DESAY 德赛

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检测
TESTING
CNAS L14670

检测报告

Test Report

产品名称：可充式锂离子电池组

Name of Product: Rechargeable Li-ion battery pack

委托单位：惠州市德赛电池有限公司

Consignor: Huizhou Desay Battery Co., Ltd.

惠州市德赛电池有限公司测试中心

Huizhou Desay Battery Co., Ltd. Test Center

检测报告 Test Report

样品名称 Sample Name	可充式锂离子电池组 Rechargeable Li-ion battery pack	委托方 Client	惠州市德赛电池有限公司 Huizhou Desay Battery Co., Ltd.
型号规格 Model / Type	BRR-2P4S-6400D，14.4V，5800mAh，83.52Wh	委托方地址 Client Address	惠州市仲恺高新技术开发区 15 号小区 No.15 Zone, Zhongkai Hi-Tech Development Zone, Huizhou, Guangdong, China
样品数量 Sample Quantity	电池组 Battery: 16pcs 电池 Cell: 30pcs	制造商 Manufacturer	惠州市德赛电池有限公司 Huizhou Desay Battery Co., Ltd.
样品来源 Sample Source	送样 Submitted by Manufacturer	制造商地址 Manufacturer Address	惠州市仲恺高新技术开发区 15 号小区 No.15 Zone, Zhongkai Hi-Tech Development Zone, Huizhou, Guangdong, China
收样日期 Received Date	2024.05.09	生产厂 Factory	惠州市德赛电池有限公司 Huizhou Desay Battery Co., Ltd.
测试日期 Testing Date	2024.05.11~2024.05.28	生产厂地址 Factory Address	惠州市惠南高新科技产业园广泰路 12 号 No. 12, Guangtai Road, Huinan High-tech Industrial Park, Huizhou City, Guangdong, P.R.China
样品外观 Sample Appearance	蓝色热缩膜外壳 Blue heat shrinkable film shell		
试验环境 Test Environment	温度 Temperature: (21.1~23.2) ℃；湿度 Humidity: (48.6~66.9) %RH		
试验标准 Test Standard	联合国《关于危险货物运输的建议书—试验和标准手册》ST/SG/AC.10/11/Rev.7&Amend.1 第 38.3 节：金属锂和锂离子电池组。 UN Recommendations on the Transport of Dangerous Goods - Manual of Tests and Criteria, seven revised edition (ST/SG/AC.10/11/Rev.7&Amend.1), Section 38.3: Lithium metal and lithium ion batteries.		
试验结论 Test Conclusion	样品符合联合国《关于危险货物运输的建议书—试验和标准手册》ST/SG/AC.10/11/Rev.7&Amend.1 第 38.3 节的要求。 The submitted samples comply with the requirements of the UN Recommendations on the Transport of Dangerous Goods - Manual of Tests and Criteria, seven revised edition (ST/SG/AC.10/11/Rev.7&Amend.1), Section 38.3.		
编制： Compiler:	张名明	日期： Date: 2024.6.14	盖章（Stamp）
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	谢圣亮 Xie ShengLiang：授权签字人 Authorized Signature 顾芹美 Gu QinMei：测试中心经理 Test Center Manager		

样品信息 Sample information			
样品类型 Sample Type	电池组 Battery	是否可充电 Rechargeable or not	是 Yes
用途 Use	智能家居产品 Smart home products	化学组分 Electrochemistry System	NCM
组成方式 Composing Mode	4 串 2 并 4S2P	电池容量 Cell Capacity	3200mAh
电池型号 Cell Model	INR18650/33V	电池生产厂 Manufacturer of Cell	亿纬锂能 EVE Energy

样品参数 Sample parameters					
标称电压 Nominal Voltage	14.4V	额定容量 Rated Capacity	5800mAh	额定能量 Rated Energy	83.52Wh
最大充电电压 Max.Charging Voltage	16.8V	最大连续充电电流 Max.Charging Current	3000mA	充电电流 Charging Current	1000mA
放电终止电压 Discharge Cut-off Voltage	11.0V	最大放电电流 Max.Discharging Current	6400mA	充电截止电流 Charge Cut-off Current	150mA

