



This specification shall be applied to battery cell supplied by AA Portable Power Corp.

1. Product Specification

| | | |
|---------------------------|---|--|
| Type | Rechargeable Lithium Iron Phosphate Cell | |
| Model | LFP18500-1000 | |
| Voltage | Nominal: 3.2V | |
| Capacity | Nominal: 1000mAh; Typical: 1050mAh at standard charge & discharge Minimum: 950mAh | |
| Charge | Standard | Constant current at 500mA charge to 3.65V, then constant voltage at 3.65V charge till current decline to $\leq 10\text{mA}$ |
| | Fast | Constant current at 1000mA charge to 3.65V, then constant voltage at 3.65V charge till current decline to $\leq 10\text{mA}$ |
| | Max. Continuous | 1000mA |
| Discharge | Standard | 200mA to 2.0V |
| | Fast | 1000mA to 2.0V |
| | Max. Continuous | 3000mA |
| Charge Voltage | 3.65V | |
| Discharge cut-off voltage | 2.0V | |
| Dimension | See drawing | |
| Operation temperature | Charge: 0~ 45 °C Discharge: - 20 ~ 60 °C | |
| Storage temperature | <1 month: -20~ 50 °C <3 months: -20~ 40 °C <12 months: -20~ 25 °C | |
| Typical Weight | 29 g | |
| Visual Inspection | The cell shall be free from deformation, cracks, scratches, rusts and leakage | |

2. Cell Dimension

Diameter: 18.7mm (+0mm, -0.7mm)
 Height: 49.5mm (+0, -1.5mm)





3. Electrical characteristics

Unless otherwise stated, tests should be conducted under the following conditions:

Time frame: Within one month after delivery

Ambient temperature: 25°C±5°C

Relative Humidity: 65% ± 20%

Atmospheric Pressure: 86kPa-106kPa

| No | Items | Test Method | Criteria |
|----|----------------------------|--|--|
| 1 | Standard Charge | Standard capacity is measured with a discharge current of 0.2C and a discharge final voltage of 2.0V within 1 hour after the standard charge. Up to three cycles are permitted for this test. | Discharge capacity ≥minimum capacity |
| 2 | Open Circuit Voltage | The open circuit voltage is measured within 1 hour after standard charge. | Open circuit voltage ≥3.35V |
| 3 | Initial Internal Impedance | The initial internal impedance is measured at the frequency of 1kHz within 1 hour after standard charge. | Initial internal impedance ≤70mΩ |
| 4 | Fast Discharge Capacity | The capacity is measured with a discharge current of 1C to a discharge final voltage of 2.0V within 1 hour after the standard charge. | Discharge capacity ≥90% of initial capacity |
| 5 | Charge Retention | Charge retention is measured with a discharge current of 0.2C and a discharge final voltage of 2.0V after standard charge and storage time of 28 days. | Discharge capacity ≥85% of initial capacity |
| 6 | Charge Recovery | After charge retention test, the cell shall be done standard charge within 24 hours and stored for 1hour. Charge recovery is measured with a discharge current of 0.2C and a discharge final voltage of 2.0V. | Discharge capacity ≥90% of initial capacity |
| 7 | Cycle Life | During this cycle life test, the ambient temperature should be kept at 23°C ±2°C. The cell shall be charged at CC/CV=0.5C/3.65V, cut off till current decline to 0.05C, stored for 10mins, then discharged at a constant current of 0.5C to a final voltage of 2.0V, after that, stored 10mins prior to next charge/discharge cycle. The cell shall be continuously charged and discharged for 1000 times. | Discharge capacity at the 1000th cycle ≥80% of initial capacity |



4. Environmental Condition Characteristics

| No | Items | Test Method | Criteria |
|----|--|--|---|
| 1 | Discharge Capacity at High Temperature | After the standard charge, the cell is stored at an ambient temperature of $55^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for not less than 16h and not more than 24h. The capacity is measured with a discharge current of 0.2C and a discharge final voltage of 2.0V. | Discharge capacity $\geq 95\%$ of initial capacity |
| 2 | Discharge Capacity at Low Temperature | After the standard charge, the cell is stored at an ambient temperature of $-10^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for not less than 16h and not more than 24h. The discharge capacity is measured with a discharge current of 0.2C and a discharge final voltage of 2.0V. | Discharge capacity $\geq 50\%$ of initial capacity |
| 3 | Constant Temperature and Humidity | After the standard charge, the cell is stored in an ambient temperature of $40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ (90-95%RH) for 48h, then placed in room temperature for 2h. After that, check its appearance, the discharge capacity is measured with a discharge current of 0.2C and a discharge final voltage of 2.0V. | No explosion, no fire, no leakage. Discharging capacity $\geq 60\%$ of initial capacity |

