Product Specification

Lithium-ion Power Cell of LP44147272-130Ah

Tianjin Lishen Battery Joint-Stock Co.,Ltd

www.lishen.com.cn

1. Scope

The product specification describes the requirement of the Prismatic Lithium Ion Power Cell to be supplied to the customer by Tianjin Lishen Battery Joint-Stock Co.,Ltd.. Should there be any additional information required by the customer, customer are advised to contact Tianjin Lishen Battery Joint-Stock Co.,Ltd .

2. General Specifications

2.1 Abbreviation Definitions

C_3—— the rated capacity (in ampere-hours) of the cell for a three-hour discharge.

I_3——a current corresponding to the manufacturer's rated capacity (in ampere-hours) for a three-hour discharge.

$I_3 = C_3$ (Ah) / 3h

In below specification 3 I_3 (A)=130A.

2.2 Specification

	Item	Specification
1	Cell Type	Lithium -ion power cell
2	Cell Model	LP44147272
3	Nominal Capacity☆	130Ah (Min capacity:125Ah, Discharge at 1I_3A)
4	Nominal Voltage☆	3.2V
5	AC-impedance☆	≤ 1.0mΩ
6	Weight	3425±100g
7	Standard Charge Method	Constant Current and Constant Voltage (CC/CV)
	Current	1I_3 A
	Voltage	3.65V
	End Current	6.5A
8	Maximum Charge Current	3 I_3（Continuous）6I_3(10s)
	Charging Voltage	3.65V
9	Standard Discharge	Constant Current (CC)
	Current	1I_3 A
	End Voltage	2.0V
10	Maximum Discharge Current	6I_3（Continuous）12I_3(30s)
11	Cycle Life	Capacity≥80% Nominal Capacity @2000th cycles

12	Max Operating TemperatureRange	
	Charge	0℃ ~ 45℃
	Discharge	-20℃ ~ 60℃
13	OptimalOperating TemperatureRange	
	Charge	15℃ ~ 35℃
	Discharge	15℃ ~ 35℃
14	Storage Temperature	
	1 month	-40℃~ 45℃
	6 months	-20℃ ~ 35℃
*Cells should be stored at 35%SOC or the voltage is between 3.275V and 3.305V.		

3. Appearance and Dimension

There shall be no such defect as deep scratch, flaw, crack, rust, leakage, which may adversely affect commercial value of the cell.Dimension refer to the attached drawing 1.

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±2)%.

4.2 Test Equipment

1) Voltmeter

Inner impedance≥1000Ω per volt.

2) Slide caliper

The slide caliper should have a scale of 0.02mm.

3)Impedance meter

The impedance meter should be operated at AC 1kHz.

4.3 Test Process and Specification

4.3.1Charge method:

Cells are charged with Constant Current and Constant Voltage (CC/CV) method at the

environmenttemperature of (25±2)℃.The constant current is $1I_3$（A）and the constant voltage is 3.65V, Charge shall be terminated when the charge current has tapered to 0.15 I_3A, then store cells for 1h.

4.3.2 Test Item and Specification

Test Item and Specification Should refer to table 2.

Number	Item	Test profile	Specification
1	Appearance and Dimension	Look and test with slide caliper	No deep scratch, No leakage, dimension should refer to the attached drawing 1
2	Weight	Electronic Scale	3425±100g
3	Open Circuit Voltage☆	Measure the open circuit voltage within 1h after charge cells per 4.3.1.	OCV≥3.35V
4	Nominal capacity☆	Discharge cells at $1I_3$(A) to 2.0V within 1h after charge cells per 4.3.1. Andmeasure the capacity. The cycle can repeat 5 times, when the capacity of one cycle meet the requirement, the test can be terminated.	$1I_3$ capacity ≥ Nominal capacity
5	Discharge capacity at $3I_3$(A)	Discharge cells at $3I_3$(A) to 2.0V within 1h after charge cells per 4.3.1. And record the time or capacity.	$3I_3$ capacity ≥ 90% of ratedcapacity.
6	Maximum charge current	1、Discharge cells at $1I_3$(A) to 2.0V within 1h after charge cells per 4.3.1. And record the capacity； 2、Charge cells to 3.65V,charge shall be terminated when the charge current has tapered to $0.15I_3$ A, the charge current is $3nI_3$ (“n” is an integer).	$3I_3$ (A)(continuous); $6I_3$ (A)(10s);
7	Maximum discharge current	1、Discharge cells at $1I_3$(A) to 2.0V after charge cells per 4.3.1. And record the capacity； 2、Charge cells at $1I_3$ (A)，and discharge to 2V at $3nI_3$ (“n” is an integer).	$6I_3$ (A)(continuous); $12I_3$ (A)(30s);
8	Cycle Life☆	Charge cells per 4.3.1. then Cells shall be discharged at $1I_3$ A to 80%DOD @ 25°C±2°C.	Discharge capacity (2000th Cycle) ≥80% of Nominal

