151.0	124.3	109.0	86.5	72.1	62.7	52.3	49.7	42.2	41.5	34.6	18.5
EHP2-455	1000	831.0	701.0	606.0	543.0	480.0	419.7	380.8	353.4	328.7	306.6	297.0	206.7	170.0	139.6	123.0	97.2	81.0	70.4	58.8	55.8	47.4	46.6	38.9	18.7
EHP2-515	1132	940.0	793.0	686.0	614.5	543.0	475.0	431.0	400.0	372.0	347.0	338.0	234.0	193.0	158.0	139.0	110.0	91.7	79.7	66.5	63.1	53.7	51.5	44.0	22.5
EHP2-560	1231	1023	862.0	746.0	668.0	590.0	516.5	468.7	435.0	404.5	377.3	365.0	254.4	209.0	171.8	151.0	119.6	99.7	86.7	72.3	68.7	58.4	57.3	47.8	24.5

Performance Data

Constant Current Discharge performance

Discharge Currents (Amperes) at 20°C to 1.80 volts per cell																									
Cell Type	Standby Time (Minutes)											Standby Time (Hours)													
	5	10	15	20	25	30	35	40	45	50	55	1	1.5	2	2.5	3	4	5	6	7	8	9	10	12	24
EHP12-14	38.0	32.0	24.0	20.0	17.5	15.0	13.8	12.7	11.5	10.8	10.0	9.30	7.50	5.70	4.90	4.10	3.30	2.50	2.23	1.97	1.70	1.55	1.40	1.24	0.70
EHP12-23	66.0	52.0	40.0	32.5	28.7	24.8	22.6	20.5	18.3	17.2	16.0	14.9	12.0	9.10	7.95	6.80	5.50	4.20	3.70	3.20	2.70	2.50	2.30	2.03	1.15
EHP12-32	95.5	70.0	52.0	44.0	38.5	33.0	30.2	27.3	24.5	23.1	21.6	20.2	16.3	12.3	10.7	9.10	7.50	5.90	5.17	4.43	3.70	3.45	3.20	2.83	1.60
EHP12-45	84.6	81.0	69.1	57.0	50.1	43.3	39.9	36.8	33.7	31.2	28.9	26.6	23.6	18.4	15.3	13.2	10.2	8.37	7.17	6.24	5.40	5.01	4.60	3.87	2.05
EHP12-55	103.2	99.0	81.7	69.7	61.3	52.9	48.8	44.9	41.2	38.1	35.3	32.5	29.3	22.8	18.9	16.3	12.7	10.4	8.88	7.74	6.60	6.21	5.50	4.80	2.54
EHP12-70	131.3	126.0	104.0	88.7	78.0	67.3	62.1	57.2	52.5	48.5	44.9	41.4	35.2	27.4	22.7	19.6	15.2	12.5	10.7	9.30	8.40	7.46	7.00	5.77	3.05
EHP12-80	138.9	117.3	101.4	89.6	81.6	71.7	65.5	58.9	53.2	49.4	44.8	43.4	35.8	28.0	23.4	21.5	16.0	12.9	11.2	10.0	9.33	8.46	8.00	6.78	3.64
EHP12-180	312.5	263.9	228.1	201.6	183.6	161.3	147.3	132.5	119.8	111.1	100.8	97.7	70.1	58.6	47.5	42.9	33.2	29.0	25.2	22.5	21.0	19.0	18.0	15.3	8.19
EHP6-105	197.0	189.0	156.0	133.0	117.0	101.0	93.2	85.8	78.7	72.7	67.4	64.5	45.6	37.4	31.0	27.1	21.2	18.1	15.7	13.7	12.6	11.2	10.5	8.70	4.50
