

# the power of tomorrow

CLEAN ENERGY DEFINES THE WORLD THAT WE LIVE IN TODAY AND TOMORROW.  
LEAD CRYSTAL® TECHNOLOGY CREATES POWER THAT IS CLEAN SAFE AND  
HIGH PERFORMING FOR A BETTER FUTURE

**LEAD  
CRYSTAL®  
BATTERIES**

POWERED BY  
**Betta Batteries**



## SPECIFICATION

Nominal Voltage	12V		
Rated Capacity (10 hour rate)	180 AH		
Dimension	Total Height (top of terminal)	224 mm	8.82"
	Height	219 mm	8.62"
	Length	522 mm	20.55"
	Width	240 mm	9.45"

Weight	Approximately 60kg / 132.27 lbs		
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Capacity 25°C	120 hour rate (1.8A)	216 AH
	20 hour rate (9.5A)	190 AH
	10 hour rate (18)	180 AH

Internal Resistance	Fully charged Battery (25°C)	3mΩ
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Self-Discharge 25°C	Capacity after 3 month storage	95%
	Capacity after 6 month storage	85%
	Capacity after 12 month storage	80%

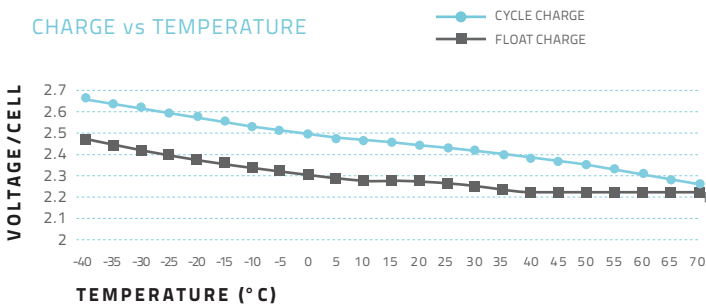
Max Discharge Current 25°C	1800A (5S)	
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Terminal	Standard	F4
	Optional	
Charging (Constant Voltage)	Cycle	Initial Charging Current 54A 14.7V/ (25°C)
	Float	13.6V/ (25°C)

## DISCHARGE CURRENT AND END VOLTAGE

Discharge current (A)	End voltage (V)
0.05C or below or Intermittent discharge	11.4
0.05C of current close to it	11.1
0.1C of current close to it	10.8
0.2C of current close to it	10.5
From 0.2C to 0.5C	10.2
From 0.5C to 1C	9.6
From 1C to 3C	9.0
Current in excess of 3C	7.8

## CHARGE vs TEMPERATURE



## CHARGE vs TEMPERATURE CHART

temperature	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70
Cycle Charge	2.66	2.64	2.62	2.60	2.58	2.56	2.54	2.52	2.50	2.48	2.47	2.47	2.45	2.45	2.43	2.41	2.39	2.37	2.35	2.33	2.31	2.29	2.27
Float Charge	2.46	2.44	2.42	2.40	2.38	2.36	2.34	2.32	2.31	2.30	2.29	2.29	2.29	2.27	2.26	2.24	2.23	2.23	2.23	2.23	2.23	2.23	2.23

## CONSTANT CURRENT DISCHARGE CHARACTERISTICS: UNITS AMPERES (25°C)

End Voltage per cell	5min	15min	30min	45min	1h	2h	3h	4h	5h	6h	8h	10h	12h	20h	24h
1.60V	660.53	349.56	211.21	153.98	124.02	71.06	51.61	40.47	34.52	29.34	22.37	18.62	15.63	10.18	8.31
1.67V	613.87	338.11	208.08	152.93	123.80	70.75	50.67	40.27	34.02	29.13	22.34	18.42	15.61	10.14	8.28
1.70V	607.61	332.93	205.99	150.86	122.78	70.13	50.36	40.05	33.50	28.82	22.27	18.42	15.56	10.11	8.27
1.75V	556.63	322.49	203.94	149.83	120.69	68.77	50.15	39.55	33.19	28.61	22.16	18.21	15.48	10.07	8.26
1.80V	499.39	301.68	195.59	145.66	117.57	67.73	49.94	39.43	32.77	28.30	22.06	18.00	15.40	9.73	8.24
1.83V	477.36	276.77	192.49	140.47	112.37	67.11	47.96	37.77	32.05	27.26	21.59	17.27	14.77	9.62	8.13
1.85V	447.34	268.42	180.00	135.26	109.24	64.40	46.72	37.25	31.22	26.36	21.33	17.06	14.57	9.52	8.06