		A cycle is defined as one charge and one discharge. Cells shall be discharged at a constant current of $1I_3$ A to 100% DOD @ 25°C±2°C every 25 cycles. Discharge capacity shall be measured after 2000 cycles.	Capacity
9	Charge Retention☆	1、After charge per 4.3.1. store the testing cells for 30 days at the environment temperature of （25±2）℃,then discharge to 2.0V at a $1I_3$(A) . 2、After charge per 4.3.1. store the testing cells at （60±2）℃ for 7 days, then discharge to 2.0V at $1I_3$(A) and measure the capacity.	Residual capacity≥90% of Nominal capacity
10	Characteristics at high temperature	Cells shall be charged per 4.3.1 and store for 5h at （60±2）℃, then discharge to 2.0V at $1I_3$(A) and measure the capacity.	Residual capacity≥95% of Nominal capacity
11	Characteristics at low temperature	Cells shall be charged per 4.3.1 and store for 20h at （-20±2）℃, then discharge to 2.0V at $1I_3$(A) and measure the capacity。	Residual capacity≥55% of Nominal capacity
12	Airproof Characteristics☆	Weighed the testing cells before and after the storage test with an electronic scale which has a minimum scale of 0.001g, and thencalculate the weight loss.	Loss of weight< 300 mg
13	Short-circuit Test★	Cell, charged per 4.3.1, shall be short circuited by connecting the positive and negative terminals of the cell with a copper wire having a maximum resistance≤5 mΩ for 10min.	No Explosion, No Fire
14	Overcharge Test★	After charged per 4.3.1, testcells (with thermocouple) shall be overcharged with the method below: Charge test cellsat $3I_3$(A), end test when the voltage reached 5V or the charge time reached 90min (test can be stopped when one of the conditions above reached first).	No Explosion, No Fire
15	Over Discharge test★	Discharge test cells at $1I_3$(A) to 0V after charge cells per 4.3.1.	No Explosion, No Fire, Noleakage

16	Thermal Test★	Put cells (with thermocouple) into the oven, then close the door of it.The oven temperature shall be raised at a rate of 5℃±2℃/min to a temperature of （85±2）℃, the cells shall remain at this temperature for 120min before the test is discontinued.	No Explosion, No Fire
17	Nail penetration Test★	After charged test cells per 4.3.1, put the cells with thermocouple into the fume hood,then penetrate completely the center of the largestside at the speed of 10-40mm per second by a Φ3.0-Φ8.0mmstainless steel nail.	No Explosion, No Fire
18	Crush Test★	After charged test cells per 4.3.1,crush the cells vertically untilthe voltage tapered to 0V。	No Explosion, No Fire
19	Drop Test★	A cell is charged in accordance with 4.3.1,then droppedfrom a height of 1500mm to a wooden board(20mmthick) which is placed on the concrete ground.Cells shall be dropped in each of three mutuallyperpendicular directions.	No Explosion, No Fire, Noleakage

5.Caution

5.1 Charge

a) NO over-charge，the charge voltage should not be over 3.65V.

b) NO reverse charging

c) Optimal chargetemperature range is 15℃ ~ 35℃。Do not charge for a long time in the temperature less than 15℃.

5.2 Discharge

a) No short circuit

b) The end of discharge voltage must be over 2.0V.

c) Optimal dischargetemperature range is 15℃~ 35℃. Do not discharge for a long time in the temperature more than 35℃

5.3 Put cells away from children.

5.4 Storage and Usage

a) For any short time storage (in one month), cell should be in a clean and dry area （humidity ≤65% RH） and at -40℃ ~+45℃ at 35%SOC .

b) For any long time storage (in 6 month), cell should be in a clean and dry area（humidity ≤65% RH） and at -20℃ ~+35℃ at 35%SOC.

c）During the course of storage or usage, keep the cells upright .

6. Warning

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

6.2 Don't put cells in overheatcircumstancesor disposed in fire ,don't put cells under the sunshine.

6.3 Don't short-circuit positive(+) and negative(-) terminals. Keep away from metal or other conductive materials. Jumbling the batteries of direct contact with positive(+) and negative(-) terminals or other conductive materials may cause short-circuit and may even cause fire and explosion.

