中国认可
国际互认
检测
TESTING
CNAS L7049

230020343561

检测报告

Test Report

样品名称:
Name of Sample 锂离子电池组 Rechargeable Li-ion Battery

委托单位:
Client 东莞新能德科技有限公司 Dongguan NVT Technology Co., Ltd.

报告编号:
Report No. DGT2394DT1002883Z

签发日期:
Issued Date 2024-12-06

中国民用航空总局第二研究所

The Second Research Institute of CAAC

检测专用章

声 明

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The test report is invalid without the signatures of Approver, Checker and Tester.

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The test report is invalid if altered.

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6、本报告结果仅对来样负责；

The test report is valid for the tested samples only.

7、委托样品保存期限为 12 个月，超过此限，本机构不再留存样品。

The retention period of sample is 12 month, beyond which the agency will not retain sample.

地址（Add）： 成都双流西航港经济开发区腾飞路 765 号

No.765, Tengfei Road, Xihanggang Economic Development Zone, Shuangliu, Chengdu, Sichuan, P. R. China

电话 (Tel)：86-028-64458195

传真 (Fax)：86-028-64458195

邮政编码(Postcode)：610211

报告查询网址：http://service.caacdgt.com

基本信息 General Information			
样品信息/Sample information			
样品名称 Sample Name	锂离子电池组 Rechargeable Li-ion Battery	样品类型 Sample Type	锂离子单电芯电池 Lithium-ion single cell battery
样品型号 Sample Model	BLPC11	标称电压 Nominal Voltage	3.92V
额定容量 Rated Capacity	5860mAh 22.98Wh(Rated) 6000mAh 23.52Wh(Typical)	锂金属含量 Metal Content	不适用 N/A
样品质量 Mass	约 76.5g App76.5g	样品描述 Description	银色，棱柱形 Silver, Prismatic

委托单位信息/ Client information					
委托单位 Client	东莞新能德科技有限公司 Dongguan NVT Technology Co., Ltd.				
单位地址 Client Address	中国广东省东莞市东坑镇兴国路东坑段 8 号 No.8, Xingguo Road, Dongkeng Town,Dongguan City, Guangdong Province, P.R. China				
生产单位信息/Manufacture information					
电芯生产单位 Cell Manufacture	宁德新能源科技有限公司 Ningde Amperex Technology Limited				
地址 Address	福建省宁德市蕉城区漳湾镇新港路 1 号 No.1 Xin Gang Road, Zhang Wan Town, Jiao cheng District, Ningde City, FuJian Province 352106, P.R,China				
电话 Tel	+86-(0)769-3882 6188 81510	邮箱 E-mail	ChenMY@nvtpower.com	网站 Website	www.nvtpower.com
电池生产单位 Battery Manufacture	东莞新能德科技有限公司 Dongguan NVT Technology Co., Ltd.				
地址 Address	中国广东省东莞市东坑镇兴国路东坑段 8 号 No.8, Xingguo Road, Dongkeng Town,Dongguan City, Guangdong Province, P.R. China				
电话 Tel	+86-(0)769-3882 6188 81510	邮箱 E-mail	ChenMY@nvtpower.com	网站 Website	www.nvtpower.com
*以上信息由委托单位提供。 The above information is provided by client.					
测试机构信息/Test Laboratory					
检测单位 Laboratory	中国民用航空总局第二研究所 The Second Research Institute of CAAC				
地址 Address	成都双流西航港经济开发区腾飞路 765 号 No.765, Tengfei Road, Xihanggang Economic Development Zone, Shuangliu, Chengdu, Sichuan, P. R. China				
电话 Tel	028-64458155	邮箱 E-mail	yanghengjin@caacsri.com	网站 Website	www.caacdgt.com
样品数量 Quantity of Sample	18 个电池，30 个电芯 18 lithium ion batteries, 30 cells				