测试项目及结论 Test items and conclusion			
测试编号 Test No.	测试项目 Test Items	样品编号 Sample No.	结论 Verdict
T1	高度模拟 Altitude simulation	A1~A4, B1~B4	P
T2	温度试验 Thermal test	A1~A4, B1~B4	P
T3	振动 Vibration	A1~A4, B1~B4	P
T4	冲击 Shock	A1~A4, B1~B4	P
T5	外部短路 External short circuit	A1~A4, B1~B4	P
T6	撞击 Impact	C1~C5, D1~D5	P
T7	过度充电 Overcharge	A5~A8, B5~B8	P
T8	强制放电 Forced discharge	E1~E10, F1~F10	P

样品预处理 Sample pretreatment	
样品编号 Sample No.	样品状态 Sample State
A1~A8	1 次循环完全充电状态 first cycle in fully charged states
B1~B8	25 次循环完全充电状态 after 25 cycles ending in fully charged states
C1~C5	1 次循环 50%额定容量 first cycle at 50 % of the design rated capacity
D1~D5	25 次循环 50%额定容量 after 25 cycles ending at 50 % of the design rated capacity
E1~E10	1 次循环完全放电状态 first cycle in fully discharged states
F1~F10	25 次循环完全放电状态 after 25 cycles ending in fully discharged states
注：A1~A8、B1~B8 为单一电池电池组，C1~C5、D1~D5、E1~E10、F1~F10 为其原件电池。 Notes: A1~A8, B1~B8 are single cell batteries, C1~C5, D1~D5, E1~E10, F1~F10 are component cells.	

试验顺序 Test order

T1 → T2 → T3 → T4 → T5 → 结束 End

T6 → 结束 End

T7 → 结束 End

T8 → 结束 End

质量损失限值 Mass loss limit	
电池或电池组质量 Mass of cell or battery（M）	质量损失限值 Mass loss limit
M < 1g	0.5%
1g ≤ M ≤ 75g	0.2%
M > 75g	0.1%

T.1 高度模拟 Altitude simulation

38.3.4.1.1 目的

本试验模拟在低压条件下的空运。

38.3.4.1.2 试验程序

试验电池和电池组应在压力等于或低于 11.6kPa 和环境温度（20 ± 5 °C）下存放至少 6 小时。

38.3.4.1.3 要求

如果无渗漏、无排气、无解体、无破裂和无起火，并且每个试验电池或电池组在试验后的开路电压不小于其在进行这一试验前电压的 90%，电池和电池组即符合这一要求。有关电压的要求不适用于完全放电状态的试验电池和电池组。

38.3.4.1.1 Purpose

This test simulates air transport under low-pressure conditions.

38.3.4.1.2 Test procedure

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).

38.3.4.1.3 Requirement

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.

样品编号 Sample No.	试验前 Before test		试验后 After test		质量损失 Mass Loss（%）	剩余电压 Residual Voltage（%）	测试结果 Test Result	判定 Verdict
	质量（g）Mass	电压（V）Voltage	质量（g）Mass	电压（V）Voltage				
A1	390.490	16.320	390.450	16.318	0.01	99.99	O	P
A2	390.680	16.339	390.610	16.338	0.02	99.99	O	P
A3	390.090	16.297	390.080	16.296	0.00	99.99	O	P
A4	391.080	16.298	391.090	16.296	0.00	99.99	O	P
B1	390.990	16.317	390.970	16.315	0.01	99.99	O	P
B2	390.700	16.303	390.690	16.301	0.00	99.99	O	P
B3	390.810	16.233	390.810	16.230	0.00	99.98	O	P
B4	390.870	16.271	390.890	16.268	-0.01	99.98	O	P

注：L-渗漏；V-排气；D-解体；R-破裂；F-起火；O-无渗漏、无排气、无解体、无破裂、无起火。

Notes: L-Leakage, V-Venting, D-Disassembly, R-Rupture, F-Fire, O-No leakage, no venting, no disassembly, no rupture, no fire.