EHP6-125	234.4	196.1	168.0	148.4	134.4	120.3	114.1	103.9	96.1	89.8	84.4	78.1	56.3	46.3	38.3	33.6	26.9	21.6	18.8	16.4	15.0	13.4	12.5	10.9	5.35
EHP6-150	261.0	217.0	189.0	178.1	161.3	144.4	136.9	124.7	115.3	107.8	101.3	93.8	67.5	55.5	45.9	40.3	32.3	25.9	22.5	19.7	18.0	16.1	15.0	13.0	6.42
EHP6-160	300.0	251.0	215.0	190.0	172.0	154.0	146.0	133.0	123.0	115.0	108.0	100.0	72.0	59.2	49.0	43.0	34.4	27.6	24.0	21.0	19.2	17.2	16.0	13.9	6.85
EHP2-200	376.0	314.0	268.0	237.0	214.5	192.0	174.1	158.3	144.7	135.7	124.4	120.0	84.0	71.2	57.0	51.6	39.5	34.5	30.0	25.6	24.0	21.1	20.0	17.2	9.08
EHP2-225	396.0	352.6	301.9	266.7	241.4	216.0	189.0	178.9	163.2	153.0	140.3	138.3	94.9	80.2	64.2	58.1	44.4	38.9	33.7	28.7	26.9	23.7	22.5	19.0	10.2
EHP2-250	439.0	391.8	335.5	296.4	268.2	240.0	210.0	198.7	181.4	170.0	155.9	153.6	105.5	89.1	71.4	64.5	49.4	43.2	37.5	31.9	29.9	26.4	25.0	21.1	11.4
EHP2-275	516.0	431.0	369.0	326.0	295.0	264.0	231.0	218.6	199.5	187.0	171.5	169.0	116.0	98.0	78.5	71.0	54.3	47.5	41.2	35.1	32.9	29.0	27.5	23.2	12.5
EHP2-300	554.0	463.0	396.0	350.0	318.8	283.0	261.2	237.5	217.1	203.6	186.6	181.0	125.7	105.0	85.1	76.1	58.9	50.9	44.2	38.3	36.0	31.7	30.0	25.4	13.7
EHP2-320	592.0	494.0	423.0	374.0	338.0	302.0	279.6	257.4	236.1	218.1	202.2	193.0	140.0	112.1	93.0	81.3	63.6	54.4	47.2	41.1	37.7	33.6	32.0	26.1	14.0
EHP2-400	751.0	627.0	537.0	474.0	429.0	384.0	334.6	316.5	289.5	271.5	249.0	246.0	168.0	142.0	113.5	103.0	78.5	69.0	59.9	51.0	47.9	42.3	40.0	33.9	18.2
EHP2-405	761.0	635.0	544.0	480.0	434.5	389.0	361.7	331.1	312.2	289.4	271.3	249.0	181.7	144.0	122.7	104.0	86.5	69.9	60.7	51.9	48.5	42.1	40.5	34.2	18.4
EHP2-455	854.0	713.0	611.0	540.0	488.5	437.0	406.4	372.0	350.7	325.1	304.8	279.0	204.1	162.0	137.8	117.0	97.2	78.5	68.2	58.3	54.5	47.3	45.5	38.4	18.7
EHP2-515	967.0	808.0	691.0	630.0	581.0	514.0	460.0	421.0	397.0	368.0	345.0	321.0	231.0	191.0	156.0	138.0	110.0	91.5	77.1	66.0	62.8	53.5	51.5	43.5	22.5
EHP2-560	1052	878.0	752.0	664.0	601.0	538.0	500.2	457.8	431.7	400.2	375.1	344.0	251.2	199.0	169.6	144.0	119.6	96.7	83.9	71.8	67.1	58.2	56.0	47.3	24.5