测试结论
Test Conclusion

序号 No.	测试项目名称 Name of Test	测试标准 Testing Standard	测试结果 Test Result	结论 Conclusion	备注 Remarks
1	高度模拟 Altitude simulation	联合国《试验和标准手册》第8修订版 UN Manual of Tests and Criteria ST/SG/AC.10/11/Rev8,Section 38.3	见附表 1 Appendix 1	合格 Passed	/
2	温度试验 Thermal test		见附表 2 Appendix 2	合格 Passed	/
3	振动 Vibration		见附表 3 Appendix 3	合格 Passed	/
4	冲击 Shock		见附表 4 Appendix 4	合格 Passed	/
5	外部短路 External Short-circuit		见附表 5 Appendix 5	合格 Passed	/
6	撞击 Impact		/	/	不适用 N/A
	挤压 Crush		见附表 6 Appendix 6	合格 Passed	/
7	过度充电 Overcharge		见附表 7 Appendix 7	合格 Passed	/
8	强制放电 Forced discharge		见附表 8 Appendix 8	合格 Passed	/
接样日期 Receiving Date		2024-11-11			
测试日期 Test Date		2024-11-12~2024-12-06			
/					

结论/Conclusion：

经测试，送检样品符合联合国《试验和标准手册》第 8 修订版第 38.3 节的测试要求。

The sample had passed the test items of UNITED NATIONS, Manual of Tests and Criteria ST/SG/AC.10/11/Rev.8,Section 38.3.

检测单位盖章(Stamp)：

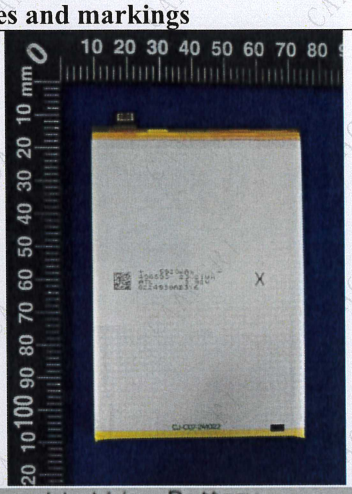
签发日期(Issued Date)：2024-12-06

检测：(Compiled by) 崔雅泓

审核：(Checked by) 戴鹏骏

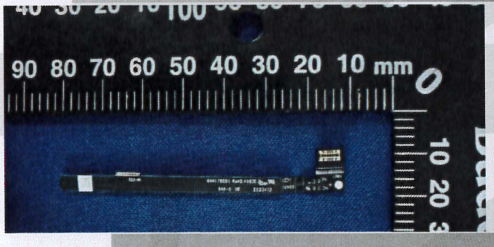
批准：(Approved by)

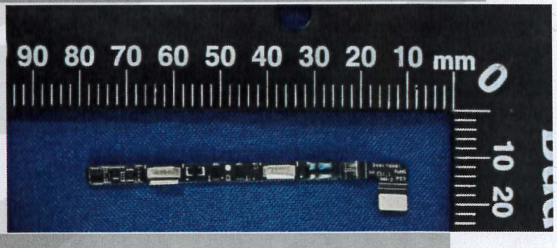
样品及标识照片
Photos of samples and markings

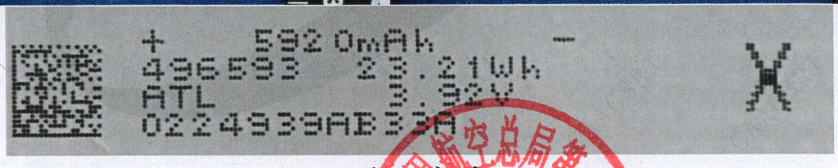


锂离子电池组/二次鋰電池組/Rechargeable Li-ion Battery
型号/型號/Model: BLPC11 1ICP5/65/94
充电限制电压/充電限制電壓/Limited Charge Voltage:4.53Vdc
额定容量/额定電容量/Rated Capacity:5860mAh, 额定能量:22.98Wh
标称电压/標稱電壓/Nominal Voltage:3.92Vdc
电池典型容量/Typical Capacity:6000mAh/23.52Wh
执行标准:GB 31241-2022

生产厂:东莞新能德科技有限公司 制造商:东莞新能德科技有限公司
Manufacturer:Dongguan NVT Technology Co., Ltd.
中国制造 中國製造 MADE IN CHINA







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检测专用章

附表 1
Appendix 1

测试项目 Test Items	高度模拟 Altitude simulation
1.1	测试步骤 Test procedure
	试验电池芯和电池在环境温度(20±5℃)下，储存在小于等于 11.6kPa 的压力下至少六小时。 Test cells and batteries shall be stored at a pressure of 11.6kPa or less for at least six hours at ambient temperature (20±5℃).
1.2	样品状态 Sample status
	C1#~C5#，在第一个循环完全充电状态； C1#~C5#, at first cycle in fully charged states.
	C6#~C10#，在 25 个循环后完全充电状态 C6#~C10#,after 25cycles ending in fully charged states
1.3	测试结果 Result