T.2 温度试验 Thermal test

38.3.4.2.1 目的

本试验评估电池和电池组的密封完善性和内部电连接。试验利用迅速和极端的温度变化进行。

38.3.4.2.2 试验程序

试验电池和电池组应先在试验温度等于 72 ± 2 °C 的条件下存放至少 6 小时，接着再在试验温度等于-40 ± 2 °C 的条件下存放至少 6 小时。两个极端试验温度之间的最大时间间隔为 30 分钟。此程序重复进行，共完成 10 次，接着将所有试验电池和电池组在环境温度（20 ± 5 °C）下存放 24 小时。对于大型电池和电池组，暴露于极端试验温度的时间至少应为 12 小时。

38.3.4.2.3 要求

如果无渗漏、无排气、无解体、无破裂和无起火，并且每个试验电池或电池组在试验后的开路电压不小于其在进行这一试验前电压的 90%，电池和电池组即符合这一要求。有关电压的要求不适用于完全放电状态的试验电池和电池组。

38.3.4.2.1 Purpose

This test assesses cell and battery seal integrity and internal electrical connections. The test is conducted using rapid and extreme temperature changes.

38.3.4.2.2 Test procedure

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 until 10 total cycles are complete, after which all test cells and batteries are to be stored for 24 hours at ambient temperature (20 ± 5 °C). For large cells and batteries the duration of exposure to the test temperature extremes should be at least 12 hours.

38.3.4.2.3 Requirement

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.

样品编号 Sample No.	试验前 Before test		试验后 After test		质量损失 Mass Loss（%）	剩余电压 Residual Voltage（%）	测试结果 Test Result	判定 Verdict
	质量（g）Mass	电压（V）Voltage	质量（g）Mass	电压（V）Voltage				
A1	390.450	16.318	390.510	16.275	-0.02	99.74	O	P
A2	390.610	16.338	390.740	16.302	-0.03	99.78	O	P
A3	390.080	16.296	390.220	16.249	-0.04	99.71	O	P
A4	391.090	16.296	391.170	16.245	-0.02	99.69	O	P
B1	390.970	16.315	391.060	16.261	-0.02	99.67	O	P
B2	390.690	16.301	390.770	16.242	-0.02	99.64	O	P
B3	390.810	16.230	390.920	16.151	-0.03	99.51	O	P
B4	390.890	16.268	390.980	16.199	-0.02	99.58	O	P

注：L-渗漏；V-排气；D-解体；R-破裂；F-起火；O-无渗漏、无排气、无解体、无破裂、无起火。
Notes: L-Leakage, V-Venting, D-Disassembly, R-Rupture, F-Fire, O-No leakage, no venting, no disassembly, no rupture, no fire.

T.3 振动 Vibration

38.3.4.3.1 目的

本试验模拟运输过程中的振动。

38.3.4.3.2 试验程序

电池和电池组紧固于振动机平台，但不能造成电池变形以致不能准确传递振动。振动应是正弦波形，对数频率扫描从 7Hz 到 200Hz，再回到 7Hz，跨度为 15 分钟。这一振动过程须对三个互相垂直的电池安装方位的每一方向重复进行 12 次，总共为时 3 小时。其中一个振动方向必须与端面垂直。

作对数式频率扫描，对总质量不足 12kg 的电池和电池组（电池和小型电池组），和对 12kg 及更大的电池组（大型电池组）应有所不同。对电池和小型电池组：从 7Hz 开始，保持 $1g_n$ 的最大加速度，直到频率达到 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 $8g_n$（频率约为 50Hz）。将最大加速度保持在 $8g_n$ 直到频率增加到 200Hz。对大型电池组：从 7Hz 开始，保持 $1g_n$ 的最大加速度，直到频率达到 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 $2g_n$（频率约为 25Hz）。将最大加速度保持在 $2g_n$ 直到频率增加到 200Hz。

38.3.4.3.3 要求

如果试验中和试验后无渗漏、无排气、无解体、无破裂和无起火，并且每个试验电池或电池组在第三个垂直安装方位上的试验后立即测得的开路电压不小于其在进行这一试验前电压的 90%，电池和电池组即符合这一要求。有关电压的要求不适用于完全放电状态的试验电池和电池组。

38.3.4.3.1 Purpose

This test simulates vibration during transport.

38.3.4.3.2 Test procedure

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.

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). For cells and small batteries: from 7 Hz a peak acceleration of 1 g_n 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 g_n occurs (approximately 50 Hz). A peak acceleration of 8 g_n is then maintained until the frequency is increased to 200 Hz. For large batteries: from 7 Hz to a peak acceleration of 1 g_n 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 g_n occurs (approximately 25 Hz). A peak acceleration of 2 g_n is then maintained until the frequency is increased to 200 Hz.

