Product Specification

Lithium-ion Power Cell of LP2714897-51Ah-BEV

Tianjin Lishen Battery Joint-Stock Co.,Ltd

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1. Scope

The product specification describes the requirement of the Prismatic Lithium Ion Power Cell LP2714897-51Ah-BEV to be supplied to the customer by Tianjin Lishen Battery Joint-Stock Co.,Ltd..

2. General Specifications

2.1 Symbol and Abbreviation Definitions

C—— the rated capacity (in ampere-hours) of the cell for an-hour discharge.

In the following specification 1 *C* =51.0A, 1/3C = 17A.

SOC —— state of charge.

DOD—— depth of discharge.

AC—— alternating current

OCV—— open circuit voltage

HL——EUCAR hazard levels

2.2 Product General Specification

No.	Item	Specification
1	Cell Type	Lithium-ion power cell
2	Cell Model	LP2714897
3	Nominal Capacity☆	51.0Ah (1/3C), 50Ah (1C)
4	Average Working Voltage☆	3.65V
5	AC-impedance☆	≤ 0.8mΩ
6	Weight	920±10g
7	Maximum Charge Current	1.5C (Continuous) @ 25℃; 3C (30s, 50%SOC) @ 25℃, (details in Chapter 3.6.2 in LP2714897-51Ah-BEV Cell Requirement)
8	Charge End Voltage	4.2V
9	Maximum Discharge Current	2C (Continuous) @ 25℃; 4.2C (30s, 50%SOC) @ 25℃, (details in Chapter 3.6.2 in LP2714897-51Ah-BEV Cell Requirement)
10	Discharge End Voltage	2.8V
	Pulse discharge end voltage	2.8V, 0℃>T>-10℃
		2.5V, T<-10℃

11	Max Operating Temperature Range	-30℃/+60℃
	Charge	-20~45℃
	Discharge	-30℃ ~ 60℃
12	Optimal Operating Temperature Range	
	Charge	15℃ ~ 35℃
	Discharge	15℃ ~ 35℃
13	Storage Temperature	
	1 month	-40℃~ 45℃
	6 months	-20℃ ~ 35℃
*Cells storage condition: 15%SOC or voltage between 3.450V and 3.550V		

3. Appearance and Dimension

Appearance and Dimension refer to the technical drawing.

4. Characteristics

4.1 Test Condition

Cells should be tested within a month after purchase and the charge-discharge times of the test cells should be less than 5. Unless noted otherwise, all tests are to be conducted at standard temperature which is(25±2)℃ and standard humidity which is (65±20)%. Unless otherwise specified, all the tests are to be conducted using cells clamped by plates. Dimensions of plates suggested to be(T*W*L):1cm*12cm*20cm, material of plates suggested to be aluminum. The plates are fixed by 4 screws. The torque is adjusted to reach the initial force of 1500N.

4.2 Test Equipment

a) Voltmeter

Inner impedance>1000Ω per volt.

b) Slide caliper

The slide caliper should have a minimum scale of 0.01mm.

c) Impedance meter

The impedance meter should be operated at AC 1kHz.

d）Balance

The Balance's accuracy should be up to 0.1 gram

4.3 Test Process and Specification

4.3.1 Charge Method

Cells are charged with Constant Current and Constant Voltage (CC/CV) method at the environment temperature of (25±2) ℃.The constant current is 1/3C and the constant voltage is 4.2V, Charge shall be terminated when the charge current has tapered to 2550mA, then rest the cell of a period of dV/dt < 3mV/min or a maximum rest time of 30 minutes until next step.

4.3.2 Test Item and Specification

Test Item and Specification Should refer to table 2.

Table 2

Number	Item	Test profile	Specification
1	Appearance and Dimension	1.Eyeballing 2.Test cells' dimension should be tested with slide caliper without plates. 3.The cell's thickness should be tested with the cell clamped. The pressure should be 50-200N. The cell is tested with plates	No deep scratch, No leakage , dimension should refer to the technical drawing
2	Weight	Electronic Scale, without plates	920±10g
3	Open Circuit Voltage☆	Measure the open circuit voltage within 1h after charge cells per 4.3.1. without plates	OCV≥4.15V
4	Nominal discharge capacity ☆	Discharge cell at a 1/3C current to 2.8V within 1h after charging the cell according to 4.3.1 and measure the capacity. The cycle can repeat 5 times, when the capacity of one cycle meet the requirement, the test can be terminated.	1/3C capacity ≥ Nominal capacity
5	Maximum charge current	1. Discharge cells at a 1/3C current to 2.8V after charging cells per 4.3.1. And record the capacity; 2. Charge cells to 4.2V at constant current of 1.5C or specified current. Then charge at constant voltage of 4.2V until the current decreases to 2550 mA.	1.5C (continuous);

