



# Energy Evolved.

## Lead Crystal Energy Solutions

Next-generation lead crystal battery systems for a sustainable future. High-performance, high-safety, and 99% recyclable.

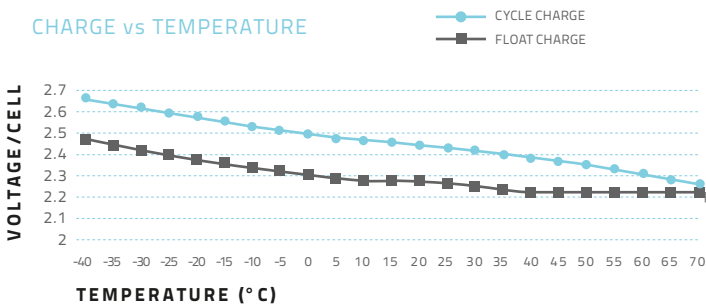
**LEAD  
CRYSTAL<sup>®</sup>**  
BATTERIES



## DISCHARGE CURRENT AND END VOLTAGE

| Discharge current (A)                    | End voltage (V) |
|--|-----------------|
| 0.05C or below or Intermittent discharge | 1.9             |
| 0.05C of current close to it             | 1.85            |
| 0.1C of current close to it              | 1.8             |
| 0.2C of current close to it              | 1.75            |
| From 0.2C to 0.5C                        | 1.7             |
| From 0.5C to 1C                          | 1.6             |
| From 1C to 3C                            | 1.5             |
| Current in excess of 3C                  | 1.3             |

## 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 | 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                | 5945.28 | 3792.8 | 2499.2 | 1881.00 | 1537.80 | 917.40 | 666.60 | 518.10 | 440.00 | 378.40 | 286.00 | 231.00 | 194.70 | 121.66 | 101.93 |
| 1.67V                | 5117.11 | 3438.6 | 2316.6 | 1782.00 | 1489.40 | 875.60 | 633.60 | 512.60 | 418.00 | 374.00 | 281.60 | 226.60 | 194.70 | 121.66 | 101.93 |
| 1.70V                | 4888.49 | 3333.0 | 2244.0 | 1760.00 | 1438.80 | 862.40 | 620.40 | 508.20 | 415.80 | 371.80 | 279.40 | 224.40 | 194.70 | 121.44 | 101.64 |
| 1.75V                | 4443.91 | 3119.6 | 2156.0 | 1691.80 | 1392.60 | 829.40 | 602.80 | 495.00 | 402.60 | 363.00 | 275.00 | 222.20 | 192.94 | 121.44 | 101.42 |
| 1.80V                | 3929.11 | 2857.8 | 2074.6 | 1630.20 | 1333.20 | 800.80 | 594.00 | 486.20 | 393.80 | 354.20 | 268.40 | 220.00 | 188.76 | 121.00 | 100.98 |
| 1.83V                | 3429.89 | 2611.4 | 1916.2 | 1515.07 | 1260.60 | 765.60 | 572.00 | 466.40 | 376.20 | 341.00 | 259.60 | 213.40 | 183.70 | 120.56 | 98.12  |
| 1.85V                | 2932.51 | 2365.0 | 1760.0 | 1401.40 | 1190.20 | 732.60 | 550.00 | 448.80 | 360.80 | 330.00 | 250.80 | 207.46 | 178.42 | 120.34 | 95.26  |