## DISCHARGE DATA WITH CONSTANT POWER UNITS: WATTS PER CELL (25°C)

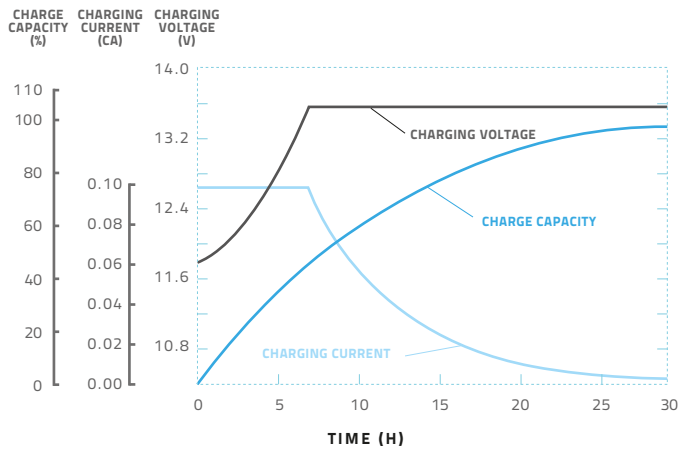
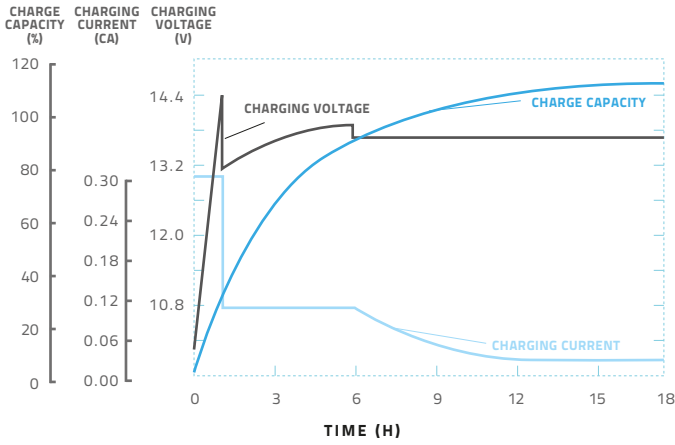
End Voltage per cell	5min	15min	30min	45min	1h	2h	3h	4h	5h	6h	8h	10h	12h	20h	24h
1.60V	1103.75	613.79	395.32	288.17	231.82	134.20	98.10	77.71	65.64	56.39	43.49	36.00	30.27	20.18	16.54
1.67V	1050.71	604.42	379.34	286.09	231.99	134.20	96.85	77.61	65.64	56.28	43.49	35.89	30.27	20.18	16.54
1.70V	1044.47	600.26	379.16	286.09	229.90	133.16	96.65	77.32	64.60	55.87	43.17	35.58	29.96	20.08	16.54
1.75V	972.69	592.97	379.58	286.09	228.87	132.12	96.44	77.19	64.40	55.45	42.96	35.34	29.96	20.08	16.44
1.80V	892.61	562.80	371.39	280.88	227.83	132.12	96.33	76.98	63.98	55.45	42.86	35.16	29.96	19.56	16.44
1.83V	861.38	517.04	368.28	272.56	218.47	131.08	93.63	74.38	63.25	53.68	42.86	34.12	29.44	19.35	16.33
1.85V	797.92	505.59	342.26	262.18	212.23	127.96	91.03	73.45	61.48	52.64	41.20	33.81	28.92	19.14	16.23

CYCLE CHARGE CHARACTERISTIC (25°C)

FLOATING CHARGE CHARACTERISTIC (25°C)

REGULAR CYCLE CHARGE CHARACTERISTICS 77°F (25°C)