6	Pulse Charge current	Charge cells per 4.3.1, then discharge to 50%SOC at 1/3C current. Rest 30min. Charge the cell at pulse current. Charge shall be terminated when the voltage reach 4.2V or charge withstand 30s.	3C (25±2℃, 50%SOC, 30s)
7	Maximum discharge current	1. Discharge cells at a 1/3C current to 2.8V after charge cells per 4.3.1. And record the capacity; 2. Charge cells at 1/3C current, and discharge to 2.8V at 2C or specified current.	2C (continuous);
8	Pulse discharge current	Charge cells per 4.3.1, then discharge to 50%SOC at 1/3C current. Rest 30min. Discharge cells at max pulse discharge current, discharge shall be terminated when the voltage reaches to 2.8V or discharge withstand 30s.	4.2C （25±2℃ 50%SOC, 30s）
9	Cycle Life☆	Single cell, stabilized between 2 metallic plates (aluminum). Charge: 1C charge to 4.2V, CCCV charge until current decreases to 2550 mA before charge ends. Rest: 30min. Discharge: 1C to2.8V; Rest: 30min. A cycle is defined as one charge and one discharge. Discharge capacity shall be measured after 1500 cycles for cycling test at （25±2）℃ or 1000 cycles for cycling test at （45±2）℃. The fast charge procedure has been defined in the document AD17: Fast charge procedure for LP2714897-51Ah-BEV. The fast charge cycle test shall be performed as following: 1. 5 Cycles of normal charge; 2. 1 Cycles of fast charge according to the fast charge procedure; 3. repeat Steps 1&2	Discharge capacity (1500th cycle at 25±2℃; or 1000th cycle at 45±2℃) ≥80% of nominal capacity. Fast charge cycling test: After 1000 full 1C/1C cycles + 200 fast charge, discharge capacity ≥ 80% of nominal capacity.
10	Capacity Retention☆	1.After charging per 4.3.1, store the testing cells under open circuit condition for 30 days at the environment temperature of （25±2）℃. Then discharge the cell to 2.8V at a 1/3C current. 2.After charging per 4.3.1, store the testing cells at	Residual capacity≥90% of Nominal capacity

		（60±2）℃ for 7 days, then discharge to 2.8V at a 1/3C current and measure the capacity.	
11	Characteristics at high temperature	Cells shall be charged per 4.3.1 and store for 5h at （60±2）℃, then discharge to 2.8V at a 1/3C current and measure the capacity.	Residual capacity≥90% of Nominal capacity
12	Characteristics at low temperature	Cells shall be charged per 4.3.1 and stored in low-temperature oven for 20h at （-20±2）℃, then discharged to 2.5V at a 1/3C current. Record the capacity。	Residual capacity≥70% of Nominal capacity
13	Airproof Characteristics☆	Weighed the testing cells before the storage test with an electronic scale which has a minimum scale of 0.01g, storage the cells at 60℃，90%RH for 24 hours. Test the weight again and then calculate the weight loss.	Loss of weight< 300 mg
14	Vibration Test★	According to IEC 62660-3:2016	HL ≤ 2
15	Short-circuit Test★	According to IEC 62660-3:2016	HL ≤ 2
16	Overcharge Test★	According to IEC 62660-3:2016	HL ≤ 3
17	Over Discharge test★	According to IEC 62660-3:2016	HL ≤ 2
18	Thermal Test★	According to IEC 62660-3:2016	HL ≤ 4
19	Nail penetration Test★	According to GB/T 31485-2015	HL ≤ 5
20	Drop Test	According to IEC 62619-2017	HL ≤ 2

5.Caution

5.1 Charge

a) NO over-charge, the charge voltage should not be over 4.2 V.

b) NO reverse charging

c) The start charging temperature of charger is -20 ℃-45 ℃

d) Recommended charging temperature range is 15℃ ~ 35℃.

5.2 Discharge

a) No short circuit

b) The end of discharge voltage must be over 2.8V(above 0℃)/2.8V（above-10℃）/2.5V(below -10℃)

c) Discharge temperature range of -30℃~60℃

d) Recommended discharging temperature range is 15℃~ 35℃.

5.3 Put cells away from children.

5.4 Storage

Allowed storage duration	Temperature range	Humidity range
≤5days	-40℃～45℃	90%RH～95%RH
≤30days	-40℃～45℃	80%RH～90%RH
≤180days	-20℃～35℃	≤80%RH

6. Warning

6.1 Before using, read the specifications to have an enough understanding for the warning content and Notes.

6.2 Avoid overheat in any circumstances.Don’t modify or disassemble the battery. It will be dangerous, and may cause ignition, heating, leakage or explosion.

6.3 Don’t put cells in overheat circumstances or disposed in fire ,don’t put cells under the sunshine.

6.4 Don’t directly connect the cell’s positive and negative terminals by using metal or other conductive wires, which will lead to short circuit and may cause fire or even explosion of the cell.

6.5 Don’t reverse the positive (+) and negative (-) terminals.

6.6 Don’t put cells in water or other conductive liquids or let cells absorb moisture.

6.7 Don’t shock cells excessively.

6.8 Don’t solder the battery outside the area of terminals. Excessive heating may cause deformation of the battery components such as the gasket, which may lead to the battery swelling, leakage, ignition or even explosion..

6.9 Don't use abnormal cell which has damages by shipping stress, drop, short, leakage or other abnomal issues.

6.10 Don't contact cans directly or with other conductive materails during the using process.

6.11 During store or using,The battery should be away from the static place,

6.12 It is forbidden to use the battery together with other batteries of which the package, model, brand or chemistry are different.

6.13 If the cell has the phenomenon of rapid heating, smelling, color change, deformation etc. during use, charging/discharging or storage, use of the cell should be stopped immediately and corresponding actions should be taken.

6.14 If the electrolyte of the cell leaks onto skin or cloth, clean water should be used to wash the skin or cloth immediately to avoid skin discomfort.

7. Shipping

7.1 Shipping temperature: -40℃~+50℃; Humidity: ≤95%RH. Violent vibration, shocking, sunshine and rain should be avoided during shipment.

7.2 The cell should have SOC lower than 30% during shipment.

8. Others

If customers need to use or operating cells beyond the specified range of this file, please contact Tianjin Lishen Battery Joint-Stock Co., Ltd. Manufacturer will not be responsible for trouble caused by using cells beyond the specified range of this file.

Manufacturer is not responsible for trouble caused by improper use of single cell together with circuit, module and charger.

Manufacturer will be exempt from warrantee any defect cells during assembling after acceptance.

9. Product Diagram

Refer to the technical drawing.