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

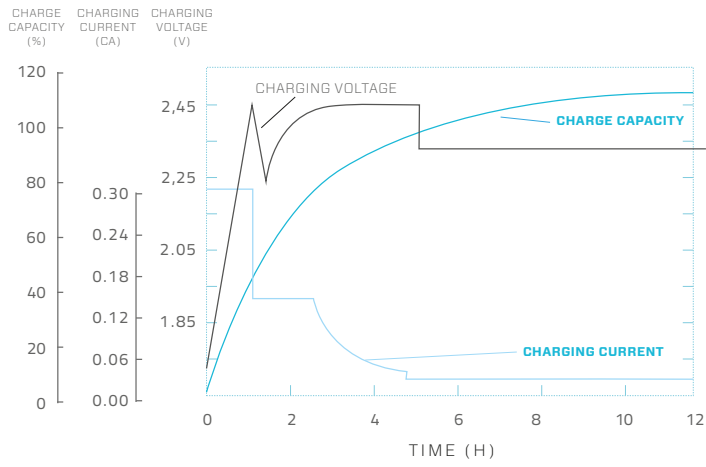
| End Voltage per cell | 5min    | 15min   | 30min   | 45min   | 1h      | 2h      | 3h      | 4h     | 5h     | 6h     | 8h     | 10h    | 12h    | 20h    | 24h    |
|----------------------|---------|---------|---------|---------|---------|---------|---------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1.60V                | 9858.12 | 6637.43 | 4542.99 | 3462.81 | 2868.80 | 1751.20 | 1276.0  | 992.16 | 844.80 | 741.40 | 561.00 | 457.24 | 382.80 | 237.60 | 199.32 |
| 1.67V                | 8806.51 | 6188.61 | 4252.61 | 3313.20 | 2794.00 | 1696.63 | 1245.2  | 987.79 | 818.40 | 732.60 | 549.89 | 446.60 | 382.80 | 237.60 | 199.32 |
| 1.70V                | 8522.55 | 6027.90 | 4136.02 | 3278.01 | 2714.77 | 1652.21 | 1194.59 | 981.20 | 802.99 | 728.18 | 548.09 | 442.20 | 382.80 | 237.60 | 199.10 |
| 1.75V                | 7867.25 | 5667.14 | 3999.59 | 3176.82 | 2640.01 | 1597.30 | 1166.0  | 965.80 | 783.20 | 717.20 | 536.80 | 437.73 | 382.80 | 237.60 | 198.88 |
| 1.80V                | 7132.38 | 5222.82 | 3863.15 | 3075.58 | 2540.98 | 1544.40 | 1152.8  | 948.25 | 763.40 | 706.20 | 528.00 | 433.40 | 371.80 | 235.40 | 198.44 |
| 1.83V                | 6298.69 | 4835.53 | 3607.97 | 2881.99 | 2413.39 | 1487.19 | 1113.2  | 917.40 | 737.00 | 686.40 | 510.42 | 422.39 | 363.00 | 235.40 | 193.38 |
| 1.85V                | 5464.79 | 4448.24 | 3352.78 | 2688.41 | 2288.01 | 1429.98 | 1073.6  | 884.40 | 708.40 | 666.60 | 492.80 | 411.40 | 354.20 | 233.20 | 188.54 |

## SPECIFICATION

|                               |                                      |  |        |
|-------------------------------|--------------------------------------|--|--------|
| Nominal Voltage               | 2V                                   |  |        |
| Rated Capacity (10 hour rate) | 2200AH                               |  |        |
| Dimension                     | Total Height (top of terminal)       | 347 mm   | 13.66" |
|                               | Height                               | 343mm  | 13.50" |
|                               | Length                               | 491 mm   | 19.33" |
|                               | Width                                | 353 mm   | 13.9"  |
| Weight                        | Approximately<br>130 kg / 286.60 lbs |  |        |
| Capacity                      | 120 hour rate (20A)                  | 2640 AH  |        |
|                               | 20 hour rate (110A)                  | 2420 AH  |        |
|                               | 10 hour rate (200A)                  | 2200 AH  |        |
| Internal Resistance           | Fully charged Battery (25°C)         | 0.08mΩ   |        |
| 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    | 20000A (5S)                          |  |        |
| Terminal                      | Standard                             | F4   |        |
|                               | Optional                             |  |        |
| Charging (Constant Voltage)   | Cycle                                | Initial Charging Current 660A<br>2.45V/ (25°C) |        |
|                               | Float                                | 2.27V/ (25°C)                                  |        |

