

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



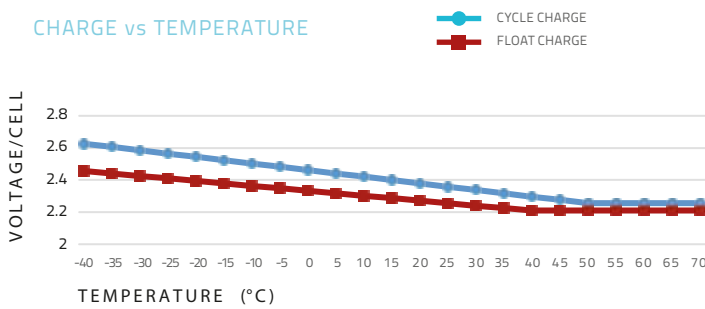
SPECIFICATION

| | | | |
|-------------------------------|------------------------------------|--|--------|
| Nominal Voltage | 12V | | |
| Rated Capacity (10 hour rate) | 190 AH | | |
| Dimension | Total Height (top of terminal) | 320 mm | 12.60" |
| | Height | 320 mm | 12.60" |
| | Length | 546 mm | 21.50" |
| | Width | 125 mm | 4.92" |
| Weight | Approximately 51.0 kg / 112.33 lbs | | |
| Capacity 25°C | 120 hour rate (1.8A) | 216 AH | |
| | 20 hour rate (10A) | 200 AH | |
| | 10 hour rate (19A) | 190 AH | |
| Internal Resistance | Fully charged battery (25°C) | ≈<6.0mΩ | |
| 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 | 1900A (5S) | | |
| Terminal | Standard | F8 | |
| | Optional | | |
| Charging (Constant Voltage) | Cycle | Initial Charging Current 36A or small 14.4V ~ 14.7V (25°C) | |
| | Float | 13.5V ~ 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)

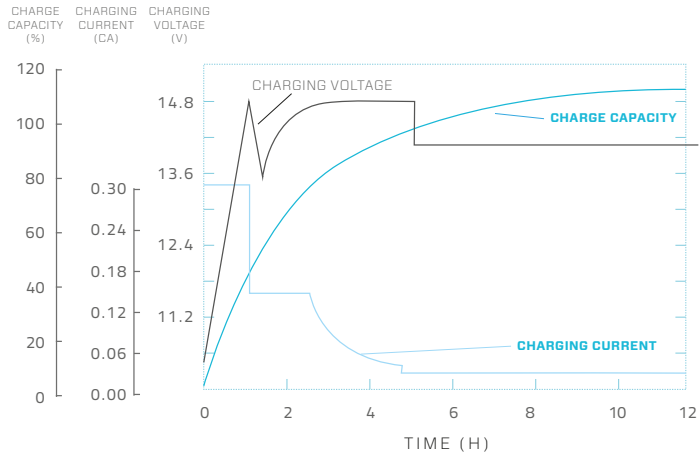
| | 5min | 15min | 30min | 45min | 1h | 2h | 3h | 4h | 5h | 6h | 8h | 10h | 12h | 20h | 24h |
|-------|------|-------|-------|-------|-----|------|------|------|------|------|------|-------|-------|-------|------|
| 1.60V | 697 | 369 | 223 | 163 | 131 | 75.0 | 54.5 | 42.7 | 36.4 | 31.0 | 23.6 | 19.7 | 16.5 | 10.7 | 8.78 |
| 1.67V | 648 | 357 | 220 | 161 | 131 | 74.7 | 53.5 | 42.5 | 35.9 | 30.8 | 23.6 | 19.4 | 16.5 | 10.7 | 8.74 |
| 1.70V | 641 | 351 | 217 | 159 | 130 | 74.0 | 53.2 | 42.3 | 35.4 | 30.4 | 23.5 | 19.4 | 16.4 | 10.7 | 8.73 |
| 1.75V | 588 | 340 | 215 | 158 | 127 | 72.6 | 52.9 | 41.7 | 35.0 | 30.2 | 23.4 | 19.2 | 16.3 | 10.6 | 8.72 |
| 1.80V | 527 | 318 | 206 | 154 | 124 | 71.5 | 52.7 | 41.6 | 34.6 | 29.9 | 23.3 | 19.0 | 16.3 | 10.3 | 8.70 |
| 1.83V | 504 | 292 | 203 | 148 | 119 | 70.8 | 50.6 | 39.9 | 33.8 | 28.8 | 22.8 | 18.2 | 15.6 | 10.2 | 8.59 |
| 1.85V | 472 | 283 | 190 | 143 | 115 | 68.0 | 49.3 | 39.3 | 32.9 | 27.8 | 22.5 | 18.01 | 15.37 | 10.05 | 8.51 |

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 | 1104 | 614 | 395 | 288 | 232 | 134 | 98.1 | 77.7 | 65.6 | 56.4 | 43.5 | 36.0 | 30.3 | 20.2 | 16.5 |
| 1.67V | 1051 | 604 | 379 | 286 | 231 | 134 | 96.9 | 77.6 | 65.6 | 56.3 | 43.5 | 35.9 | 30.3 | 20.2 | 16.5 |
| 1.70V | 1044 | 600 | 378 | 286 | 230 | 133 | 96.3 | 77.3 | 64.6 | 55.9 | 43.2 | 35.6 | 30.0 | 20.1 | 16.5 |
| 1.75V | 973 | 593 | 377 | 286 | 229 | 132 | 95.3 | 77.2 | 64.4 | 55.4 | 43.0 | 35.3 | 30.0 | 20.1 | 16.4 |
| 1.80V | 893 | 563 | 371 | 281 | 228 | 132 | 94.0 | 77.0 | 64.0 | 55.4 | 42.9 | 35.2 | 30.0 | 19.6 | 16.4 |
| 1.83V | 861 | 517 | 368 | 273 | 218 | 131 | 92.5 | 74.4 | 63.3 | 53.7 | 42.9 | 34.1 | 29.4 | 19.4 | 16.3 |
| 1.85V | 798 | 506 | 342 | 262 | 212 | 128 | 91.0 | 73.4 | 61.5 | 52.6 | 41.2 | 33.8 | 28.9 | 19.1 | 16.2 |