Performance Data

Constant Power Discharge performance

Constant Power Discharge (Watts per cell) at 20°C to 1.65 volts per cell																									
Cell Type	Standby Time (Minutes)											Standby Time (Hours)													
	5	10	15	20	25	30	35	40	45	50	55	1	1.5	2	2.5	3	4	5	6	7	8	9	10	12	24
EHP12-14	81.2	68.2	51.2	42.3	37.3	32.2	29.5	26.8	24.2	22.7	21.3	19.8	15.8	11.8	10.3	8.67	7.08	5.50	4.83	4.17	3.50	3.17	2.83	2.50	1.42
EHP12-23	139.3	113.3	85.6	70.1	61.0	51.9	47.2	42.5	37.8	35.3	32.7	30.2	24.1	18.0	15.8	13.6	11.2	8.80	7.80	6.80	5.80	5.25	4.70	4.15	2.35
EHP12-32	191.4	151.2	115.3	93.7	81.5	69.3	63.2	57.0	50.8	47.6	44.4	41.2	32.9	24.7	21.6	18.5	15.3	12.0	10.6	9.22	7.83	7.17	6.50	5.74	3.25
EHP12-45	209.1	186.0	165.0	123.9	99.4	95.1	80.6	72.0	67.7	63.9	61.7	57.9	38.1	33.1	25.7	23.9	18.0	15.9	13.6	11.7	10.8	9.51	8.91	7.37	3.81
EHP12-55	261.4	227.3	201.7	151.4	121.5	116.3	98.5	88.0	82.8	78.0	75.4	70.7	46.6	40.5	31.4	29.2	22.1	19.4	16.6	14.2	13.2	11.6	10.9	9.01	4.66
EHP12-70	332.7	289.3	248.9	192.7	154.7	148.0	125.3	112.0	105.3	99.3	96.0	90.0	59.3	51.5	40.0	37.1	28.1	24.7	21.1	18.1	16.8	14.8	13.9	11.5	5.93
EHP12-80	351.2	291.6	246.3	207.9	183.6	157.6	138.4	126.4	115.1	105.7	95.9	90.7	62.7	53.8	41.7	39.1	28.8	26.3	22.6	19.2	18.3	16.7	15.9	13.2	7.09
EHP12-180	790.2	656.1	554.1	467.7	413.0	354.5	311.3	284.5	258.9	237.9	215.8	204.1	141.2	121.1	93.7	88.0	64.9	59.3	50.8	43.1	41.2	37.6	35.7	29.7	16.0
EHP6-105	499.0	410.0	342.0	289.0	232.0	222.0	188.0	168.0	158.0	149.0	144.0	135.0	89.0	77.3	60.0	55.7	42.1	37.0	31.7	27.2	25.2	22.2	20.8	17.2	8.90
EHP6-125	593.8	487.5	407.8	343.8	298.4	264.1	228.1	207.0	190.6	173.4	160.9	160.2	109.4	92.0	72.7	66.3	50.2	44.0	37.7	32.5	30.0	26.7	24.6	20.5	10.7
EHP6-150	659.6	551.8	464.4	412.5	358.1	316.9	273.8	248.4	228.8	208.1	193.1	192.2	131.3	110.4	87.2	79.5	60.2	52.8	45.3	39.0	36.0	32.1	29.5	24.7	12.8
EHP6-160	760.0	624.0	522.0	440.0	382.0	338.0	292.0	265.0	244.0	222.0	206.0	205.0	140.0	117.8	93.0	84.8	64.2	56.3	48.3	41.6	38.4	34.2	31.5	26.3	13.7
EHP2-200	950.0	780.0	652.0	550.0	470.3	422.0	374.2	339.1	312.0	289.9	265.9	256.0	171.2	147.0	114.5	106.0	78.3	70.4	60.4	49.5	48.0	40.7	40.0	32.8	17.9
EHP2-225	996.2	877.9	733.9	619.4	516.8	474.5	417.4	382.3	351.7	326.8	299.7	288.8	193.0	165.3	128.9	119.5	88.4	79.2	68.0	55.6	54.0	46.2	43.8	37.1	20.2
EHP2-250	1105	975.5	815.5	688.2	574.2	527.3	463.7	424.8	390.8	363.1	333.0	320.9	214.5	183.6	143.3	132.7	98.2	88.0	75.5	61.7	60.0	51.4	48.6	41.2	22.5
EHP2-275	1306	1073	897.0	757.0	631.6	580.0	510.1	467.3	429.9	399.4	366.3	353.0	235.9	202.0	157.6	146.0	108.0	96.8	83.1	67.9	66.0	56.5	53.5	45.3	24.7
EHP2-300	1401	1151	962.0	812.0	717.0	622.0	552.0	509.8	469.0	435.7	399.6	378.0	253.0	217.0	168.0	156.0	115.0	104.0	89.1	73.3	70.0	62.7	59.5	49.5	26.6
EHP2-320	1496	1229	1027	867.0	696.0	665.0	564.0	504.0	474.0	447.0	432.0	371.0	267.0	232.0	180.0	167.1	126.3	111.0	95.1	81.6	75.6	66.6	62.4	51.6	26.7
EHP2-400	1900	1561	1200	1038	920.0	844.0	748.4	678.2	624.0	579.8	531.8	484.0	342.4	282.0	229.0	201.0	156.6	141.0	121.0	99.0	96.0	81.4	80.0	65.6	35.6
EHP2-405	1924	1581	1320	1114	984.6	854.8	716.7	658.4	599.4	557.4	523.2	515.2	363.5	298.0	247.7	214.7	171.4	142.3	122.7	104.6	97.2	83.4	81.0	74.2	35.9
EHP2-455	2161	1776	1483	1252	1106	960.4	805.2	739.7	673.4	626.2	587.8	578.8	408.4	334.8	278.3	241.2	192.6	159.9	137.8	117.5	109.2	93.7	91.0	83.4	38.5
EHP2-515	2446	2010	1679	1417	1252	1087	911.3	837.2	762.2	708.7	665.3	655.1	462.2	379.0	315.0	273.0	218.0	181.0	156.0	133.0	123.6	106.0	103.0	94.4	43.6
EHP2-560	2660	2186	1826	1541	1361	1182	991.0	910.4	828.8	770.7	723.4	712.4	502.6	412.1	342.5	296.9	237.0	196.8	169.6	144.6	134.4	115.3	112.0	102.6	47.4