样品编号 Sample No.	测试前/Before		测试后/After		质量损失 Mass Loss (%)	剩余电压 Residual OCV (%)	测试结果 Test Result
	质量/Mass (g)	电压/Voltage (V)	质量/Mass (g)	电压/Voltage (V)			
C1#	76.4680	4.48	76.4666	4.48	0.0018	100.000	O
C2#	76.2096	4.48	76.2087	4.47	0.0012	99.777	O
C3#	76.4712	4.48	76.4700	4.48	0.0016	100.000	O
C4#	76.1714	4.48	76.1704	4.48	0.0013	100.000	O
C5#	76.2096	4.47	76.2079	4.47	0.0022	100.000	O
C6#	76.0725	4.47	76.0717	4.47	0.0011	100.000	O
C7#	76.0872	4.48	76.0856	4.47	0.0021	99.777	O
C8#	76.2628	4.48	76.2612	4.47	0.0021	99.777	O
C9#	76.3291	4.48	76.3278	4.47	0.0017	99.777	O
C10#	76.3202	4.47	76.3187	4.47	0.0020	100.000	O

Note:

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

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

附表 2
Appendix 2

测试项目 Test Items	温度试验 Thermal test
1.1	测试步骤 Test procedure
	将测试电芯和电池在温度为 72±2°C的条件下贮存不少于 6 个小时，然后在温度-40±2°C条件下贮存不少于 6 个小时，两个温度间的间隔最长为 30min。重复操作上述步骤 10 次，然后将测试电芯和电池在环境温度为 20±5°C的条件下放置 24 个小时。 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 in 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).
1.2	样品状态 Sample status
	C1#~C5#，在第一个循环完全充电状态； C1#~C5#, at first cycle in fully charged states.
	C6#~C10#，在 25 个循环后完全充电状态 C6#~C10#,after 25cycles ending in fully charged states
1.3	测试结果 Result

样品编号 Sample No.	测试前/Before		测试后/After		质量损失 Mass Loss (%)	剩余电压 Residual OCV (%)	测试结果 Test Result
	质量/Mass (g)	电压/Voltage (V)	质量/Mass (g)	电压/Voltage (V)			
C1#	76.4666	4.48	76.4582	4.39	0.0110	97.991	O
C2#	76.2087	4.47	76.1993	4.39	0.0123	98.210	O
C3#	76.4700	4.48	76.4612	4.39	0.0115	97.991	O
C4#	76.1704	4.48	76.1613	4.39	0.0119	97.991	O
C5#	76.2079	4.47	76.1992	4.39	0.0114	98.210	O
C6#	76.0717	4.47	76.0623	4.40	0.0124	98.434	O
C7#	76.0856	4.47	76.0773	4.40	0.0109	98.434	O
C8#	76.2612	4.47	76.2521	4.40	0.0119	98.434	O
C9#	76.3278	4.47	76.3189	4.40	0.0117	98.434	O
C10#	76.3187	4.47	76.3097	4.40	0.0118	98.434	O

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

附表 3
Appendix 3

测试项目 Test Items	振动 Vibration
1.1	测试步骤 Test procedure
	将电芯和电池牢固地安装在振动台的台面上，同时确保电芯和电池没有变形，以此保证振动有效地传播。振动为正弦波形式，频率从 7Hz 增加至 200Hz，然后再回到 7Hz，持续 15 分钟，此为一个循环。每个电芯和电池需在三个互相垂直的安装方向上循环 12 次振动，且其中一个振动方向必须与端面垂直，整个测试共 3 个小时。 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.
1.2	样品状态 Sample status
	C1#~C5#，在第一个循环完全充电状态； C1#~C5#, at first cycle in fully charged states.
	C6#~C10#，在 25 个循环后完全充电状态 C6#~C10#,after 25cycles ending in fully charged states
1.3	测试结果 Result

样品编号 Sample No.	测试前/Before		测试后/After		质量损失 Mass Loss (%)	剩余电压 Residual OCV (%)	测试结果 Test Result
	质量/Mass (g)	电压/Voltage (V)	质量/Mass (g)	电压/Voltage (V)			
C1#	76.4582	4.39	76.4569	4.38	0.0017	99.772	O
C2#	76.1993	4.39	76.1984	4.39	0.0012	100.000	O
C3#	76.4612	4.39	76.4596	4.38	0.0021	99.772	O
C4#	76.1613	4.39	76.1604	4.39	0.0012	100.000	O
C5#	76.1992	4.39	76.1987	4.39	0.0007	100.000	O
C6#	76.0623	4.40	76.0618	4.39	0.0007	99.773	O
C7#	76.0773	4.40	76.0761	4.39	0.0016	99.773	O
C8#	76.2521	4.40	76.2510	4.40	0.0014	100.000	O
C9#	76.3189	4.40	76.3176	4.39	0.0017	99.773	O
C10#	76.3097	4.40	76.3086	4.39	0.0014	99.773	O

