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检测
TESTING
CNAS L5998

UN38.3 测试报告
UN38.3 Test Report

产 品 名 称: 锂离子电池组
Name of Products: Lithium ion Battery Pack

委 托 单 位:
Applicant: HUBBLE LITHIUM (PTY) LTD

生 产 单 位:
Factory: HUBBLE LITHIUM (PTY) LTD

检测人 **Tester**	审核人 **Reviewer**	批准人 **Approver**
项目工程师 / **Project Engineer**	资深工程师 / **Senior Engineer**	主管工程师 / **Chief Engineer**

广东联鼎检测科技有限公司检验检测专用章

广东联鼎检测科技有限公司

GUANGDONG UTL CO., LTD.

UN38.3, Seventh Edition **Recommendations on transport of dangerous goods, manual of test and criteria, Section 38.3 - Lithium metal and lithium ion Batteries**	
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Website/网址..... :	N/A/不适用
Test specification/测试规范	
Standard.....:	ST/SG/AC.10/11/Rev.7/Section 38.3
Test procedure..... :	N/A
Non-standard test method……..:	N/A
Test item description/样品名称……:	Lithium ion Battery Pack 锂离子电池组
Trade Mark/商标.....:	N/A
Model/Type reference/型号..... :	Hubble AM-4 2.75KW
Ratings/规格..... :	25V, 110Ah, 2750Wh

Summary of testing:
测试信息概要：

Test Conclusion 测试结论		
Test(s) 测试项目	Sample Number 样品编号	Conclusion 单项结论
T.1: Altitude simulation / 高度模拟	B1# - B4#	Pass / 通过
T.2: Thermal test / 温度试验		Pass / 通过
T.3: Vibration / 振动		Pass / 通过
T.4: Shock / 冲击		Pass / 通过
T.5: External short circuit / 外部短路		Pass / 通过
T.6: Crush / 挤压	C1# - C10#	Pass / 通过
T.7: Overcharge / 过充电	B1# - B4#	Pass / 通过
T.8: Forced discharge / 强制放电	C11# – C30#	Pass / 通过

The sample's status is good.

样品状况良好。

The conditions of the batteries of samples No. B1# to B2# are at first cycle, in fully charged states.
样品编号B1# -B2#为第一次循环充放电周期后完全充电状态的电池。

The conditions of the batteries of samples No. B3# to B4# are after twenty-fifth cycles ending in fully charged states.
样品编号B3# -B4#为二十五次循环充放电周期后完全充电状态的电池。

The conditions of the cells of samples No. C1# to C5# are at first cycle at 50% of the design rated capacity.
样品编号C1# -C5#为第一次循环充放电周期充电至标称容量的50%状态的电芯。

The conditions of the cells of samples No. C6# to C10# are after twenty-fifth cycles ending at 50% of the design rated capacity.
样品编号c6# -C10#为第二十五次循环充放电周期充电至标称容量的50%状态的电芯。

The conditions of the cells of samples No. c11# to c20# are at first cycle, in fully discharged states.
样品编号C11# -c20#为第一次循环充放电周期完全放电状态的电芯。

The conditions of the cells of samples No. C21# to C30# are after twenty-fifth cycles ending in fully discharged states.
样品编号C21# -C30#为二十五次循环充放电周期后完全放电状态的电芯。

The test results：Pass

Test item particulars
样品信息:

Cell type.....: 电芯型号	C08M
Nominal Voltage of cell.....: 电芯额定电压	3.7V
Rated Capacity of cell.....: 电芯额定容量	100Ah
Battery Type.....: 电池类型	Lithium ion battery 锂离子电池
Appearance.....: 颜色	Multicolor 多种颜色
Number of cell.....: 电芯数量	7pcs (7S1P)
Dimension(mm).....: 尺寸	371mm (max) × 375mm (max) × 147mm (max)

Test case verdicts
测试判定

Test case does not apply to the test object.....: 判定不适用于测试对象	N/A
Test item does meet the requirement.....: 测试符合规定	P(Pass)
Test item does not meet the requirement.....: 测试不符合规定	F(Fail)

Testing 测试

Date of receipt of test item .....: 接样日期	2022-01-05
Date(s) of performance of test.....: 测试周期	2022-01-05 to 2022-01-19

General remarks 备注

This report shall not be reproduced, except in full, without the written approval of the testing laboratory.
除非全部复制，未经本实验室书面批准不得部分复制。
The test results presented in this report relate only to the item tested.
本报告的测试结果仅对送检样品负责。
"(see remark #)" refers to a remark appended to the report.
"(见注#)" 指报告的备注。
Throughout this report a point is used as the decimal separator.
本报告中以点代替小数点。