Performance Data

Constant Power Discharge performance

Constant Power Discharge (Watts per cell) at 20°C to 1.70 volts per cell																									
Cell Type	Standby Time (Minutes)											Standby Time (Hours)													
	5	10	15	20	25	30	35	40	45	50	55	1	1.5	2	2.5	3	4	5	6	7	8	9	10	12	24
EHP12-14	78.6	66.7	50.2	41.3	36.4	31.5	28.9	26.4	23.8	22.4	21.1	19.7	15.7	11.7	10.2	8.67	7.08	5.50	4.83	4.17	3.50	3.17	2.83	2.50	1.42
EHP12-23	134.2	112.0	84.5	68.6	59.7	50.8	46.4	41.9	37.4	34.9	32.5	30.0	23.9	17.8	15.7	13.5	11.1	8.67	7.68	6.69	5.70	5.20	4.70	4.15	2.35
EHP12-32	184.5	147.3	112.8	92.5	80.4	68.3	62.4	56.4	50.5	47.3	44.1	40.8	32.7	24.5	21.4	18.3	15.2	12.0	10.6	9.22	7.83	7.17	6.50	5.74	3.25
EHP12-45	194.3	180.0	160.0	119.6	97.7	93.4	79.3	70.3	66.4	62.1	60.4	57.0	37.3	32.7	25.3	23.6	17.9	15.6	13.5	11.6	10.8	9.47	8.91	7.37	3.81
EHP12-55	240.4	220.0	195.6	146.1	119.4	114.2	96.9	85.9	81.2	76.0	73.9	69.7	45.6	40.0	30.9	28.8	21.9	19.1	16.5	14.1	13.2	11.6	10.9	9.01	4.66
EHP12-70	306.0	280.0	242.7	186.0	152.0	145.3	123.3	109.3	103.3	96.7	94.0	88.7	58.0	50.9	39.3	36.7	27.9	24.3	21.0	18.0	16.8	14.7	13.9	11.5	5.93
EHP12-80	323.4	276.9	235.3	200.7	178.7	155.0	133.9	123.6	112.1	103.6	94.9	90.0	62.2	53.3	41.2	38.9	28.6	26.1	22.4	19.1	18.2	16.7	15.9	13.2	7.07
EHP12-180	727.6	623.0	529.3	451.6	402.0	348.8	301.2	278.2	252.1	233.1	213.5	202.5	140.1	120.0	92.6	87.4	64.3	58.7	50.4	43.0	41.0	37.6	35.7	29.7	15.9
EHP6-105	459.0	389.0	327.0	279.0	228.0	218.0	185.0	164.0	155.0	145.0	141.0	133.0	87.0	76.4	59.0	55.0	41.8	36.5	31.5	27.0	25.2	22.1	20.8	17.2	8.90
EHP6-125	546.9	463.3	389.8	332.0	293.0	259.4	223.4	203.9	188.3	171.1	159.4	158.6	108.6	91.0	72.7	65.5	50.0	43.5	37.5	32.4	30.0	26.7	24.5	20.5	10.7
EHP6-150	609.0	518.4	435.6	398.4	351.6	311.3	268.1	244.7	225.9	205.3	191.3	190.3	130.3	109.2	87.2	78.6	60.0	52.2	45.0	38.9	36.0	32.1	29.4	24.7	12.8
EHP6-160	700.0	593.0	499.0	425.0	375.0	332.0	286.0	261.0	241.0	219.0	204.0	203.0	139.0	116.5	93.0	83.8	64.0	55.7	48.0	41.5	38.4	34.2	31.4	26.3	13.7
EHP2-200	875.0	741.0	623.0	532.0	448.3	415.0	364.2	331.7	303.9	284.1	263.0	254.0	169.5	146.0	113.8	105.0	77.9	69.6	60.0	49.4	48.0	40.7	39.8	32.8	17.9
EHP2-225	924.0	833.7	701.2	598.1	494.4	466.4	403.6	373.9	342.6	320.2	296.5	285.5	191.2	163.6	128.2	117.8	88.0	78.3	67.5	55.6	54.0	46.2	43.8	37.1	20.2
EHP2-250	1024	926.4	779.1	664.5	549.4	518.2	448.5	415.5	380.6	355.8	329.5	317.3	212.5	181.8	142.5	130.9	97.7	87.0	75.0	61.7	60.0	51.4	48.6	41.2	22.5
EHP2-275	1203	1019	857.0	731.0	604.3	570.0	493.3	457.0	418.7	391.4	362.4	349.0	233.7	200.0	156.7	144.0	107.5	95.7	82.5	67.9	66.0	56.5	53.5	45.3	24.7
EHP2-300	1290	1093	919.0	784.0	698.0	612.0	534.0	498.5	456.8	427.0	395.3	375.0	251.0	215.0	166.0	155.0	114.0	103.0	88.5	73.2	69.8	62.7	59.5	49.5	26.5
EHP2-320	1378	1167	982.0	837.0	684.0	653.0	555.0	492.0	465.0	435.0	423.0	370.0	261.0	229.0	177.0	165.0	125.4	110.0	94.5	81.0	75.6	66.3	62.4	51.6	26.7
EHP2-400	1750	1482	1132	995.0	880.0	830.0	728.4	663.4	607.8	568.2	526.0	478.2	339.0	278.9	227.6	198.0	155.8	139.0	120.0	98.8	96.0	81.4	79.7	65.6	35.5
EHP2-405	1772	1501	1262	1077	958.2	839.9	695.1	639.6	592.4	554.4	523.0	512.2	357.5	294.9	245.4	212.3	170.1	140.8	121.9	104.6	97.2	83.4	80.7	73.1	35.9
EHP2-455	1991	1687	1418	1210	1077	943.6	780.9	718.5	665.5	622.9	587.5	575.4	401.6	331.3	275.7	238.5	191.1	158.1	136.9	117.5	109.2	93.7	90.6	82.1	38.5
EHP2-515	2253	1909	1605	1369	1219	1068	883.9	813.3	753.3	705.0	665.0	651.3	454.6	375.0	312.0	270.0	216.3	179.0	155.0	133.0	123.6	106.0	102.6	92.9	43.6
EHP2-560	2450	2076	1745	1489	1325	1161	961.1	884.3	819.1	766.6	723.1	708.2	494.3	407.8	339.3	293.6	235.2	194.6	168.5	144.6	134.4	115.3	111.6	101.0	47.3