38.3.4.3.3 Requirement

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.

样品编号 Sample No.	试验前 Before test		试验后 After test		质量损失 Mass Loss（%）	剩余电压 Residual Voltage（%）	测试结果 Test Result	判定 Verdict
	质量（g）Mass	电压（V）Voltage	质量（g）Mass	电压（V）Voltage				
A1	390.510	16.275	390.480	16.275	0.01	100.00	O	P
A2	390.740	16.302	390.700	16.302	0.01	100.00	O	P
A3	390.220	16.249	390.150	16.249	0.02	100.00	O	P
A4	391.170	16.245	391.120	16.244	0.01	99.99	O	P
B1	391.060	16.261	391.020	16.260	0.01	99.99	O	P
B2	390.770	16.242	390.720	16.241	0.01	99.99	O	P
B3	390.920	16.151	390.830	16.150	0.02	99.99	O	P
B4	390.980	16.199	390.910	16.198	0.02	99.99	O	P

注：L-渗漏；V-排气；D-解体；R-破裂；F-起火；O-无渗漏、无排气、无解体、无破裂、无起火。

Notes: L-Leakage, V-Venting, D-Disassembly, R-Rupture, F-Fire, O-No leakage, no venting, no disassembly, no rupture, no fire.

T.4 冲击 Shock

38.3.4.4.1 目的

本试验评估电池和电池组对累积冲击效应的耐受程度。

38.3.4.4.2 试验程序

试验电池和电池组用坚固支架紧固在试验机上，支架支撑着每个试验电池组的所有安装面。

每个电池须经受最大加速度 $150g_n$ 和脉冲持续时间 6ms 的半正弦波冲击。不过，大型电池须经受最大加速度 $50g_n$ 和脉冲持续时间 11ms 的半正弦波冲击。

每个电池组须经受最大加速度 $150g_n$（或加速度（g_n）$=\sqrt{10085/质量}$，取较小值）和脉冲持续时间 6ms 的半正弦波冲击。不过，大型电池组须经受最大加速度 $50g_n$（或加速度（g_n）$=\sqrt{30000/质量}$，取较小值）和脉冲持续时间 11ms 的半正弦波冲击。

每个电池或电池组须在三个互相垂直的电池或电池组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。

38.3.4.4.3 要求

如果无渗漏、无排气、无解体、无破裂和无起火，并且每个试验电池或电池组在试验后的开路电压不小于其在进行这一试验前电压的 90%，电池和电池组即符合这一要求。有关电压的要求不适用于完全放电状态的试验电池和电池组。

38.3.4.4.1 Purpose

This test assesses the robustness of cells and batteries against cumulative shocks.

38.3.4.4.2 Test procedure

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.

Each cell shall be subjected to a half-sine shock of peak acceleration of 150 g_n and pulse duration of 6 milliseconds. Alternatively, large cells may be subjected to a half-sine shock of peak acceleration of 50 g_n and pulse duration of 11 milliseconds.

Each battery shall be subjected to a half-sine shock of peak acceleration of 150 g_n (or Acceleration (g_n) $=\sqrt{10085/mass}$,whichever is smaller) and pulse duration of 6 milliseconds. Alternatively, large batteries may be subjected to a half-sine shock of peak acceleration of 50 g_n (or Acceleration (g_n) $=\sqrt{30000/mass}$,whichever is smaller) and pulse duration of 11 milliseconds.

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.

38.3.4.4.3 Requirement

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.

样品编号 Sample No.	试验前 Before test		试验后 After test		质量损失 Mass Loss（%）	剩余电压 Residual Voltage（%）	测试结果 Test Result	判定 Verdict
	质量（g）Mass	电压（V）Voltage	质量（g）Mass	电压（V）Voltage				
A1	390.480	16.275	390.520	16.273	-0.01	99.99	O	P
A2	390.700	16.302	390.690	16.301	0.00	99.99	O	P
A3	390.150	16.249	390.150	16.247	0.00	99.99	O	P
A4	391.120	16.244	391.110	16.243	0.00	99.99	O	P
B1	391.020	16.260	391.070	16.259	-0.01	99.99	O	P
B2	390.720	16.241	390.740	16.240	-0.01	99.99	O	P
B3	390.830	16.150	390.890	16.146	-0.02	99.98	O	P
B4	390.910	16.198	390.960	16.196	-0.01	99.99	O	P

注：L-渗漏；V-排气；D-解体；R-破裂；F-起火；O-无渗漏、无排气、无解体、无破裂、无起火。

Notes: L-Leakage, V-Venting, D-Disassembly, R-Rupture, F-Fire, O-No leakage, no venting, no disassembly, no rupture, no fire.