According to the Standard, a single-cell battery (Battery Pack) is considered a "Cell" (Battery Cell) and shall be tested according to the testing requirements for "Cell". This testing included the samples of Battery Pack and Battery Cell as aforementioned. For testing details, please refer to Table of Test Conclusion and individual test record.
按照标准要求，单电芯电池(电池包)被视作"电芯"(电池芯)，以"电芯"的要求进行测试，本测试项目样品包含如前所述电池包和电池芯。有关测试详情，请查阅测试结论表格及各单项测试记录。

General product information:
产品信息：

The main features of this model are shown as below:
产品主要信息如下:

Model 型号	Nominal capacity 额定容量	Nominal voltage 额定电压	Nominal Charge Current 额定充电电流	Nominal Discharge Current 额定放电电流	Maximum Charge Current 最大充电电流	Maximum Discharge Current 最大放电电流	Maximum Charge Voltage 最大充电电压	Cut-off Voltage 放电截止电压
Battery / 电池								
Hubble AM-4 2.75KW	110Ah	25V	20A	20A	100A	100A	53.6V	42.0V
Cell / 电芯								
C08M	110Ah	3.7V	50A	50A	100A	100A	4.2V	3.0V

Test Procedure:
测试程序：

1. Tests T.1 to T.5 shall be conducted in sequence on the same cell or battery. Tests T.6 and T.8 shall be conducted using not otherwise tested cells. Test T.7 may be conducted using undamaged batteries previously used in Tests T.1 to T.5 for purposes of testing on cycled batteries.
测试T.1-T.5须按顺序依次在同一组电芯或电池上进行。T.6和T.8须用全新的电芯进行测试。T.7 可以用之前T.1-T.5测试中完整无损的电池进行测试。

2. In order to quantify the mass loss, the following procedure is provided:
质量损失按照如下公式计算:

$$\text{Mass loss (\%)} = \frac{(M1 - M2)}{M1} \times 100$$

Where M1 is the mass before the test and M2 is the mass after the test. When mass loss does not exceed the values in Table 38.3.1, it shall be considered as “no mass loss”.
M1是测试前的重量，M2是测试后的重量。若质量损失不超过Table 38.3.1中的值即可视为“没有质量损失”。

Table 38.3.1 Mass loss limit

Mass M of cell or battery	Mass loss limit
M <1 g	0.5%
1 g ≤ M ≤ 75 g	0.2%
M > 75 g	0.1%

UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
38.3.4.1	**Test T.1: Altitude simulation/高度模拟**		**P**
	Test cells and batteries shall be stored at a pressure of 11.6 kPa or less for at least six hours at ambient temperature (20±5°C)/将电芯和电池在温度为20±5°C、大气压力不大于11.6kpa的环境中贮存不少于6个小时。		P
	Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states. /电芯和电池符合要求：无漏液、无排气、无解体、无破裂以及无着火现象；电芯或电池测试后的开路电压不低于测试前开路电压的90%。此项关于电压方面的要求不适用于完全放电后的电芯和电池。	No leakage, no venting, no disassembly, no rupture and no fire. / 无漏液、无排气、无解体、无破裂以及无着火现象。 See test data for details. / 详见测试数据。	P
38.3.4.2	**Test T.2: Thermal test/温度试验**		**P**
	Test cells and batteries are to be stored for at least six hours at a test temperature equal to 72±2°C, followed by storage for at least six hours at a test temperature equal to - 40±2°C. The maximum time interval between test temperature extremes is 30 minutes. This procedure is to be repeated 10 times, after which all test cells and batteries are to be stored for 24 hours at ambient temperature (20 ±5°C). /首先将样品放在72±2°C的环境中放置至少6个小时，然后放在- 40±2°C的环境中放置至少6个小时。温度转换的最大间隔时间为30分钟。如此循环10次，最后将样品放在20±5°C的环境中静置24小时。		P
	For large cells and batteries the duration of exposure to the test temperature extremes should be at least 12 hours. /对于大电芯和大电池，在高温和低温中放置的时间最少12个小时。		P
	Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states. /电芯和电池符合要求：无漏液、无排气、无解体、无破裂以及无着火现象；电芯或电池测试后的开路电压不低于测试前开路电压的90%。此项关于电压方面的要求不适用于完全放电后的电芯和电池。	No leakage, no venting, no disassembly, no rupture and no fire. / 无漏液、无排气、无解体、无破裂以及无着火现象。 See test data for details. / 详见测试数据。	P

UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
38.3.4.3	**Test T.3: Vibration/振动**		**P**
	Cells and batteries are firmly secured to the platform of the vibration machine without distorting the cells in such a manner as to faithfully transmit the vibration. The vibration shall be a sinusoidal waveform with a logarithmic sweep between 7 Hz and 200 Hz and back to 7 Hz traversed in 15 minutes. This cycle shall be repeated 12 times for a total of 3 hours for each of three mutually perpendicular mounting positions of the cell. One of the directions of vibration must be perpendicular to the terminal face. /样品必须牢固地安装在振动台台面上。振动以正弦波形式，以7Hz增加至200Hz，然后减少回到7Hz为一个循环，一个循环持续15分钟的对数前移传送。对样品从三个互相垂直的方向上循环12次，每个方向3个小时，共9个小时。其中一个振动方向必须是垂直样品的极性平面。		P
	The logarithmic frequency sweep shall differ for cells and batteries with a gross mass of not more than 12 kg (cells and small batteries), and for batteries with a gross mass of more than 12 kg (large batteries). /对于质量不大于12kg的样品(电芯和小电池)和质量超过12kg的电池(大电池)，对数扫频不同，		P
	For cells and small batteries: from 7 Hz a peak acceleration of 1 gn is maintained until 18 Hz is reached. The amplitude is then maintained at 0.8 mm (1.6 mm total excursion) and the frequency increased until a peak acceleration of 8 gn occurs (approximately 50 Hz). A peak acceleration of 8 gn is then maintained until the frequency is increased to 200 Hz. /对于电芯和小电池，对数扫频为：从7Hz开始保持1gn的最大加速度直到频率为18Hz，然后将振幅保持在0.8mm (总偏移1.6mm) 并增加频率直到最大加速度达到8gn (频率约为50Hz)，将最大加速度保持在8gn直到频率增加到200Hz。		N/A
	For large batteries: from 7 Hz to a peak acceleration of 1 gn is maintained until 18 Hz is reached. The amplitude is then maintained at 0.8 mm (1.6 mm total excursion) and the frequency increased until a peak acceleration of 2 gn occurs (approximately 25 Hz). A peak acceleration of 2 gn is then maintained until the frequency is increased to 200 Hz. /对于大电池，对数扫频为：从7Hz开始保持1gn的最大加速度直到频率为18Hz，然后将振幅保持在0.8mm (总偏移1.6mm) 并增加频率直到最大加速度达到2gn (频率约为25Hz)，将最大加速度保持在2gn直到频率增加到200Hz。		P

UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
	Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire during the test and after the test and if the open circuit voltage of each test cell or battery directly after testing in its third perpendicular mounting position is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states. /电芯和电池符合要求：无漏液、无排气、无解体、无破裂以及无着火现象；电芯或电池测试后的开路电压不低于测试前开路电压的90%。此项关于电压方面的要求不适用于完全放电后的电芯和电池。	No leakage, no venting, no disassembly, no rupture and no fire. / 无漏液、无排气、无解体、无破裂以及无着火现象。 See test data for details. / 详见测试数据。	P
38.3.4.4	**Test T.4: Shock/冲击**		**P**
	Test cells and batteries shall be secured to the testing machine by means of a rigid mount which will support all mounting surfaces of each test battery. /以稳固的托架固定住每个样品。		P
	Shock: a half-sine shock of peak acceleration of 150 g_n (or Acceleration(g_n)= $\sqrt{\left(\frac{100850}{mass}\right)}$, which is smaller) and pulse duration of 6 milliseconds, large cells and large batteries shall be subjected to a half-sine or peak acceleration of 50 g_n (or Acceleration(g_n)= $\sqrt{\left(\frac{30000}{mass}\right)}$, which is smaller) and pulse duration of 11 milliseconds/对小电芯或小电池以峰值为150 g_n (或与 $\sqrt{\left(\frac{100850}{mass}\right)}$ 中的较小值）的半正弦的加速度撞击，脉冲持续6毫秒，大电芯和大电池组须经受最大加速度50 g_n (或与 $\sqrt{\left(\frac{30000}{mass}\right)}$ 中的较小值）和脉冲持续时间11毫秒的半正弦波冲击。	Large batteries. /大电池组	P
	Each cell or battery shall be subjected to three shocks in the positive direction and to three shocks in the negative direction in each of three mutually perpendicular mounting positions of the cell or battery for a total of 18 shocks. /每个样品必须在三个互相垂直的电池安装方位的正方向经受三次冲击，接着在反方向经受三次冲击，总共经受18次冲击。		P

UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
	Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states. / 电芯和电池符合要求：无漏液、无排气、无解体、无破裂以及无着火现象；电芯或电池测试后的开路电压不低于测试前开路电压的90%。此项关于电压方面的要求不适用于完全放电后的电芯和电池。	No leakage, no venting, no disassembly, no rupture and no fire. / 无漏液、无排气、无解体、无破裂以及无着火现象。 See test data for details. / 详见测试数据。	P
38.3.4.5	**Test T.5: External short circuit/外部短路**		**P**
	The cell or battery to be tested shall be temperature stabilized so that its external case temperature reaches 57±4°C. /保持测试环境温度稳定在57±4°C，以便样品外表温度达到57±4°C。		P
	The cell or battery at 57 ± 4°C shall be subjected to one short circuit condition with a total external resistance of less than 0.1 ohm. This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to 57±4°C, or in the case of the large batteries, has decreased by half of the maximum temperature increase observed during the test and remains below that value. /在环境温度57±4°C的条件下，将样品正负极用小于0.1欧姆的总电阻回路进行短路，样品的外表温度恢复到57±4°C之后保持短路状态1小时以上；对于大电池，电池温度降低至最高温升值的一半时实验结束。		P
	Cells and batteries meet this requirement if their external temperature does not exceed 170°C and there is no disassembly, no rupture and no fire during the test and within six hours after the test./ 电芯和电池符合要求：在测试过程中以及之后6个小时内，外表温度不超过170°C，并且无解体、无破裂和无着火现象发生。	No disassembly, no rupture and no fire. / 无解体、无破裂以及无着火现象发生。 See test data for details. / 详见测试数据。	P
38.3.4.6	**Test T.6: Impact / Crush/撞击/挤压**		**P**
	Test procedure – Impact (applicable to cylindrical cells not less than 18.0 mm in diameter) /撞击(适合于直径大于等于18.0mm的圆柱形电芯)	Prismatic cells. /棱柱形电芯	N/A

UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
	The sample cell or component cell is to be placed on a flat smooth surface. A 15.8 mm±0.1mm diameter, at least 6 cm long, or the longest dimension of the cell, whichever is greater, Type 316 stainless steel bar is to be placed across the centre of the sample. A 9.1 kg±0.1 kg mass is to be dropped from a height of 61±2.5 cm at the intersection of the bar and sample in a controlled manner using a near frictionless, vertical sliding track or channel with minimal drag on the falling mass. The vertical track or channel used to guide the falling mass shall be oriented 90 degrees from the horizontal supporting surface. /将样品放在一个平坦的光滑平面上。将一直径为15.8 mm± 0.1mm，长度不小于6cm的316不锈钢棒横过样品中部放置后，将一质量为9.1 kg±0.1 kg的重物从61±2.5 cm的高度落向样品。		N/A
	The test sample is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8 mm±0.1mm diameter curved surface lying across the centre of the test sample. Each sample is to be subjected to only a single impact. /接受撞击的样品，纵轴应与平坦的表面平行并与横放在样品中心的直径15.8 mm±0.1mm弯曲表面的纵轴垂直。每一个样品只接受一次撞击。		N/A
	Test Procedure – Crush (applicable to prismatic, pouch, coin/button cells and cylindrical cells less than 18.0 mm in diameter). /挤压 (适用于棱柱形、袋状、硬币/纽扣电芯和直径小于18.0mm的圆柱形电芯)	Prismatic cells. /棱柱形电芯	P
	A cell or component cell is to be crushed between two flat surfaces. The crushing is to be gradual with a speed of approximately 1.5 cm/s at the first point of contact. The crushing is to be continued until the first of the three options below is reached. /将样品放在两个平面之间挤压，挤压力度逐渐加大，在第一个接触点上的速度大约为1.5cm/s。挤压持续进行，直到出现以下三种情况之一		P
	(a) The applied force reaches 13 kN±0.78 kN; /施加力达到13 kN±0.78 kN		P
	(b) The voltage of the cell drops by at least 100 mV; /样品的电压下降至少100mV		N/A
	(c) The cell is deformed by 50% or more of its original thickness. /电池变形达原始厚度的50%以上。		N/A

UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
	A prismatic or pouch cell shall be crushed by applying the force to the widest side. A button/coin cell shall be crushed by applying the force on its flat surfaces. For cylindrical cells, the crush force shall be applied perpendicular to the longitudinal axis. /棱柱形或袋状电芯应从最宽的一面施压。纽扣/硬币形电芯应从其平坦表面施压。圆柱形应从与纵轴垂直的方向施压。		P
	Each test cell or component cell is to be subjected to one crush only. The test sample shall be observed for a further 6 h. The test shall be conducted using test cells or component cells that have not previously been subjected to other tests. /每个样品都是全新样品，并且只经受一次施压。施压结束后样品应静置观察6小时。		P
	Cells and component cells meet this requirement if their external temperature does not exceed 170°C and there is no disassembly and no fire during the test and within six hours after this test. /电芯满足要求：在测试过程中以及之后6个小时内，外表温度不超过170°C，并且无解体和无着火现象发生。	No disassembly and no fire. / 无解体，无着火现象发生。 The data see table 2. / 测试数据见表2。	P
38.3.4.7	**Test T.7: Overcharge/过充电**		**P**
	The charge current shall be twice the manufacturer's recommended maximum continuous charge current. Tests are to be conducted at ambient temperature. The duration of the test shall be 24 hours. The minimum voltage of the test shall be as follows: /在室温下，以2倍的制造商宣称的最大持续充电电流对样品充电，测试时间为24小时。测试的最小电压如下：		P
	(a) When the manufacturer's recommended charge voltage is not more than 18V, the minimum voltage of the test shall be the lesser of two times the maximum charge voltage of the battery or 22V. /如果制造商宣称的充电电压不超过18V，本测试的最小充电电压应是制造商宣称的最大充电电压的两倍或者是22V之中的较小者。		N/A
	(b) When the manufacturer's recommended charge voltage is more than 18V, the minimum voltage of the test shall be 1.2 times the maximum charge voltage. /如果制造商宣称的充电电压超过18V，本测试的最小充电电压应该是制造商宣称的最大充电电压的1.2倍。	The voltage of the test is 64.32V, and the current is 200A. / 测试电压为64.32V，电流为200A.	P
	There is no disassembly and no fire during the test and within seven days after the test. /在测试中和测试完成后7天内，样品无解体和无着火现象。	No disassembly and no fire. / 无解体，无着火现象发生 See test data for details. / 详见测试数据。	P

UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
38.3.4.8	**Test T.8: Forced discharge/强制放电**		**P**
	Each cell shall be forced discharged at ambient temperature by connecting it in series with a 12V D.C. power supply at an initial current equal to the maximum discharge current specified by the manufacturer. /在室温下，将单个电芯连接在12V的直流电源上进行强制放电，此直流电源供给每个电芯初始电流为制造商宣称的最大放电电流。 The specified discharge current is to be obtained by connecting a resistive load of the appropriate size and rating in series with the test cell. Each cell shall be forced discharged for a time interval (in hours) equal to its rated capacity divided by the initial test current (in ampere). /指定的放电电流通过串联在测试电芯上的合适大小和功率的负载来获得，每个电芯的强制放电时间(小时)为额定容量除以初始电流(安培)。		P
	There is no disassembly and no fire during the test and within seven days after the test. /在测试中和测试完成后7天内，样品无解体和无着火现象发生。	No disassembly and no fire. /无解体和无着火现象发生。 See test data for details. /详见测试数据。	P

Test Data 测试数据

T.1 高度模拟(Altitude simulation)

Sample No. 样品编号	Before test 测试前		After test 测试后		Mass loss 质量损失(%)	Change ratio 电压比(%)	Results 试验结果
	Mass 质量 (g)	Voltage 电压 (V)	Mass 质量 (g)	Voltage 电压 (V)			
B1#	39540	53.2	39540	53.2	0.000	100.000	P
B2#	39530	53.2	39530	53.2	0.000	100.000	P
B3#	39540	53.2	39540	53.1	0.000	99.812	P
B4#	39530	53.2	39530	53.2	0.000	100.000	P

Note/注:
A. Leakage/漏液； B. Venting/排气；C. Disassembly/解体；D. Rupture/破裂；E. Fire/着火
P. No leakage, no venting, no disassembly, no rupture, no fire/无漏液，无排气，无解体，无破裂，无着火.

T.2 温度试验(Thermal test)

Sample No. 样品编号	Before test 测试前		After test 测试后		Mass loss 质量损失(%)	Change ratio 电压比(%)	Results 试验结果
	Mass 质量 (g)	Voltage 电压 (V)	Mass 质量 (g)	Voltage 电压 (V)			
B1#	39540	53.2	39530	52.9	0.025	99.436	P
B2#	39530	53.2	39530	52.9	0.000	99.436	P
B3#	39540	53.1	39540	52.9	0.000	99.623	P
B4#	39530	53.2	39530	52.9	0.000	99.436	P

Note/注:
A. Leakage/漏液； B. Venting/排气；C. Disassembly/解体；D. Rupture/破裂；E. Fire/着火
P. No leakage, no venting, no disassembly, no rupture, no fire/无漏液，无排气，无解体，无破裂，无着火.