Note:

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

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

附表 4
Appendix4

测试项目 Test Items	冲击 Shock
1.1	测试步骤 Test procedure
	将测试电芯和电池用坚硬支架紧固在试验装置上，支架支撑着每个试验样品的所有安装面。每个测试电芯和电池须经受最大加速度 150g_n 和脉冲持续时间 6 毫秒的半正弦波冲击。每个电芯和电池需在三个互相垂直的正方向经受三次冲击，然后在反方向经受三次冲击，总共 18 次。 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. 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.
1.2	样品状态 Sample status
	C1#~C5#，在第一个循环完全充电状态； C1#~C5#, at first cycle in fully charged states.
	C6#~C10#，在 25 个循环后完全充电状态 C6#~C10#,after 25cycles ending in fully charged states
1.3	测试结果 Result

样品编号 Sample No.	测试前/Before		测试后/After		质量损失 Mass Loss (%)	剩余电压 Residual OCV (%)	测试结果 Test Result
	质量/Mass (g)	电压/Voltage (V)	质量/Mass (g)	电压/Voltage (V)			
C1#	76.4569	4.38	76.4567	4.38	0.0003	100.000	O
C2#	76.1984	4.39	76.1984	4.39	0.0000	100.000	O
C3#	76.4596	4.38	76.4595	4.38	0.0001	100.000	O
C4#	76.1604	4.39	76.1604	4.39	0.0000	100.000	O
C5#	76.1987	4.39	76.1980	4.39	0.0009	100.000	O
C6#	76.0618	4.39	76.0618	4.39	0.0000	100.000	O
C7#	76.0761	4.39	76.0760	4.39	0.0001	100.000	O
C8#	76.2510	4.40	76.2507	4.40	0.0004	100.000	O
C9#	76.3176	4.39	76.3175	4.39	0.0001	100.000	O
C10#	76.3086	4.39	76.3085	4.39	0.0001	100.000	O

Note:

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

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

附表 5
Appendix5

测试项目 Test Items	外部短路 External short circuit
1.1	测试步骤 Test procedure
	测试电芯和电池应加热一段必要的时间，使得电芯和电池外壳温度达到均匀稳定的57±4℃。这段加热时间的长短取决于电芯和电池的设计尺寸大小，同时这段加热时间应加以评估和记录。若无法评估加热时间，则小型电芯和电池需暴露至少 6 小时。然后，测试电芯和电池应在 57±4℃条件下经受总外电阻小于 0.1 欧姆的外短路。当小型电芯和电池的外壳温度降到 57±4℃后应继续维持外短路状态至少 1 个小时。短路和降温阶段的温度应至少相当于环境温度。 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 larges 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 phase shall be conducted at least at ambient temperature.
1.2	样品状态 Sample status
	C1#~C5#，在第一个循环完全充电状态； C1#~C5#, at first cycle in fully charged states.
	C6#~C10#，在 25 个循环后完全充电状态 C6#~C10#,after 25cycles ending in fully charged states
1.3	测试结果 Result

样品编号 Sample No.	样品表面最高温度 (°C) Max. External Temperature	测试结果 Test Result
C1#	59.00	O
C2#	58.86	O
C3#	58.21	O
C4#	58.26	O
C5#	59.65	O
C6#	59.35	O
C7#	59.51	O
C8#	59.43	O
C9#	59.61	O
C10#	59.44	O

Note:

D -Disassembly, R -Rupture, F-Fire, O-No leakage, no venting, no disassembly, no rupture, no fire.

