PRODUCT SPECIFICATION

LiFePO4 BATTERY
EU1212FJ
1. SCOPE

The product specification describes the requirement of the LiFePO4 Cell to be supplied to the customer by EUROPA Batteries. Should there be any additional information required by the customer, customer are advised to contact EUROPA Batteries.

2. DESCRIPTION

Rechargeable LiFePO4 Battery

3. Model

EU1212FJ

4. GENERAL SPECIFICATIONS

4.1. Nominal Capacity

12Ah/min 11.5Ah (at 0.2C Discharge)

4.2. Charging Voltage

14.6V±0.05V

4.3. Average working Voltage

12.80V, @0.2C

4.4. Standard Charge Method

Constant Current and Constant Voltage (CC/CV)

4.5. Maximum Charge

Current 1C

End Voltage 8.0V

End time 2.5h

4.6. Standard Discharge

Constant Current (CC)

4.7. Maximum Discharge

Current 1C, 3C peak

4.8. Cycle Life

Capacity≥80% Nominal Capacity after 1000 cycles

4.9. Weight of Bare Cell

Approx. 1.3Kg

4.10. Operating Temperature

Charge 0°C ~ 45 °C

Discharge -20°C ~ 60°C

4.11. Storage Temperature

1 month -20°C ~ 45 °C

6 months -20°C ~ 35 °C

5. OUTLINE DIMENSION (UNIT: mm)

5.1. Dimension: max101mm (T) × max99 mm (W) × max152mm (L), refer to the attached drawing 1.

6. APPEARANCE

There shall be no such defect as deep scratch, flaw, crack, rust, leakage, which may adversely affect commercial value of the cell.
7. TEST CONDITION AND DEFINITIONS

7.1. Measuring Equipment
   1. Voltmeter
      Inner impedance > 1000Ω per volt.
   2. Ampere-meter
      Total external resistance (ammeter and wire) < 0.01Ω.
   3. Slide caliper
      The slide caliper should have a scale of 0.02mm.
   4. Impedance meter
      The impedance meter should be operated at AC 1KHz.

7.2. Unless otherwise specified, all tests shall be performed at (20 ± 5)°C and humidity of (65±20)% RH.

7.3. All tests shall be performed at the same charge voltage, per 7.1.

7.4. Definitions:
   7.4.1. C Rate ("C"): The rate (milliamperes) at which a fully charged cell is discharged to its end voltage in one (1) hour.
   7.4.2. C Capacity: The capacity (milliampere-hour) obtained during a C discharge. For test purposes, C is defined as the minimum rated capacity of the cell.

8. CHARACTERISTICS

8.1. Charge method:
   8.1.1 Charging shall consist of charging at a 0.5C constant current rate until the cell voltage reaches 14.6V. The cell shall then be charged at constant voltage of 14.6 volts while tapering the charge current. Charging shall be terminated when the charging current has tapered to 350mA.

8.2. Discharge method:
   8.2.1. Cells shall be discharged at a constant current of 1C to 8.0 volts @ 20°C ± 5°C
   8.2.2. Cells shall be discharged at a constant current of C/2 to 8.0 volts @ 20°C ± 5°C
   8.2.3. Cells shall be discharged at a constant current of C/5 to 8.0 volts @ 20°C ± 5°C

8.3. Weight of Bare Cell
   Meet 4.9. by balance.

8.4. Internal Impedance
   The impedance shall be measured at AC 1000 Hz initially.
   Initial Internal Impedance ≤ 60mohm

8.5. Discharge capacity (1C)
   Within 1 hour after charge as per 4.6, discharge at 1C until end of discharge voltage.
   The capacity ≥ 95% of Nominal Capacity
8.6. Cycle Life
Charge cells per 4.4 Rest 10 minutes. Discharge per 4.6. Rest 10 minutes before recharge. A cycle is defined as one charge and one discharge. Discharge capacity shall be measured after 1000 cycles. Discharge capacity (1000th Cycle) ≥80% of Nominal Capacity

8.7. Storage Characteristics
After charge as per 4.4, store the testing cells at 20°C±5°C for 28 days. Then discharge at 0.2C to 2.0V.
Discharge capacity ≥85% of Nominal Capacity

8.8. Temperature Characteristics
Cells shall be charged per 4.4 and discharged per 4.6. except to be discharged at temperatures per Table 1. Cells, full charged, shall be stored for 3 hours at the test temperature prior to discharging and then shall be discharged at the test temperature. The capacity of a cell at each temperature shall be compared to the capacity achieved at 20 ºC and the percentage shall be calculated. Each cell shall meet or exceed the requirements of Table 1.