Test Data 测试数据

T.3 振动(Vibration)

Sample No. 样品编号	Before test 测试前		After test 测试后		Mass loss 质量损失(%)	Change ratio 电压比(%)	Results 试验结果
	Mass 质量 (g)	Voltage 电压 (V)	Mass 质量 (g)	Voltage 电压 (V)			
B1#	39530	52.9	39530	52.9	0.000	100.000	P
B2#	39530	52.9	39530	52.9	0.000	100.000	P
B3#	39540	52.9	39540	52.8	0.000	99.811	P
B4#	39530	52.9	39530	52.9	0.000	100.000	P

Note/注:
A. Leakage/漏液； B. Venting/排气；C. Disassembly/解体；D. Rupture/破裂；E. Fire/着火
P. No leakage, no venting, no disassembly, no rupture, no fire/无漏液，无排气，无解体，无破裂，无着火.

T.4 冲击(Shock)

Sample No. 样品编号	Before test 测试前		After test 测试后		Mass loss 质量损失(%)	Change ratio 电压比(%)	Results 试验结果
	Mass 质量 (g)	Voltage 电压 (V)	Mass 质量 (g)	Voltage 电压 (V)			
B1#	39530	52.9	39530	52.8	0.000	99.811	P
B2#	39530	52.9	39530	52.9	0.000	100.000	P
B3#	39540	52.8	39540	52.8	0.000	100.000	P
B4#	39530	52.9	39530	52.9	0.000	100.000	P

Note/注:
A. Leakage/漏液； B. Venting/排气；C. Disassembly/解体；D. Rupture/破裂；E. Fire/着火
P. No leakage, no venting, no disassembly, no rupture, no fire/无漏液，无排气，无解体，无破裂，无着火.

T.5 外部短路(External short circuit)

Sample No. 样品编号	Total circuit Resistance 回路总电阻 (mΩ)	Maximum Temperature, °C 最高温度（°C）	Results 试验结果
B1#	81.9	57.7	P
B2#	70.6	57.9	P
B3#	85.4	57.7	P
B4#	90.5	57.8	P

Note/注:
A. Disassembly/解体；B. Rupture/破裂；C. Fire/着火
P. No disassembly, no rupture, no fire within 6 hours after the test/测试后6小时内无解体，无破裂，无着火.

T.6 挤压(Crush)

Sample No. 样品编号	Voltage before Test 试验前电压(V)	Maximum Temperature, °C 最高温度（°C）	Results 试验结果
C1#	3.577	24.2	P
C2#	3.578	24.3	P
C3#	3.572	24.6	P
C4#	3.576	24.7	P
C5#	3.570	24.1	P
C6#	3.576	24.0	P
C7#	3.580	24.5	P
C8#	3.579	23.9	P
C9#	3.576	24.2	P
C10#	3.574	24.9	P

Note/注:
A. Disassembly/解体；B. Fire/着火
P. No disassembly, no fire within 6 hours after the test/测试后6小时内无解体，无着火.

T.7 过充电(Overcharge)

Sample No. 样品编号	Voltage before Test 试验前电压(V)	Results 试验结果
B1#	53.2	P
B2#	53.2	P
B3#	53.2	P
B4#	53.2	P

Note/注:
A. Disassembly/解体；B. Fire/着火
P. No disassembly, no fire within seven days after the test/测试后7天内无解体，无着火.

T.8 强制放电(Forced discharge)

Sample No. 样品编号	Voltage before Test 试验前电压(V)	Sample No. 样品编号	Voltage before Test 试验前电压(V)	Results 试验结果
C11#	3.082	C21#	3.092	P
C12#	3.081	C22#	3.095	P
C13#	3.089	C23#	3.088	P
C14#	3.090	C24#	3.086	P
C15#	3.084	C25#	3.087	P
C16#	3.085	C26#	3.084	P
C17#	3.095	C27#	3.083	P
C18#	3.084	C28#	3.086	P
C19#	3.082	C29#	3.085	P
C20#	3.091	C30#	3.087	P

Note/注:
A. Disassembly/解体；B. Fire/着火
P. No disassembly, no fire within seven days after the test/测试后7天内无解体，无着火.