6.4 Don't reverse the positive (+) and negative (-) terminals.

6.5 Don't put cells in water or other conductive liquids or let cells absorb amoisture.

6.6 Don't impact cells excessively.

6.7 Don't solder the battery directly. Excessive heating may cause deformation of the battery components such as the gasket, which may lead to the battery swelling,leakage, explosion,or ignition.

6.8 Don't use abnormal cell which has damages by shipping stress, drop, short or something else, and which gives off electrolyte odor.

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

6.10 Don't twist the terminal post with the torque which is more than 15N • m.

7. Shipping

7.1 During transportation, keep the battery from acutely vibration, impacting, insolation,

drenching.

7.2 The delivery battery should be at a half charged state.

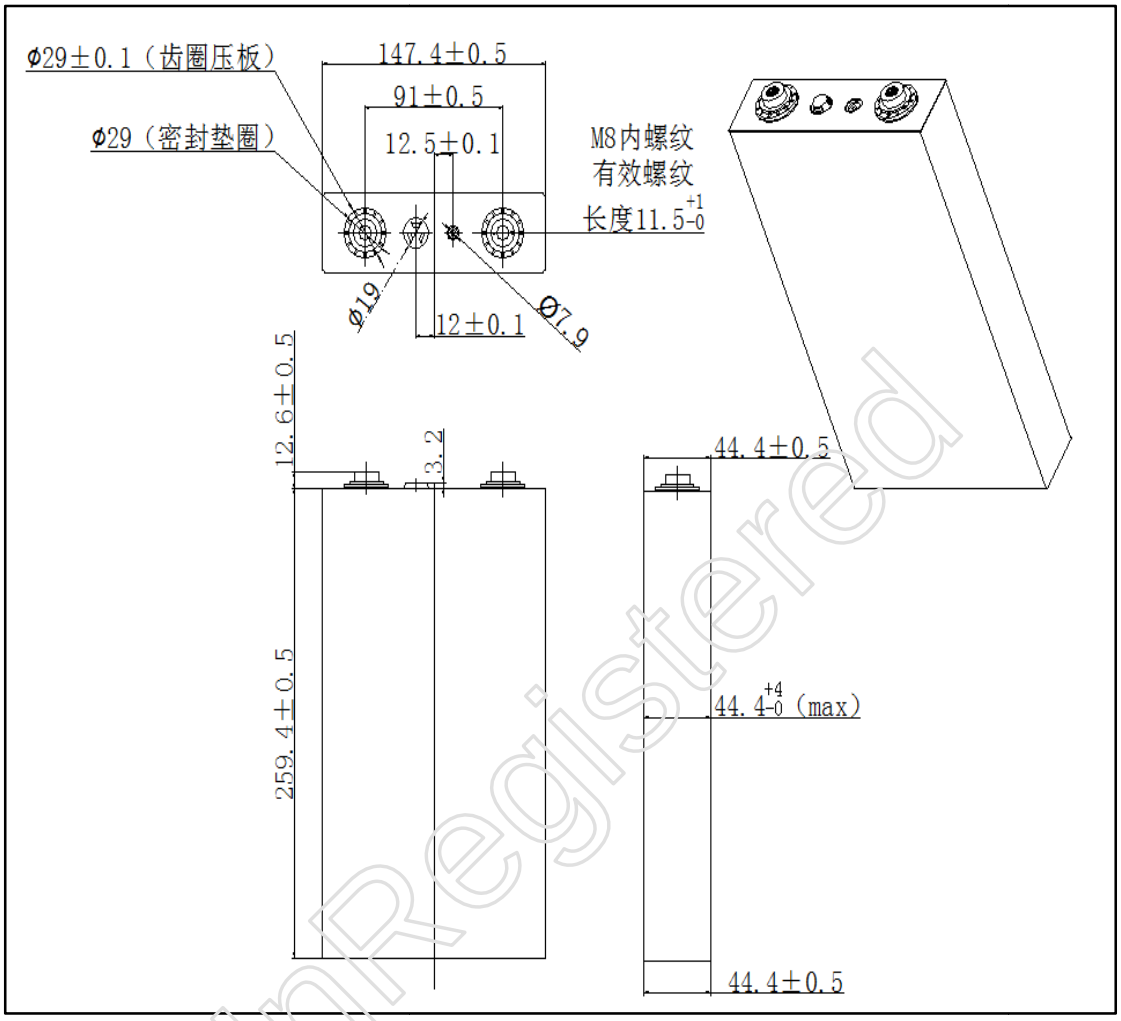
8. Others

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 will not be responsible for trouble occurred by matching electric circuit, cell pack and charger.

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

Attached drawing 1



Remarks： The size of drawing is the cell which in insulation sleeve