T.5 外部短路 External short circuit

38.3.4.5.1 目的

本试验模拟外部短路。

38.3.4.5.2 试验程序

对于待测电池或电池组，应加热一段时间，使其外壳温度稳定到 57± 4 °C。加热时间取决于电池或电池组的大小和设计，应进行评估和记录。如果无法评估，小型电池和电池组暴露时间至少 6 小时，大型电池和电池组至少 12 小时。然后电池或电池组在 57± 4 °C 条件下经受总外电阻小于 0.1Ω的短路条件。

这一短路条件应在电池或电池组外壳温度回到 57± 4 °C 后继续至少 1 小时，对大型电池组，温度降幅达到最高温升值的一半，并保持低于该数值。

短路和降温阶段应在试验环境温度下进行。

38.3.4.5.3 要求

如果表面温度不超过 170°C，并且在试验过程中及试验后 6 小时内无解体、无破裂、无起火，电池和电池组即符合本项要求。

38.3.4.5.1 Purpose

This test simulates an external short circuit.

38.3.4.5.2 Test procedure

The cell or battery to be tested shall be heated for a period of time necessary to reach a homogeneous stabilized temperature of 57 ± 4 °C, measured on the external case. This period of time depends on the size and design of the cell or battery and should be assessed and documented. If this assessment is not feasible, the exposure time shall be at least 6 hours for small cells and small batteries, and 12 hours for large cells and large batteries. Then 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.

The short circuit and cooling down phases shall be conducted at least at ambient temperature.

38.3.4.5.3 Requirement

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.

样品编号 Sample No.	表面最高温度（℃） Max. External Temperature	测试结果 Test Result	判定 Verdict
A1	57.2	O	P
A2	57.3	O	P
A3	57.6	O	P
A4	57.4	O	P
B1	57.3	O	P
B2	57.2	O	P
B3	57.4	O	P
B4	57.3	O	P

注：D-解体；R-破裂；F-起火；O-无解体、无破裂、无起火。
Notes: D-Disassembly, R-Rupture, F-Fire, O-No disassembly, no rupture, no fire.

T.6 撞击 Impact

38.3.4.6.1 目的

本试验模拟撞击等可能造成内部短路的机械性破坏。

38.3.4.6.2 试验程序—撞击（适用于直径不小于 18mm 的圆柱形电池）

试样电池或元件电池放在平坦光滑的表面上。一根 316 型不锈钢棒横放在试样中心，钢棒直径 15.8mm ± 0.1mm，长度至少 6cm，或电池最长端的尺寸，取二者之长者。将一块 9.1kg ± 0.1kg 的重锤从 61 ± 2.5cm 高处跌落到钢棒和试样交叉处，使用一个几乎没有摩擦的、对落体重锤阻力最小的垂直轨道或管道加以控制。垂直轨道或管道用于引导落锤沿与水平支撑表面呈 90 度落下。

接受撞击的试样，纵轴应与平坦表面平行并与横放在试样中心的直径 15.8mm ± 0.1mm 弯曲表面的纵轴垂直。每一试样只经受一次撞击。

38.3.4.6.4 要求

如果表面温度不超过 170℃，并且在试验过程中及试验后 6 小时内无解体、无起火，电池和元件电池即符合本项要求。

38.3.4.6.1 Purpose

This test simulates mechanical abuse from an impact that may result in an internal short circuit.

38.3.4.6.2 Test procedure – Impact (applicable to cylindrical cells not less than 18.0 mm in diameter)

The test sample cell or component cell is to be placed on a flat smooth surface. A 15.8 mm ± 0.1 mm 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 9.1kg ± 0.1kg 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.