Performance Data

Constant Power Discharge performance

Constant Power Discharge (Watts per cell) at 20°C to 1.75 volts per cell																									
Cell Type	Standby Time (Minutes)											Standby Time (Hours)													
	5	10	15	20	25	30	35	40	45	50	55	1	1.5	2	2.5	3	4	5	6	7	8	9	10	12	24
EHP12-14	74.3	64.2	48.8	40.2	35.4	30.7	28.3	25.9	23.5	22.1	20.7	19.3	15.4	11.5	10.0	8.50	6.96	5.42	4.78	4.14	3.50	3.17	2.83	2.50	1.42
EHP12-23	129.8	105.8	81.5	66.8	58.2	49.6	45.4	41.1	36.9	34.5	32.2	29.8	23.7	17.7	15.5	13.3	10.9	8.50	7.50	6.50	5.50	5.10	4.70	4.15	2.35
EHP12-32	180.2	141.2	109.2	89.5	78.1	66.7	60.9	55.1	49.3	46.3	43.2	40.2	32.3	24.3	21.3	18.2	15.0	11.8	10.4	9.06	7.67	7.00	6.33	5.59	3.17
EHP12-45	176.2	169.0	156.0	112.3	96.0	89.1	76.7	68.6	65.1	60.4	57.9	55.7	36.0	32.2	25.1	23.3	17.8	15.4	13.4	11.5	10.6	9.47	8.91	7.37	3.81
EHP12-55	220.5	206.6	190.7	137.2	117.3	109.0	93.8	83.8	79.6	73.9	70.7	68.1	44.0	39.4	30.6	28.5	21.7	18.8	16.4	14.0	13.0	11.6	10.9	9.01	4.66
EHP12-70	280.7	262.9	222.4	174.7	149.3	138.7	119.3	106.7	101.3	94.0	90.0	86.7	56.0	50.1	39.0	36.3	27.7	23.9	20.9	17.9	16.5	14.7	13.9	11.5	5.93
EHP12-80	296.3	252.1	216.3	188.2	169.0	148.2	128.1	119.3	108.4	99.2	91.1	87.8	61.8	52.3	40.9	38.4	28.3	25.6	22.3	19.1	18.2	16.7	15.8	13.2	7.07
EHP12-180	666.6	567.2	486.7	423.4	380.2	333.5	288.2	268.3	243.9	223.2	205.0	197.6	138.9	117.7	92.1	86.3	63.7	57.6	50.1	43.0	40.9	37.6	35.6	29.6	15.9
EHP6-105	421.0	354.0	301.0	262.0	224.0	208.0	179.0	160.0	152.0	141.0	135.0	130.0	84.0	75.2	58.5	54.4	41.5	35.9	31.3	26.8	24.8	22.1	20.8	17.2	8.90
EHP6-125	500.8	421.9	357.8	311.7	281.3	247.7	218.8	200.0	183.6	168.8	157.0	154.7	107.0	89.5	71.9	64.8	49.8	42.7	37.3	32.3	29.5	26.6	24.5	20.5	10.6
EHP6-150	551.8	465.9	392.4	374.1	337.5	297.2	262.5	240.0	220.3	202.5	188.4	185.6	128.4	107.4	86.3	77.7	59.8	51.3	44.7	38.8	35.4	32.0	29.4	24.6	12.8
EHP6-160	641.0	540.0	458.0	399.0	360.0	317.0	280.0	256.0	235.0	216.0	201.0	198.0	137.0	114.6	92.0	82.9	63.8	54.7	47.7	41.4	37.8	34.1	31.4	26.2	13.6
EHP2-200	801.0	675.0	573.0	498.0	433.0	397.0	351.6	319.9	293.9	272.0	252.6	248.0	163.0	143.0	111.1	104.0	76.3	68.4	59.6	49.4	47.2	40.6	39.6	32.8	17.9
EHP2-225	831.3	759.3	644.7	560.5	475.4	446.7	386.8	360.7	331.4	306.6	284.7	279.0	183.9	161.2	125.1	116.2	86.2	77.0	67.1	55.6	53.1	46.2	43.6	37.1	20.2
EHP2-250	923.6	843.6	716.4	622.7	528.2	496.4	429.7	400.7	368.2	340.6	316.4	310.0	204.4	179.1	139.0	129.1	95.7	85.5	74.5	61.7	59.0	51.4	48.5	41.2	22.5
EHP2-275	1102	928.0	788.0	685.0	581.0	546.0	472.7	440.8	405.0	374.7	348.0	341.0	224.8	197.0	152.9	142.0	105.3	94.1	82.0	67.9	64.9	56.5	53.3	45.3	24.7
EHP2-300	1182	995.0	845.0	735.0	660.0	585.0	511.0	480.9	441.8	408.8	379.6	366.0	249.0	211.0	165.0	153.0	113.0	101.0	87.9	73.2	69.5	62.6	59.4	49.4	26.5
EHP2-320	1262	1063	902.0	785.0	672.0	625.0	537.0	480.0	456.0	423.0	405.0	368.0	252.0	226.0	175.5	163.2	124.5	108.0	93.9	80.4	74.3	66.3	62.4	51.6	26.7
EHP2-400	1602	1350	1064	927.0	838.0	794.0	703.2	639.8	587.8	544.0	505.2	465.3	326.0	266.7	222.2	196.0	152.6	137.0	119.0	98.8	94.4	81.2	79.2	65.6	35.5
EHP2-405	1622	1367	1160	1009	906.3	803.7	694.8	627.0	588.2	552.9	521.2	507.7	351.5	290.2	243.0	210.0	169.9	138.4	120.3	103.8	95.5	83.4	80.2	72.2	35.8
EHP2-455	1823	1536	1303	1134	1018	902.9	780.6	704.5	660.9	621.2	585.6	570.4	394.9	326.0	273.0	235.9	190.8	155.5	135.2	116.6	107.3	93.7	90.1	81.1	38.4
EHP2-515	2063	1738	1475	1283	1153	1022	883.5	797.4	748.0	703.1	662.8	645.6	446.9	369.0	309.0	267.0	216.0	176.0	153.0	132.0	121.5	106.0	102.0	91.8	43.5
EHP2-560	2243	1890	1604	1395	1253	1111	960.7	867.0	813.4	764.5	720.7	702.0	486.0	401.2	336.0	290.3	234.9	191.4	166.4	143.5	132.1	115.3	110.9	99.8	47.3