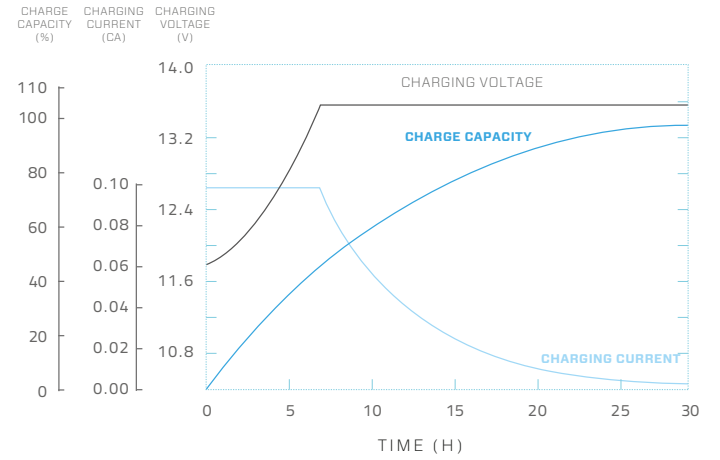
CYCLE CHARGE CHARACTERISTIC (25°C)

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



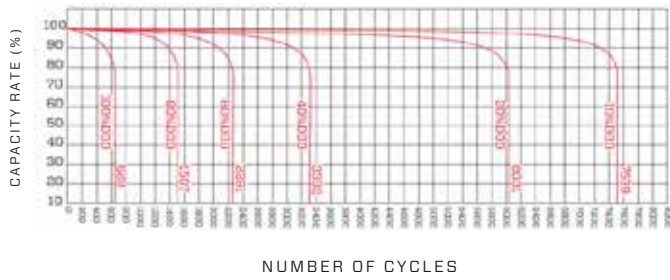
FLOATING CHARGE CHARACTERISTIC (25°C)

FLOATING CHARGE CHARACTERISTICS 77°F (25°C)

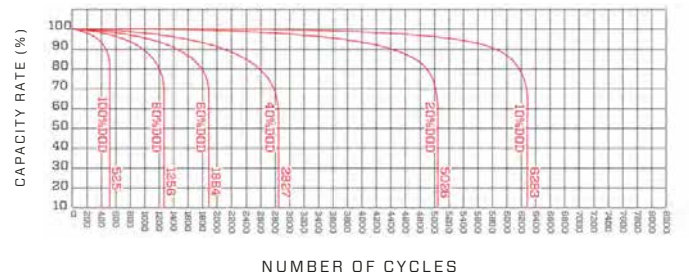


CYCLE LIFE CURVE GRAPH

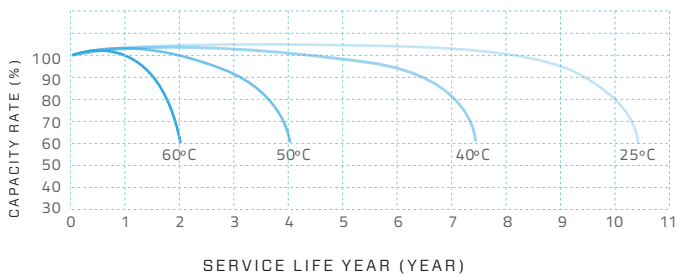
CYCLE LIFE CURVE GRAPH (25°C)



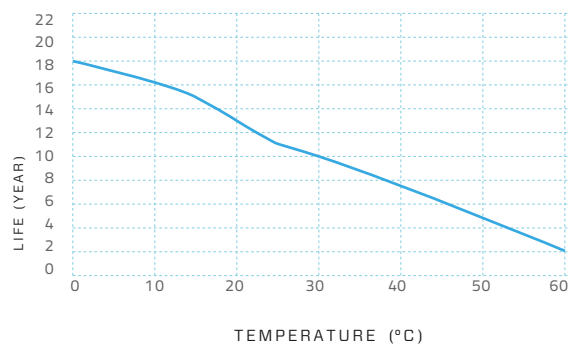
CYCLE LIFE CURVE GRAPH (40°C)



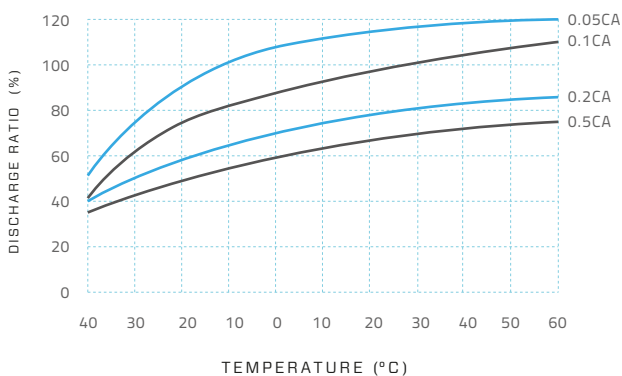
TEMPERATURE & FLOAT SERVICE LIFE



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 SiO₂ 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).