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 ± 0.1 mm diameter curved surface lying across the centre of the test sample. Each sample is to be subjected to only a single impact.

38.3.4.6.4 Requirement

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.

样品编号 Sample No.	表面最高温度（℃） Max. External Temperature	测试结果 Test Result	判定 Verdict
C1	54.4	O	P
C2	28.6	O	P
C3	27.3	O	P
C4	25.6	O	P
C5	25.3	O	P
D1	26.4	O	P
D2	25.8	O	P
D3	25.4	O	P
D4	27.6	O	P
D5	26.3	O	P

注：D-解体；F-起火；O-无解体、无起火。

Notes: D-Disassembly, F-Fire, O-No disassembly, no fire.

T.6 挤压 Crush

38.3.4.6.1 目的

本试验模拟挤压等可能造成内部短路的机械性破坏。

38.3.4.6.3 试验程序—挤压（适用于棱柱形、袋装、硬币/纽扣电池和直径小于 18mm 的圆柱形电池）

将电池或元件电池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：

(a) 施加的力量达到 13kN ± 0.78kN；

(b) 电池的电压下降至少 100mV；

(c) 电池变形达到原始厚度的 50%或以上。

一旦达到最大压力，电压下降 100mV 或更多，或电池变形至少达原厚度的 50%，即可解除压力。

棱柱形或袋装电池应从最宽的一面施压。纽扣/硬币形电池应从其平坦表面施压。圆柱形电池应从与纵轴垂直的方向施压。

每个试样电池或元件电池只做一次挤压试验。试样应继续观察 6 小时。试验应使用之前未做过其他试验的电池或元件电池进行。

38.3.4.6.4 要求

如果表面温度不超过 170°C，并且在试验过程中及试验后 6 小时内无解体、无起火，电池和元件电池即符合本项要求。

38.3.4.6.1 Purpose

This test simulates mechanical abuse from a crush that may result in an internal short circuit.

38.3.4.6.3 Test procedure – Crush (applicable to prismatic, pouch, coin/button cells and cylindrical cells less than 18.0 mm in diameter)

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.

(a) The applied force reaches 13 kN ± 0.78 kN;

(b) The voltage of the cell drops by at least 100 mV;

(c) The cell is deformed by 50 % or more of its original thickness.

Once the maximum pressure has been obtained, the voltage drops by 100 mV or more, or the cell is deformed by at least 50 % of its original thickness, the pressure shall be released.

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.

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.

38.3.4.6.4 Requirement

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.

样品编号 Sample No.	表面最高温度（℃） Max. External Temperature	测试结果 Test Result	判定 Verdict
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—

注：D-解体；F-起火；O-无解体、无起火。

Notes: D-Disassembly, F-Fire, O-No disassembly, no fire.

T.7 过度充电 Overcharge

38.3.4.7.1 目的

本试验评估可充电电池组或可充电单一电池电池组承受过度充电状况的能力。

38.3.4.7.2 试验程序

充电电流必须是制造商建议的最大连续充电电流的两倍。试验的最小电压如下：

(a) 制造商建议的充电电压不大于18V时，试验的最小电压应是电池组最大充电电压的两倍或22V两者中的较小者。

(b) 制造商建议的充电电压大于18V时，试验的最小电压应为最大充电电压的1.2倍。

试验应在环境温度下进行。进行试验的时间应为24小时。

38.3.4.7.3 要求

可充电电池组如在试验过程中和试验后7天内无解体、无起火，即符合本项要求。

38.3.4.7.1 Purpose

This test evaluates the ability of a rechargeable battery or a single cell rechargeable battery to withstand an overcharge condition.

38.3.4.7.2 Test procedure

The charge current shall be twice the manufacturer's recommended maximum continuous charge current. The minimum voltage of the test shall be as follows:

(a) when the manufacturer's recommended charge voltage is not more than 18 V, the minimum voltage of the test shall be the lesser of two times the maximum charge voltage of the battery or 22 V.

(b) when the manufacturer's recommended charge voltage is more than 18 V, the minimum voltage of the test shall be 1.2 times the maximum charge voltage.

Tests are to be conducted at ambient temperature. The duration of the test shall be 24 hours.

38.3.4.7.3 Requirement

Rechargeable batteries meet this requirement if there is no disassembly and no fire during the test and within seven days after the test.

