STIEE

报 告 编 号：23ZAS09P14D33-31038/1

Reference №：

CMA 230008349711

ilac-MRA

CNAS 中国认可 国际互认 检测 TESTING CNASL1145

UN38.3 检测报告

UN38.3 Test Report

✡新申请 New Application　□变更 Modification　□其他： Other:

产品名称：Name of products：锂离子电池模块 1P48S Li-ion battery Pack

型　　号：Type：JKPK-43K-1P48S-LAA

委托单位：Client：浙江晶科储能有限公司 Zhejiang Jinko Energy Storage Co., Ltd.

检测类别：Kind of test：委托检测 Commission Test

上海电器设备检测所有限公司

Shanghai Testing & Inspection Institute for Electrical Equipment Co., Ltd

上 海 电 器 设 备 检 测 所 有 限 公 司

Shanghai Testing & Inspection Institute for Electrical Equipment Co., Ltd.

检 测 报 告

Test Report

产品名称 Name of Product	锂离子电池模块 1P48S Li-ion battery Pack	商 标 Trade Mark	/
型 号 Type	JKPK-43K-1P48S-LAA		
硬件版本 Hardware version	/	软件版本 Software version	/
检测类别 Kind of Test	委托检测 Commission Test	技术参数 technical parameter	/
委托方 Applicant	浙江晶科储能有限公司 Zhejiang Jinko Energy Storage Co., Ltd.	地 址 Address	中国浙江省嘉兴市海宁市黄湾镇采宝路 6 号三号厂房 Plant No.3, No.6, Caibao Road, Huangwan Town, Haining City, Jiaxing City, Zhejiang Province, China
制造厂 Manufacturer	浙江晶科储能有限公司 Zhejiang Jinko Energy Storage Co., Ltd.	地 址 Address	中国浙江省嘉兴市海宁市黄湾镇采宝路 6 号三号厂房 Plant No.3, No.6, Caibao Road, Huangwan Town, Haining City, Jiaxing City, Zhejiang Province, China
送样数量 Number of Samples	4 modules+30 cells	送样者 Deliverer	/
产品编号 Product Number	/	样品编号 Sample Number	P23K04103801~ P23K04103830（cells） P23K04103831~ P23K04103834（modules）
到样日期 Date of Receiving Samples	2023/5/6	完成日期 Completing Date	2023/6/29
检测依据 Test Specification	联合国《关于危险货物的建议书 试验和标准手册》第 7 版修订 1 第 38.3 节 Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria, ST/SG/AC.10/11/Rev.7/Amend.1 38.3		
检测日期 Test Duration	2023/6/1~2023/6/29		

检测结论 Test Results	经检测，锂离子电池模块产品符合上述标准要求 After testing, 1P48S Li-ion battery Pack products meet the above standard requirements 签发日期： 2023/7/6 Date of Issue
备 注 Remark	

批准 Approved by: 刘媛 审核 Verified by: 郭慧闻 编制 Edited by: 陈红梅

目录 Contents

1. 检测报告基本信息

Basic information of test report

1.1 检测项目汇总表

Test items summary list

样品编号 Sample No.	检测项目 Test Item	依据标准条款 Reference Specification	判定结果 Test Result
P23K04103831 ~ P23K04103834	高度模拟 Altitude simulation	UN 38.3 T.1	P
	温度试验 Thermal test	UN 38.3 T.2	P
	振动 Vibration	UN 38.3 T.3	P
	冲击 Shock	UN 38.3 T.4	P
	外部短路 External short circuit	UN 38.3 T.5	P
P23K04103801 ~ P23K04103810	撞击/挤压 Impact/Crush	UN 38.3 T.6	P
/	过度充电 Overcharge	UN 38.3 T.7	N/A
P23K04103811 ~ P23K04103830	强制放电 Forced discharge	UN 38.3 T.8	P
	以下空白 The end		

备注 1： 符合要求：达到标准要求；Pass: Up to standard;

Note 1: 不符合要求：未达到标准要求；Fail: Not up to standard;

N/A：要求不适用该标准，或不进行该项试验；N/A: Not to this standard or not performing this test;

仅提供数据：Provide data only.

1.2 检测报告变更记录

Document change of test report

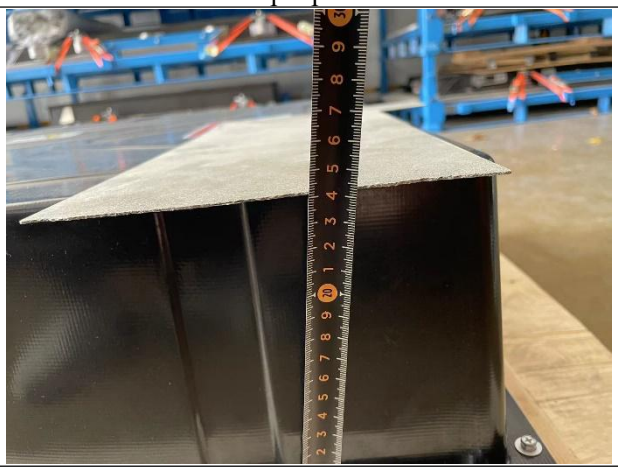
日期 Date	版本 Version	更改内容 Record change
2023/7/6	1.1	正式报告发送 Official report delivery