Performance Data

Constant Power Discharge performance

Constant Power Discharge (Watts per cell) at 20°C to 1.80 volts per cell																									
Cell Type	Standby Time (Minutes)											Standby Time (Hours)													
	5	10	15	20	25	30	35	40	45	50	55	1	1.5	2	2.5	3	4	5	6	7	8	9	10	12	24
EHP12-14	70.3	60.5	46.7	38.3	33.9	29.5	27.3	25.1	22.8	21.5	20.2	18.8	15.0	11.2	9.75	8.33	6.83	5.33	4.69	4.06	3.42	3.13	2.83	2.50	1.42
EHP12-23	122.1	99.5	76.6	63.2	55.5	47.8	43.9	40.0	36.1	33.8	31.6	29.3	23.3	17.3	15.2	13.0	10.7	8.33	7.32	6.31	5.30	4.90	4.50	3.98	2.25
EHP12-32	176.7	132.7	103.0	85.2	74.7	64.2	58.8	53.5	48.2	45.3	42.4	39.5	31.8	24.0	20.9	17.8	14.8	11.7	10.3	8.89	7.50	6.83	6.17	5.45	3.08
EHP12-45	157.4	152.0	143.0	101.6	93.9	82.7	72.9	66.9	63.9	59.1	55.7	53.1	34.3	31.1	24.9	22.6	17.7	15.1	13.2	11.4	10.5	9.43	8.79	7.33	3.81
EHP12-55	192.8	185.8	174.8	124.1	114.7	101.1	89.0	81.7	78.0	72.3	68.1	65.0	41.9	38.0	30.4	27.6	21.6	18.5	16.1	14.0	12.9	11.5	10.7	8.96	4.66
EHP12-70	245.3	236.4	206.0	158.0	146.0	128.7	113.3	104.0	99.3	92.0	86.7	82.7	53.3	48.3	38.7	35.1	27.5	23.5	20.5	17.8	16.4	14.7	13.7	11.4	5.93
EHP12-80	259.4	220.4	191.7	170.2	154.4	137.1	117.8	110.8	100.0	92.8	88.3	85.4	60.8	50.6	40.2	37.1	28.1	25.1	21.8	19.1	18.1	16.7	15.8	13.2	7.07
EHP12-180	583.7	495.9	431.4	383.0	347.3	308.4	265.0	249.3	225.1	208.7	198.7	192.2	136.7	113.8	90.4	83.5	63.2	56.4	49.1	43.0	40.7	37.5	35.6	29.6	15.9
EHP6-105	368.0	310.0	266.0	237.0	219.0	193.0	170.0	156.0	149.0	138.0	130.0	124.0	80.0	72.5	58.0	52.7	41.2	35.3	30.7	26.7	24.6	22.0	20.5	17.1	8.90
EHP6-125	438.3	368.8	317.2	301.6	264.5	235.2	213.3	195.3	179.7	166.4	154.7	147.7	105.5	86.3	70.3	62.7	49.6	42.0	36.5	32.2	29.2	26.6	24.5	20.5	10.6
EHP6-150	485.5	403.6	349.7	361.9	317.4	282.2	255.9	234.4	215.6	199.7	185.6	177.2	126.6	103.5	84.4	75.3	59.5	50.4	43.8	38.6	35.1	31.9	29.3	24.6	12.8
EHP6-160	561.0	472.0	406.0	386.0	338.6	301.0	273.0	250.0	230.0	213.0	198.0	189.0	135.0	110.4	90.0	80.3	63.5	53.8	46.7	41.2	37.4	34.0	31.3	26.2	13.6
EHP2-200	702.0	590.0	508.0	451.0	395.7	367.0	326.7	297.3	271.3	254.4	234.0	236.0	159.2	138.0	109.1	100.0	76.1	67.2	58.4	49.3	46.8	40.5	39.1	32.4	17.7
EHP2-225	736.6	663.5	571.1	507.3	441.8	412.4	352.4	335.1	305.8	286.7	263.8	265.9	179.5	155.5	123.1	112.9	85.7	75.6	65.7	55.5	52.7	46.2	43.6	37.1	19.9
EHP2-250	816.5	737.3	634.5	563.6	490.9	458.2	391.5	372.4	339.8	318.5	293.1	295.5	199.5	172.7	136.7	125.5	95.3	84.0	73.0	61.6	58.5	51.4	48.5	41.2	22.1
EHP2-275	965.0	811.0	698.0	620.0	540.0	504.0	430.7	409.6	373.8	350.4	322.4	325.0	219.4	190.0	150.4	138.0	104.8	92.4	80.3	67.8	64.4	56.5	53.3	45.3	24.3
EHP2-300	1035	870.0	749.0	665.0	603.0	541.0	469.9	446.8	407.8	382.3	368.0	356.0	245.0	204.0	162.0	148.0	112.0	99.0	86.1	73.1	69.3	62.5	59.4	49.4	26.5
EHP2-320	1105	929.0	799.0	710.0	657.0	578.0	510.0	468.0	447.0	414.0	390.0	365.0	240.0	217.0	174.0	158.1	123.6	106.0	92.0	80.1	73.7	66.0	61.5	51.3	26.7
EHP2-400	1403	1179	953.0	840.0	791.0	734.0	653.4	594.6	542.6	508.8	468.0	439.9	318.4	263.5	218.2	193.0	152.2	134.0	117.0	98.6	93.6	81.0	78.2	64.8	35.4
EHP2-405	1421	1194	1028	913.0	828.1	743.2	672.9	615.8	586.9	549.9	520.9	489.7	348.8	279.2	240.6	203.7	168.3	136.0	118.0	103.0	94.8	82.6	79.1	71.2	35.8
EHP2-455	1596	1341	1155	1026	930.3	834.9	755.9	691.8	659.4	617.7	585.2	550.2	391.8	313.6	270.3	228.8	189.1	152.8	132.5	115.7	106.5	92.8	88.9	80.0	38.4
EHP2-515	1807	1518	1307	1161	1053	945.0	855.6	783.1	746.4	699.2	662.4	622.7	443.5	355.0	306.0	259.0	214.0	173.0	150.0	131.0	120.5	105.0	100.6	90.5	43.5
EHP2-560	1965	1651	1421	1262	1145	1028	930.4	851.5	811.6	760.3	720.3	677.2	482.3	386.0	332.7	281.6	232.7	188.1	163.1	142.4	131.0	114.2	109.4	98.4	47.3