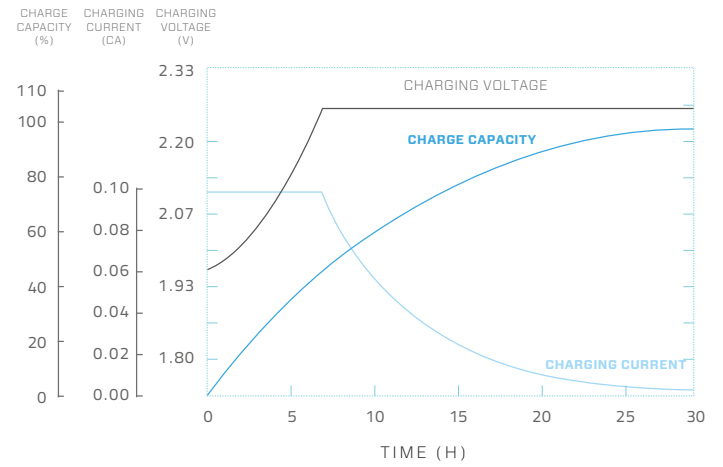
**CYCLE CHARGE CHARACTERISTIC (25°C)**

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



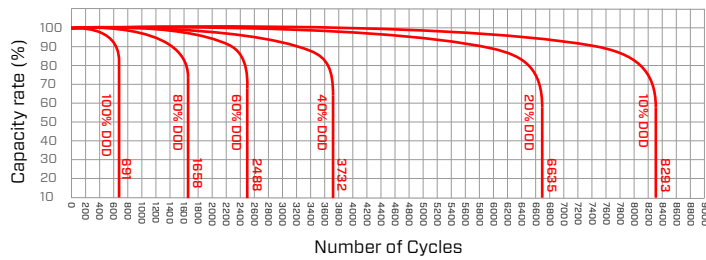
**FLOATING CHARGE CHARACTERISTIC (25°C)**

FLOATING CHARGE CHARACTERISTICS 77°F (25°C)

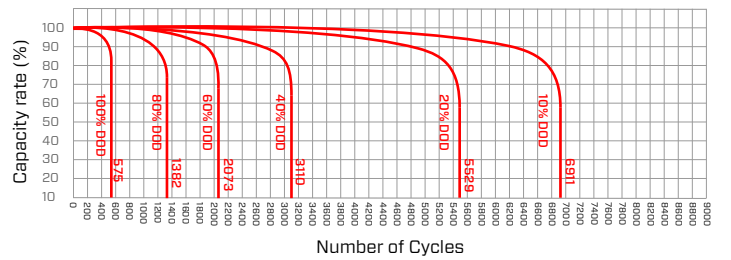


**CYCLE LIFE CURVE GRAPH**

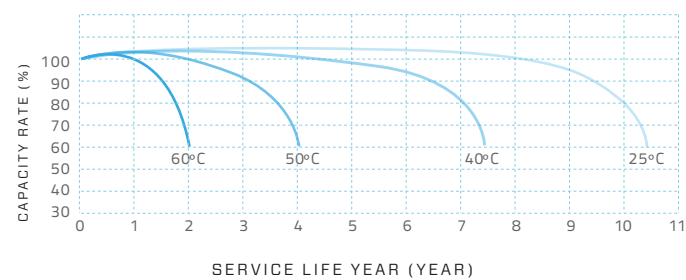
Cycle life curve graph (25°C) 2V



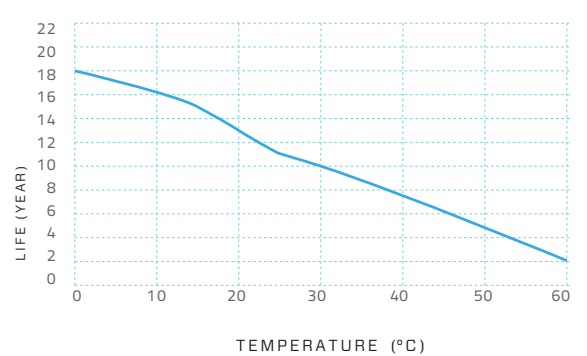
Cycle life curve graph (40°C) 2V



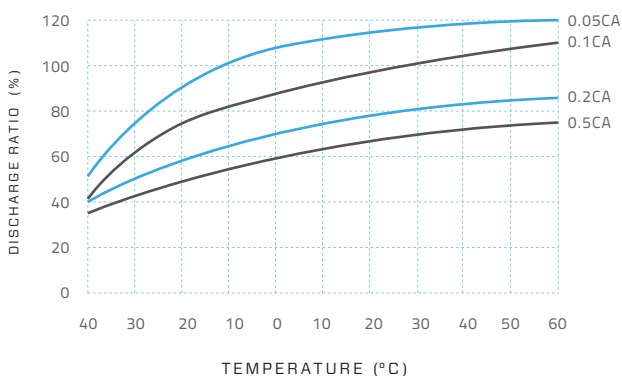
**TEMPERATURE & FLOAT SERVICE LIFE**



**FLOAT SERVICE LIFE CURVE GRAPH**



**TEMPERATURE & DISCHARGE CAPACITY**



CNFJ-2200 2V / 2200 A



## Energy Evolved.

**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 & Safer:** 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).



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