5. Mechanical performance

| No | Items | Test Method | Criteria |
|----|----------------|--|--|
| 1 | Vibration Test | After standard charge, the cell is installed onto the vibration desk with clamps. The test is to be varied at the rate of 1oct/min between 10 and 55Hz. Repeat vibration for 30min in three mutually perpendicular directions. Equipment parameters of frequency and amplitude are as follows: Vibration frequency: 10-30Hz, amplitude: 0.38mm; 30-55Hz, amplitude: 0.19mm | No scratch, no leakage, no fume, no explosion. Cell voltage $\geq 3.2\text{V}$ |
| 2 | Drop Test | After standard charge, the cell is dropped from a height of 1m to a concrete surface. Each cell is to be dropped once in the positive and negative directions of three mutually perpendicular mounting positions for a total of 6 times, then rest for 1 hrs. | No leakage, no fume, no explosion |



6. Safety Performance

| No | Items | Test Method | Criteria |
|----|----------------|---|-----------------------------------|
| 1 | Overcharge | At standard testing condition, the cell is charged with constant current 3C to voltage 5.0V, then charged with constant voltage of 5.0V till current decline to 0.005C. Charge time is no less than 8hrs. | No fire, no explosion |
| 2 | Over-discharge | At standard testing condition, the cell is discharged at 0.2C current to final voltage of 2.0V, then connect 30Ω load to discharge for 24 hours. | No leakage, no fume, no fire |
| 3 | Crush | At standard testing condition, the cell is charged by standard charge, then placed on the crush flat, the axis is parallel to the crush flat, it is to be crushed between two flat surfaces. Crushing force is approximately 13kN and hold for 1 min | No fire, no explosion |
| 4 | Short-circuit | At standard testing condition, the cell is charged by standard charge, then connect the positive and negative terminals of the cell with a circuit load having a resistance load of 80mΩ±20mΩ. The temperature of the battery case is to be recorded during the test. Stop the test until the cell surface temperature lower 10°C than the temperature max. | No fire, no explosion |
| 5 | Heating | At standard testing condition, the cell is charged at standard charge, put the cells in the oven, the temperature of the oven is to be raised at 5°C ± 2°C per minute to a temperature of 130°C ± 2°C and remain for 30 minutes. | No fire, no explosion |
| 6 | Impact | At standard testing condition, the cell is charged at standard charge, then is placed on a flat surface so that the longitudinal axis of the cell shall be parallel with it. A 7.9mm diameter bar is to be placed across the center of the sample. A 9.1kg weight is to be dropped from a height of 610mm on the sample. | No fire, no explosion |
| 7 | Low Pressure | At standard testing condition, charge the cell at standard charge, then store for 6hrs at absolute pressure of 11.6kPa. After that, rest for 2hrs at 20°C ± 5°C. | No leakage, no fire, no explosion |

7. Shipment

The cell shall be shipped in voltage range of 3.2-3.4V or in accordance with customers' requirement. The remaining capacity before charging shall be changed depending on the storage time and conditions.

8. Precautions and Safety Instructions

The cell/battery subject to abusive conditions can cause damage to the cell/battery and/or personal injury. Please read and observe the standard battery precautions below before using utilization.



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Note 1: The customer is required to contact AA Portable Power Corp in advance, if and when the customer needs other applications or operating conditions than those described in this document.

Note 2: AA Portable Power Corp will take no responsibility for any accident when the cell/battery is used under other conditions than those described in this document.

Precaution

- Do not expose the cell/battery to extreme heat or flame.
- Do not short circuit, over-charge or over-discharge the battery.
- Do not subject the cell/battery to strong mechanical shocks.
- Do not immerse the cell/battery in water or sea water, or get it wet.
- Do not reverse the polarity of the cell/battery for any reason.
- Do not disassemble or modify the cell/battery.
- Do not handle or store with metallic like necklaces, coins or hairpins, etc.
- Do not use the cell/battery with conspicuous damage or deformation.
- Do not connect cell/battery to the plug socket or car-cigarette-plug.
- Do not make the direct soldering onto a cell/battery.
- Do not touch a leaked cell/battery directly.
- Do not use for other equipment.
- Do not mix use with other kind of cells.
- Do not use or leave the cell/battery under the blazing sun (or in heated car by sunshine).
- Keep cell/battery away from children.
- Do not drive a nail into the cell/battery, strike it by hammer or tread it.
- Do not give cell/battery impact or fling it.

Please contact us when you need any help for custom battery packs and safety concerns

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