Operating Characteristics

The **Enduro EHP** range of cells should be charged using constant potential chargers.

Float voltage

At normal room temperature (20°C/68°F), the recommended float voltage is equal to 2.28 Vpc.

To optimized battery performance it is recommended that the float voltage is adjusted for room ambient temperatures in accordance with the following table.

Temperature (°C)	Float voltage range per cell
0°C	2.29-2.33V
10°C	2.26-2.30V
20°C	2.24-2.28V
25°C	2.23-2.27V
30°C	2.22-2.26V
35°C	2.21-2.25V
40°C	2.19-2.23V
45°C	2.18-2.22V

Under these conditions a recharge will be completed in approximately 72 hours.

Charging current

A discharged VRLA battery will accept a high recharge current, but for those seeking a more economical charging system a current limit of 0.08 C_{10} : 0.1 C_3 (A) is adequate.

Note: For a completely discharged battery, 80% of the capacity is replaced in approximately:

◆10 hours at 0.1 C_{10}

◆6 hours at 0.3 C_{10}

◆5 hours no current limit applied

Fast recharge

Increasing the charge voltage to 2.40 volts per cell can reduce recharge time and it is possible, depending on the depth of discharge, to halve the recharge time. Under these conditions, however, the charge must be monitored and must be terminated when the charge current remains reasonably steady for 3 consecutive hours after the voltage limit has been reached. At the beginning of charge the current must be limited to 0.1 C_{10} : 0.125 C_3 (A). This charge regime, in order to achieve a normal service life, must not be used more than once per month.

The effect of temperature on capacity

Correction factors for capacity at different temperatures are shown in the following table, the reference temperature being 20°C.

Battery temperature

Duration of discharge	0°C	5°C	10°C	15°C	20°C	25°C	30°C	35°C	40°C
5 minutes to 59 minutes	0.80	0.86	0.91	0.96	1.00	1.04	1.06	1.09	1.10
1 hour to 24 hours	0.86	0.90	0.94	0.97	1.00	1.03	1.05	1.06	1.07

Operating Instructions and Guidelines

Accidental deep discharge

e.g. (1) discharge at a lower current for a longer time than the original system specification.

(2) failure of the charging system.

(3) battery not recharged immediately after a discharge.

When a battery is completely discharged:

(1) the utilization of the sulphuric acid in the electrolyte is total and the electrolyte now consists only of water. During recharge this condition may produce metallic dendrites which can penetrate the separator and cause a short circuit in a cell.

(2) the sulphation of the plate is at its maximum and the internal resistance of the cell is also at its maximum.

The battery should be recharged under a constant potential of 2.26 volts per cell with the current limited to a maximum of 0.3 C_{10} (A) in order to prevent excessive internal heating. For instance, for a 6V105 the maximum charge current is 31 amps. If the sulphation of the cell/battery is extensive, then the recharge of the battery may require more than 96 hours.

Note: Deep discharging will produce a premature deterioration of the battery and a noticeable reduction in the life expectancy of the battery.

For optimum operation the minimum voltage of the system should be related to the duty as follows:

Duty	Minimum end voltage
5min≤t≤1h	1.65V
1h<t≤5h	1.70V
5h<t≤8h	1.75V
8h<t≤20h	1.80V

In order to protect the battery it is advisable to have system monitoring and low voltage cut-out.

Float charge ripple

Excessive ripple on the D.C. supply across a battery has the effect of reducing life and performance.

It is recommended, therefore, that voltage regulation across the system including the load, but without the battery connected, under steady state conditions, shall be better than ±1% between 5% and 100% load.

Transient and other ripple type excursions can be accommodated provided that, with the battery disconnected but the load connected, the system peak to peak voltage including the regulation limits, falls within ±2.5% of the recommended float voltage of the battery.

Under no circumstances should the current flowing through the battery when it is operating under float conditions, reverse into the discharge mode.

Electro-Magnetic Compatibility (EMC)

Enduro EHP products are covered by the EMC statement in EN 50226 which reads as follows:

Rechargeable cells or batteries are not sensitive to normal electromagnetic disturbances, and therefore no immunity tests shall be required. Free-standing rechargeable cells or batteries electrically isolated from any associated electrical system are for all practical purposes electromagnetically inert, and therefore the requirements for electromagnetic compatibility shall be deemed to be satisfied.