注： D- 解体；R- 破裂；F - 起火；O- 无泄漏、无排气、无解体、无破裂、无起火。

附表 6
Appendix6

测试项目 Test Items	挤压 Crush
1.1	测试步骤 Test procedure
	将一块电芯或组成电池的电芯放置在挤压设备的两个挤压平面之间进行挤压。挤压在第一个接触点以约 1.5cm/s 的速度逐步进行，直到出现以下三种情况之一为止： 1）挤压力达到 13KN±0.78KN； 2）电芯电压下降了至少 100mV；或 3）电芯厚度和最初比较，变形至少 50%。 一旦达到了最大压力或电芯的电压下降超过 100mV 或电芯变形超过 50%，应解除压力。对棱柱或袋形电芯，应对最宽面进行挤压；对钮扣电芯应对平面进行挤压；对圆柱形电芯，应在纵轴的垂直方向进行挤压。 每个电芯只接受一次挤压，并且用于测试的电芯应没有做过其它测试试验，试验结束后应继续观察 6h。 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; or (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 6h. The test shall be conducted using test cells or component cells that have not previously been subjected to other tests.
1.2	样品状态 Sample status
	C11#~C15#，在第一个循环后 50%的额定容量 C11#~C15#, at first cycle at 50% of the design rated capacity
	C16#~C20#，在 25 个循环后 50%的额定容量 C16#~C20#,after 25 cycles ending at 50% of the design rated capacity.
1.3	测试结果 Result

样品编号 Sample No.	样品表面最高温度 (℃) Max. External Temperature	测试结果 Test result	样品编号 Sample No.	样品表面最高温度 (℃) Max. External Temperature	测试结果 Test result
C11#	21.6	O	C16#	18.9	O
C12#	20.7	O	C17#	20.2	O
C13#	20.7	O	C18#	20.9	O
C14#	20.8	O	C19#	20.6	O
C15#	20.8	O	C20#	20.9	O

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

附表 7
Appendix7

测试项目 Test Items	过度充电 Overcharge
1.1	测试步骤 Test procedure
	充电电流为制造商推荐的最大连续充电电流的两倍。 The charge current shall be twice the manufacturer·s recommended maximum continuous charge current.
	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 22 伏特两者中的较小者。 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.
	制造商建议的充电电压大于 18V 时，测试的最小电压应该为 1.2 倍的制造商标定的最大充电电压。 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.
	厂家推荐最大充电电压为 4.53V，厂家推荐最大充电电流为 10.548A。测试电压为 9.06 V，电流为 21.096 A。 The manufacturer,s recommended maximum charge voltage is 4.53 V. The manufacturer,s recommended maximum continuous charge current is 10.548 A.The voltage of the test is 9.06 V, and the current is 21.096 A.
1.2	样品状态 Sample status
	C21#~C24#，在第一个循环完全充电状态； C21#~C24#, at first cycle in fully charged states.
	C25#~C28#，在 25 个循环后完全充电状态 C25#~C28#,after 25cycles ending in fully charged states
1.3	测试结果 Result

样品编号 Sample No.	测试前开路电压 Voltage Before Test (V)	测试结果 Test Result
C21#	4.46	O
C22#	4.46	O
C23#	4.47	O
C24#	4.46	O
C25#	4.46	O
C26#	4.46	O
C27#	4.47	O
C28#	4.47	O

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

附表 8
Appendix8

测试项目 Test Items	强制放电 Forced discharge
1.1	测试步骤 Test procedure
	在 20±5℃的环境温度下，将单个电芯连接在 12V 的直流电源上进行强制放电，此直流电源提供每个电芯初始电流为制造厂指定的最大放电电流，放电时间为额定容量除以初始电流。 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 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).
1.2	样品状态 Sample status
	C29#~C38#,在第一个循环完全放电状态； C29#~C38#, at first cycle in fully discharged states;
	C39#~C48#,在 25 个循环后完全放电状态； C39#~C48#, after 25cycles ending in fully discharged states;
1.3	测试结果 Result

样品编号 Sample No.	测试前开路电压 Voltage Before Test (V)	测试结果 Test Result	样品编号 Sample No.	测试前开路电压 Voltage Before Test (V)	测试结果 Test Result
C29#	3.691	O	C39#	3.682	O
C30#	3.681	O	C40#	3.681	O
C31#	3.683	O	C41#	3.669	O
C32#	3.677	O	C42#	3.673	O
C33#	3.675	O	C43#	3.677	O
C34#	3.684	O	C44#	3.693	O
C35#	3.665	O	C45#	3.683	O
C36#	3.692	O	C46#	3.669	O
C37#	3.698	O	C47#	3.690	O
C38#	3.697	O	C48#	3.690	O

Note:

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

注：D-解体；F -起火；O-无解体、无起火。

——以下无内容——