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>-10°C @0.5C</td>
<td>≥40% Nominal Capacity</td>
</tr>
<tr>
<td>20°C @0.2C</td>
<td>12Ah</td>
</tr>
<tr>
<td>60°C @1C</td>
<td>≥90% Nominal Capacity</td>
</tr>
</tbody>
</table>

8.9 Battery drawing:
See attached file according to customers different request.
Drawing 1
9. SAFETY

9.1. External Short-circuiting Test
Cell, charged per 4.4, is to be short circuited by connecting the positive and negative terminals of the cell with copper wire having a maximum resistance ≤ 50 mohms. Stop the test when the battery temperature decays to about 10 ºC from the maximum.
Criteria: No Explosion, No Fire

9.2. Overcharge Test
Overcharge test take constant current and constant Voltage. Charging at 3A firstly, the voltage increase following charging time. When voltage reach 40V, cell charge with constant voltage, the current decreases gradually. Stop the test when battery temperature decays to about 10 ºC from the maximum or the current decays to less than 350mA.
Criteria: No Explosion, No Fire

9.3. Tack Through
Hitting the battery with a nail of diameter 2.5~5.0mm for 6h, end test
Criteria: No Fire, No Explosion

9.4. Heating Test
Cell, Charged per 4.4, is to be heated in a gravity convection or circulating air oven. The temperature of the oven is to be raised at a rate of (5±2)°C/min to a temperature of (130±2) °C and remain for 60 minutes at that temperature before the test is discontinued.
Criteria: No Explosion, No Fire

9.5. Pressing test
Fix the testing cells in the middle of bottom armor plate, pressing the cells with 13kN.
Criteria: No Explosion, No Fire

10. Danger and Warning and Cautions in handing the battery

Danger Warning
Danger warning(it should be described in manual or instruction for users, indicated especially)To prevent the possibility of the battery from leaking, heating, explosion,
Please observe the following precautions:
1. Do not disassemble or reconstruct battery.
2. Do not short-circuit battery
3. Do not use or leave battery nearby fire, stove or heated place(more than 80 ºC)
4. Do not immerse the battery in water or sea water, or get it wet
5. Do not charge battery nearby the fire or under the blazing sun
6. Do use the specified charger and observe charging requirement
7. Do not drive a nail into the battery. Strike it by hammer, or tread it
8. Do not give battery impact or fling it
9. Do not use the battery with conspicuous damage or deformation
10. Do not make the direct soldering on battery
11. Do not reverse charge or overdischarge the cell
12. Do not reverse-charge or reverse-connect
13. Do not connect battery to the plug socket or car-cigarette-plug
14. Do not use battery for unspecified equipment
15. Do not touch a leaked battery directly

Warning
1. Do not use Lithium ion battery in mixture
2. Keep the battery away from babies
3. Do not get into a microwave or a high pressure container
4. Do not use a leaked battery nearby fire
5. Do not use an abnormal battery

Caution
1. Do not use or leave the battery under the blazing sun (or heated car by sunshine). The battery may smoke, heat or flame. And also, it might cause the deterioration of battery’s characteristics or cycle life.
2. Do not use nearby the place where generates static electricity (more than 64V).
3. Do not charge the battery out of recommended temperature range of 0°C and 60°C.
4. When the battery has rust, bad smell or something abnormal at first-time-using, do not use the equipment and go to bring the battery to the shop which it was bought.
5. In case children use the battery, their parents teach how to use batteries according to the manual with care.
6. If the skin or cloth is smeared with liquid from the battery, wash with fresh water.