样品编号 Sample No.	测试结果 Test Result	判定 Verdict
A5	O	P
A6	O	P
A7	O	P
A8	O	P
B5	O	P
B6	O	P
B7	O	P
B8	O	P

注：D-解体；F-起火；O-无解体、无起火。

Notes: D-Disassembly, F-Fire, O-No disassembly, no fire.

T.8 强制放电 Forced discharge

38.3.4.8.1 目的

本试验评估原电池或可充电电池承受强制放电状况的能力。

38.3.4.8.2 试验程序

每个电池应在环境温度下与 12V 直流电源串联在起始电流等于制造商给定的最大放电电流的条件下强制放电。

将适当大小和额定值的电阻负荷与试验电池串联，计算得出给定的放电电流。对每个电池进行强制放电，放电时间（小时）应等于其额定容量除以初始试验电流（安培）。

38.3.4.8.3 要求

原电池或可充电电池如在试验过程中和试验后 7 天内无解体、无起火，即符合本项要求。

38.3.4.8.1 Purpose

This test evaluates the ability of a primary or a rechargeable cell to withstand a forced discharge condition.

38.3.4.8.2 Test procedure

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.

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).

38.3.4.8.3 Requirement

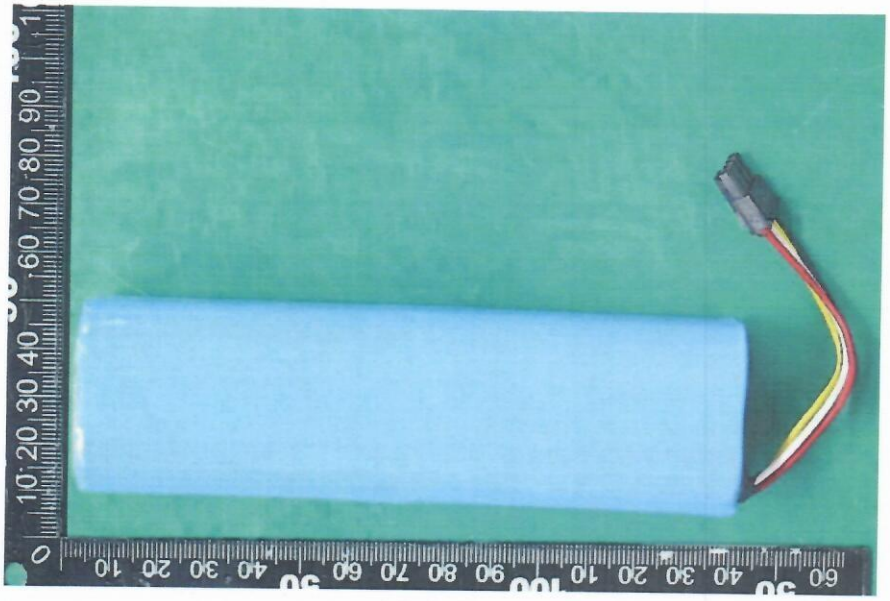
Primary or rechargeable cells meet this requirement if there is no disassembly and no fire during the test and within seven days after the test.

样品编号 Sample No.	测试结果 Test Result	判定 Verdict
E1	O	P
E2	O	P
E3	O	P
E4	O	P
E5	O	P
E6	O	P
E7	O	P
E8	O	P
E9	O	P
E10	O	P
F1	O	P
F2	O	P
F3	O	P
F4	O	P
F5	O	P
F6	O	P
F7	O	P
F8	O	P
F9	O	P
F10	O	P

注：D-解体；F-起火；O-无解体、无起火。
Notes: D-Disassembly, F-Fire, O-No disassembly, no fire.