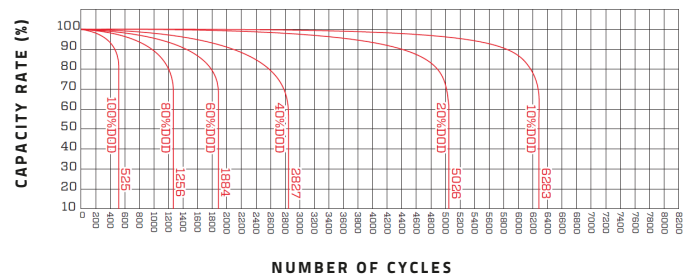
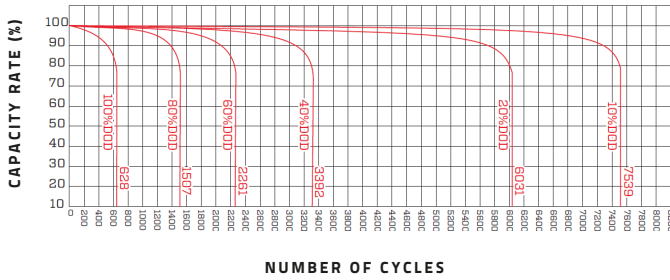
FLOATING CHARGE CHARACTERISTICS 77°F (25°C)



CYCLE LIFE CURVE GRAPH

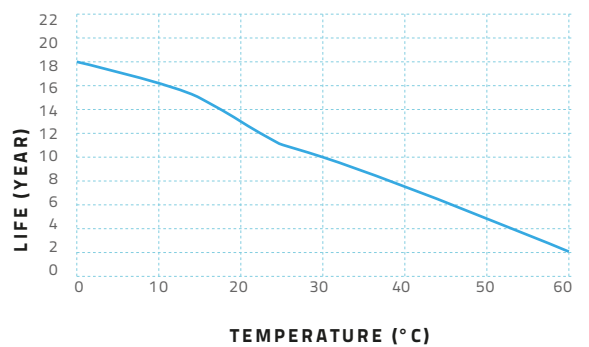
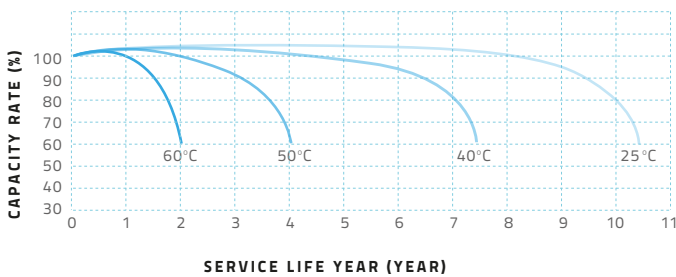
CYCLE LIFE CURVE GRAPH (25°C)

CYCLE LIFE CURVE GRAPH (40°C)

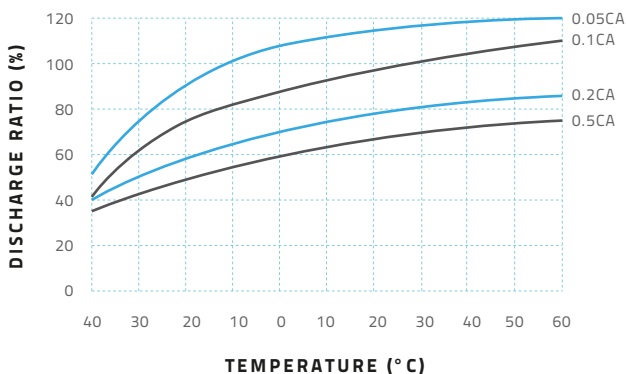


TEMPERATURE & FLOAT SERVICE LIFE

FLOAT SERVICE LIFE CURVE GRAPH



TEMPERATURE & DISCHARGE CAPACITY



## LEAD CRYSTAL®: CHANGING THE FUTURE

**Performance** Robust, resilient, high performing. Lead Crystal® batteries can be discharged deeper, cycled more often (also in extreme temperatures) and have a longer service life. They recover to full rated capacity over and over again.

**Technology** A unique micro-porous high absorbent mat (AGM), high-purity lead calcium selenium plates, safe SiO<sub>2</sub> electrolyte solution that solidifies into a white crystalline powder when charged/discharged.

**Cleaner & safe** Less acid, no cadmium, no antimony. Lead Crystal® batteries are up to 99% recyclable and are classified as non-hazardous goods for transport.

**Markets** Lead Crystal® batteries are being used in telecoms, ups, petrochem/marine, defence, renewable energy, health care, manufacturing, transportation and electric motion (wheelchairs, golf carts & trolleys).