Note: It should be noted that rechargeable cells or batteries are part of an electrical system, and the manner in which they are used could invoke the requirements of the electromagnetic compatibility upon that system. In such cases, the requirements of electromagnetic compatibility shall be accommodated by the design of the system.

Maintenance

●Every month, check that the total voltage at the battery terminals is (N x 2.26V) for a temperature of 20°C.

N = the number of cells in the battery and 2.26= 20°C float voltage.

●Once a year, take a reading of the individual cell or monobloc voltages . A variation of ±4.5% on individual voltages from the average voltage is acceptable.

The system must be checked once or twice a year.

●New and old batteries cannot be used together.

The batteries of various specifications and from different manufacturers cannot be used together.

Principal factors affecting the life of recombination **batteries**

●Deep discharge

●Poor control of the float voltage

●Cycling or micro-cycling

●Poor quality of charging current (excessive ripple)

●High ambient temperature

●Overcharge

Installation and Commissioning Charge

Warning

Enduro EHP cells or monoblocs are already charged when delivered. They should be unpacked carefully. Avoid short circuiting terminals of opposite polarity as these units are capable of discharging at a very high current, especially if the lid or the container is damaged.

Unpacking

It is advisable to unpack all the cells or monoblocs and accessories before commencing to erect and not to unpack and erect cell by cell.

All items should be carefully checked against the accompanying advice notes to ascertain if any are missing. Advise the Sales Department of any discrepancies.

Transit insulation covers are fitted to one pole or a rigid plastic insulating cover is provided which totally protects the unit terminals. These are factory fitted to all products of the range and there is no need to remove them until access to the terminals is required.

Setting up the battery stands

The structure should be assembled in accordance with instructions supplied with the equipment.

To level the stand use the adjustable insulating feet.

Mounting in a cabinet

Ensure that the cabinet:

- is sufficiently strong to cope with the weight of the battery.
- is suitably insulated
- is naturally ventilated

Connecting the cells

- **Torque setting**

Tighten the nuts or bolts to the recommended levels of torque indicated on the product label.

Always use insulated tools for fitting and torquing up battery connections.

- **In series**

The number of cells in series (N) will not affect the selected float voltage per cell. Therefore, charging float voltage = N x Cell float Voltage.

No special circuit arrangements are required.

- **In parallel**

Using constant voltage chargers, and ensuring that the connections made between the charger and the batteries have the same electrical resistance, no special arrangements have to be made for batteries in parallel.

Although no special circuit arrangements are required, where the parallel connection is made at the charger or distribution board, to avoid out of step conditions, the bus bar run length and the area of cross section should be designed so that the circuit resistance value for each string is equal within limits $\pm 5\%$.

General recommendations

- Do not wear clothing of synthetic material to avoid static generation.
- Use only a clean soft damp cloth for cleaning the cells.
- Do not use chemicals or detergents.
- Use insulated tools.
- Commence installation at the least accessible point.
- Consult the drawing for the correct position of the cell poles.

Commissioning charge

Ensure that the batteries will be operated in a dry and clean environment.

Before use, the batteries should be charged at a constant float voltage adjusted according to the ambient temperature,

e.g. 2.26 volts per cell at 20°C for 48 to 96 hours or, alternatively, a voltage of 2.36 volts per cell at 20°C can be used to reduce the commissioning period from 24 to 15 hours.

Where the batteries have been stored under harsh conditions, this increased voltage recharge is particularly effective.

Battery Storage

Storage conditions

Store the battery in a dry, clean and preferably cool location.

Storage time

As the batteries are supplied charged, storage time is limited. In order to easily charge the batteries after prolonged storage, it is advisable not to store batteries for more than:

- 6 months at 20°C
- 3 months at 30°C
- 1.5 month at 40°C

Battery state of charge

The battery state of charge can be simply determined by measuring the open-circuit voltage of cells in rest position for 72 hours at 20°C.

Stage of charge	Voltage
100%	2.12Vpc
80%	2.10Vpc
60%	2.07Vpc
40%	2.04Vpc
20%	2.00Vpc

Open circuit voltage variation with temperature is about 2.5mV per cell per 10°C.

Recharge of stored batteries

Following storage and before putting the batteries into service, a refreshing charge shall be performed at 20°C for 48 to 96 hours.

A current limit is not essential, but for optimum charge efficiency the current output of the charger can be limited to 10% of the 3-hour capacity rating.

The necessity of a refreshing charge can also be determined by measuring the open circuit voltage of a stored battery. Refreshing charge is advised if the voltage drops below2.09 volts per cell.

Failure to observe these conditions may result in greatly reduced capacity and service life.

Battery Accommodation

A comprehensive range of steel stands has been specifically designed to provide a compact battery arrangement whilst retaining the requirements of electrical and mechanical safety, ease of installation and access during operation for taking meter readings.

Transition boxes can be supplied for convenient connection of outgoing cables.

Cabinets and other special designs can be engineered and supplied to meet particular specifications.

Please contact Sacredsun's International Sales Department for further information.

ABT World Wide

Our sales growth is due to a complete Global Network with Master distributors and Country managers who apply ABT commercial strategy and trough Global Key Account, in Telecom,Power Supply and UPS

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