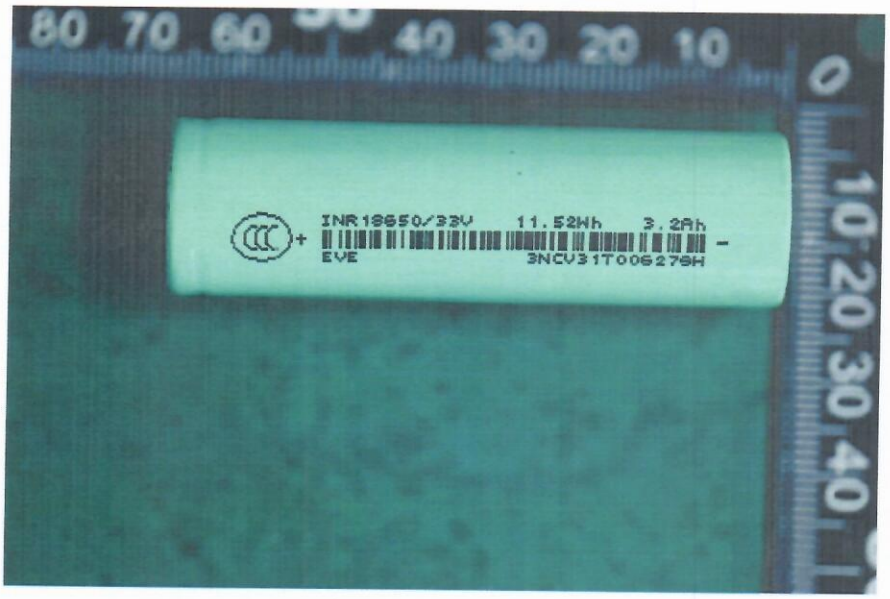
样品照片 Photos of sample

电池组外观
View of the battery



电池组外观
View of the battery

样品照片 Photos of sample



元件电池外观

View of the component cell

电池组铭牌

View of the battery nameplate

试验仪器设备清单 Test equipment list					
序号 No.	名称 Name	型号 Type	编号 Equipment No.	校准有效期至 Calibration Due Date	本次使用 Used
1	电池检测系统 Battery Testing System	CT-4008-5V6A-S1	T1709-135177	2024/12/21	√
2	电池检测系统 Battery Testing System	CE-5008-20V15A-SMB	E2204-319477	2024/6/26	√
3	高空低气压试验箱 Low Pressure Chamber	JDS-DQY-125L	JDS22071118	2024/6/28	√
4	高低温冲击箱 Thermal Shock Test Chamber	KTS-252B	K-20140611-041	2024/12/6	√
5	电磁式振动试验机 Vibration Testing Machine	MY-EV210H0505 VCSusb-8	2022111401	2024/12/6	√
6	加速度冲击试验机 Shock Testing Machine	CZ-010	ZH12905	2025/3/22	√
7	温控短路试验机 Temperature Control Short Circuit Testing Machine	BE-8102	20171101001	2024/12/6	√
8	电池重物冲击试验机 Battery Heavy Impact Testing Machine	BE-8106	20171101004	2024/8/16	√
9	万用表 Multimeter	289C	44280222	2024/8/20	√
10	直流电源 DC Power Supply	IT6952A	600543010717510031	2024/8/16	√
11	直流电源 DC Power Supply	IT6952A	600543010717510037	2025/4/8	√
12	直流电源 DC Power Supply	IT6831	600006014717220010	2024/8/6	√
13	直流电源 DC Power Supply	IT6831	600006014717220024	2024/8/13	√
14	电子负载 Electronic Load	IT8512+	600023010716710019	2024/8/17	√
15	电子负载 Electronic Load	IT8512+	600023010717210036	2025/4/8	√
16	电子秤 Electronic Scale	DT3002A	0632316	2024/8/21	√
17	数字源表 SourceMeter	2460	4456874	2025/2/25	√
18	数据采集器 Data Collector	200mm	A18009271	2024/8/20	√
19	内阻仪 Inner Resistance Tester	BT3562	170822897	2025/4/21	√

注意事项
Notes

1. 判定栏中“P”表示合格，“F”表示不合格，“—”表示不适用。
   In verdict column, “P” means pass, “F” means fail, “—” means not applicable.
2. 本报告无测试中心检测专用章或批准人签名均无效。
   The test report is invalid without both testing stamp of the laboratory and the signature of approver.
3. 本报告未经本实验室批准不得部分复制，全文复制除外。
   The test report shall not be reproduced except in full without approval of the laboratory.
4. 本报告试验结果仅对受试样品有效。
   The test results presented in this report is only valid to the samples tested.
5. 对检测报告若有异议，应于收到报告之日起十五天内向本实验室提出。
   Objections to the test report must be submitted to the laboratory within 15 days.

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