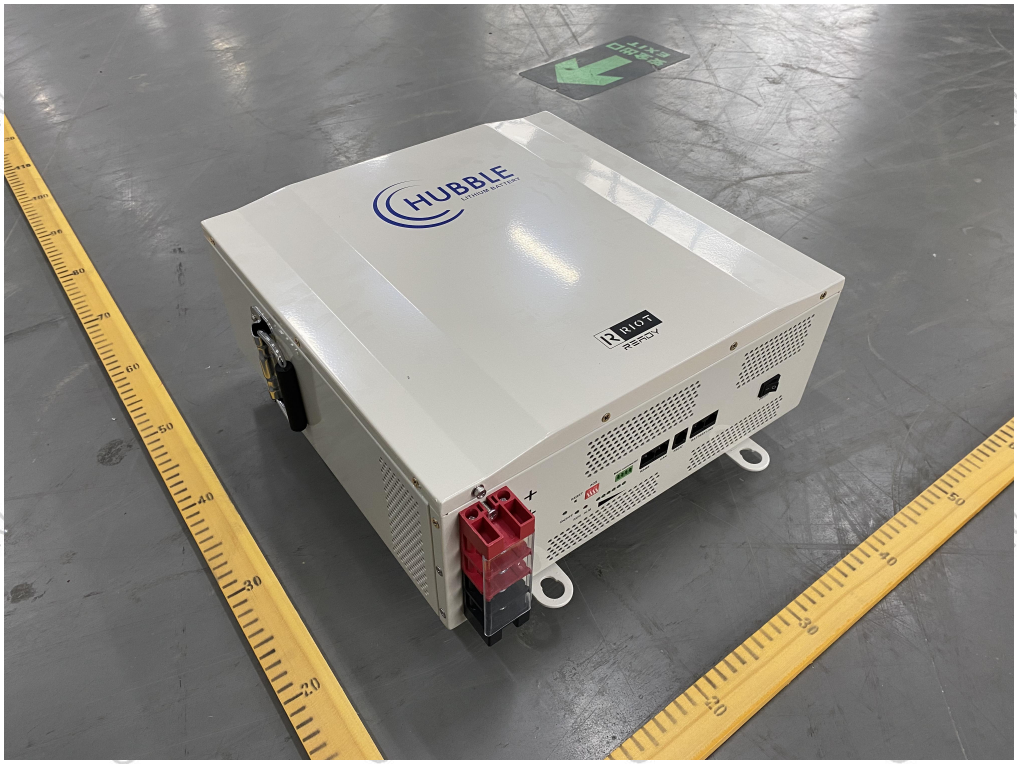

Figure 1 Overall view I of battery

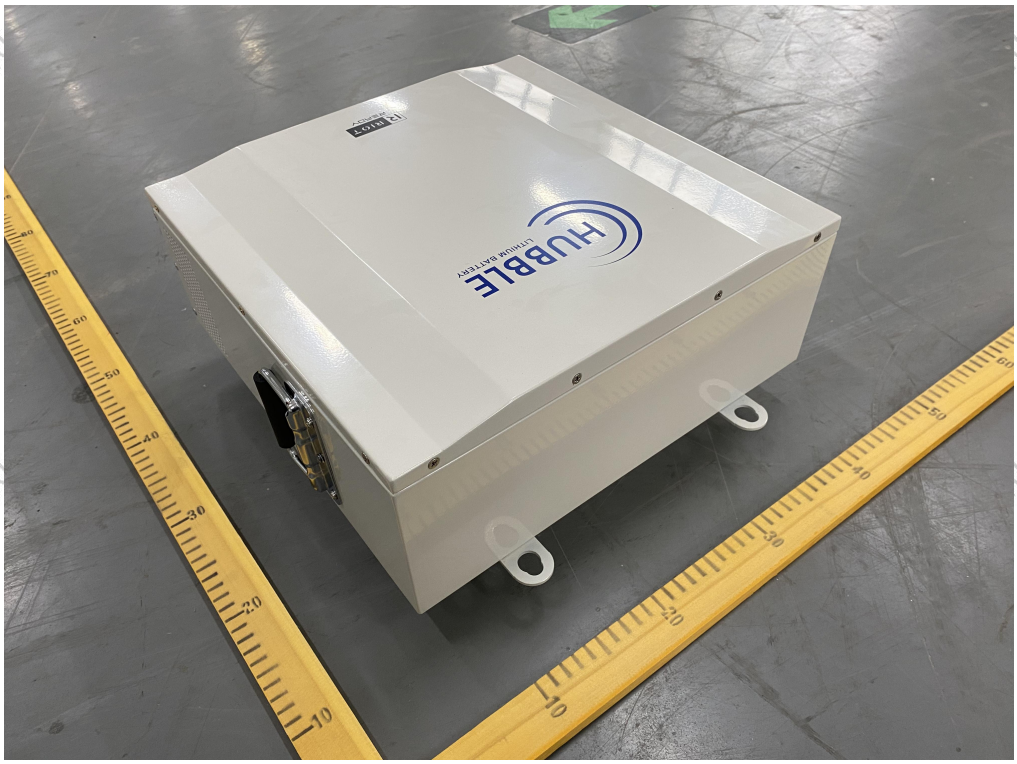

Figure 2 Overall view II of battery

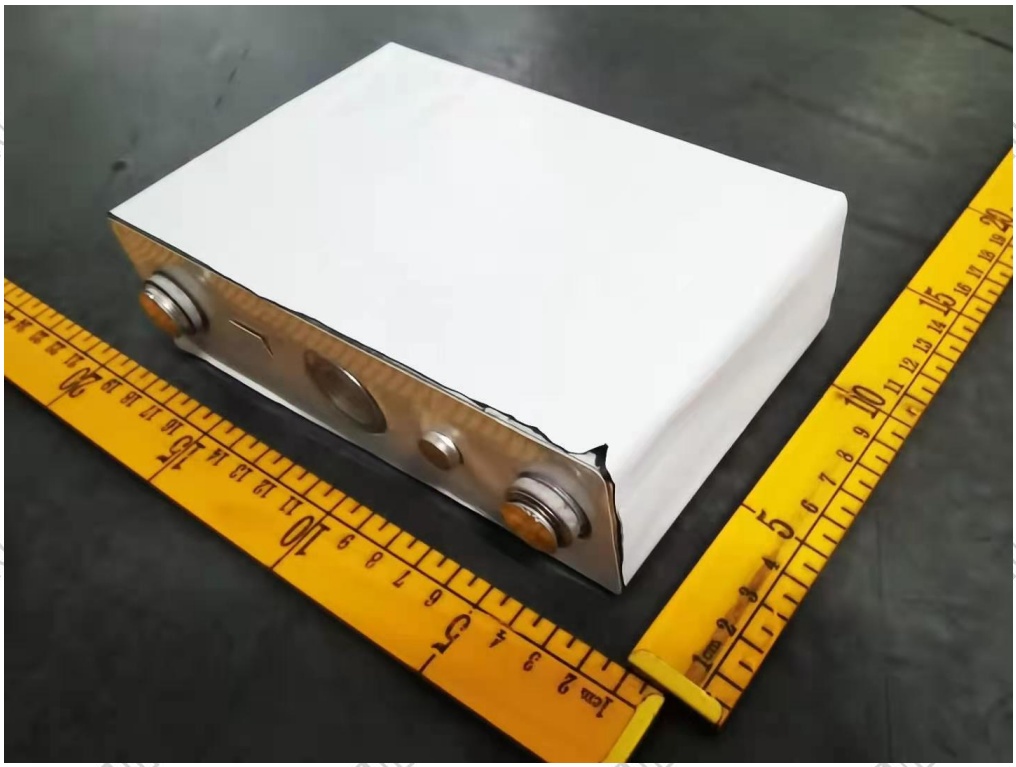

Figure 3 Overall view of cell

Figure 4 Battery Label

Figure 5 The battery color card

注 意 事 项
Important

1. 未经本试验室书面同意，不得复制或部分地复制本报告。
   Nobody is allowed to photocopy or partly photocopy this test report without written permission of UTL.
2. 本报告无批准人、审核人及检测人签名无效。
   The test report is invalid without the signatures of Approver, Reviewer and Tester.
3. 本报告涂改无效。
   The test report is invalid if altered.
4. 对检验报告若有异议，应于收到报告之日起十五天内向检验单位提出。
   Objections to the test report must be submitted to UTL within 15 days.
5. 本报告中以点号代替小数点。
   Throughout this report a point is used as the decimal separator.
6. 本报告仅对送检样品负责。
   The test report is valid for the tested samples only.
7. 本报告并未授权许可申请单位使用UTL任何UTL的名称、商标、标识等。
   The test report does not grant applicant the use of UTL name, trademark or label.
8. 任何情况下检测单位的赔偿责任都不会超过检测单位就本次检测所收取的检测费用。
   UTL's liability under no circumstance will exceed the testing fee received from applicant for test conducted hereof this testing report.
9. 检测数据和结果不具备社会证明性作用。
   The test data and results do not have social proof function.

****** 报告结束 End of Test Report ******