2. 样品基本信息

Sample basic information

2.1 样品照片

Sample Photo

样品照片及标签 Sample photo and label	
	
样品布置照 1 Sample photo 1	样品布置照 2 Sample photo 2
	
样品布置照 3 Sample photo 3	样品布置照 4 Sample photo 4
	

样品布置照 5 Sample photo 5	样品布置照 6 Sample photo 6
	
标签照片 Label photo	标签细节照片 Label detail photo

2.2 样品基本参数信息
Sample basic parameter information

样品说明及描述/Description and illustration of the sample：
（外观及颜色的描述）
样品状态/Sample status：

测试项目 Test item	样品编号 Sample No.	样品状态 Sample State
T1~T5	P23K04103831~ P23K04103832	第 1 个充放电循环，完全充电状态 At first cycle, in fully charged states
	P23K04103833~ P23K04103834	第 25 个充放电循环，完全充电状态 After 25 cycles ending in fully charged states
T6	P23K04103801~ P23K04103805	第 1 个充放电循环，50%设计额定容量状态 At first cycle at 50% of the design rated capacity
	P23K04103805~ P23K04103810	第 25 个充放电循环后，50%设计额定容量状态 After 25 cycles ending at 50% of the design rated capacity
T7	/	第 1 个充放电循环，完全充电状态 At first cycle, in fully charged states
	/	第 25 个充放电循环后，完全充电状态 After 25 cycles ending in fully charged states
T8	P23K04103811~ P23K04103820	第 1 个充放电循环，完全放电状态 At first cycle, in fully discharged states
	P23K04103821~ P23K04103830	第 25 个充放电循环后，完全放电状态 After 25 cycles ending in fully discharged states

备注
Remarks
1、 该样品为大型电池组；
This sample is a large battery pack.
2、 该样品未安装过充电保护装置，无需 T.7 试验；
This sample has not been equipped with a charging protection device, without the need for T.7 testing.

技术参数 Technical Parameters			
额定容量 Ah Rated capacity (Ah)	280	标称电压 V Nominal Voltage (V)	153.6
额定能量 kWh Rated power (kWh)	43	充电终止电压 V End of charge voltage (V)	175.2
标准充电电流 A Standard Charge Current (A)	140	最大连续充电电流 A Maximum continuous charging current (A)	197.6
充电截止电流 mA End charge current (mA)	/	标准放电电流 A Standard Discharge Current (A)	140
最大放电电流 A Maximum Discharge Current（A）	/	放电终止电压(V) End of discharging voltage (V)	120
电芯型号 Model of cell	LF280K	内含电芯数量（个） Cell numbers(pcs)	48
电芯排列方式 Permutation of cell	1P48S	电芯容量 Ah Capacity of cell (Ah)	280
电芯形状及尺寸 Cell shape and size	□圆柱形 Φ≥18mm Cylindrical Φ≥18mm □圆柱形＜18mm Cylindrical Φ＜18mm ✡棱柱形 Prismatic □袋装电池 Pouch Cell □纽扣电池 Button Cell		

2.3 通用测试说明
General test instructions

Manual of Tests and Criteria ST/SG/AC.10/11/Rev.7, section 38.3 《试验和标准手册》ST/SG/AC.10/11/Rev.7, section 38.3			
Clause 条款	Requirement 要求	Remark-Result 备注-结果	Verdict 判断
38.3.2	Scope 范围		P
	所有电芯类型应该进行 T.1 到 T.6 和 T.8。 All cell types shall be subjected to tests T.1 to T.6 and T.8.		
	所有不可充电电池，包括由测试合格的电芯组成的电池应该进行 T.1 到 T.5。 All non-rechargeable battery types, including those composed of previously tested cells, shall be subjected to tests T.1 to T.5.		
	所有可充电电池，包括由测试合格的电芯组成的电池应该进行 T.1 到 T.5，以及 T.7 的测试。 All rechargeable battery types, including those composed of previously tested cells, shall be subjected to tests T.1 to T.5 and T.7.		
	另外，有过充保护的可充单电芯电池应该进行 T.7 的测试。 In addition, rechargeable single cell batteries with overcharge protection shall be subjected to test T.7.		
	不单独运输的作为配件的电芯进行 T.6 和 T.8 的测试。 A component cell that is not transported separately from the battery		

	it is part of needs only to be tested according to tests T.6 and T.8.		
	单独运输的作为配件的电芯进行 T.1 到 T.6 以及 T.8 的测试。 A component cell that is transported separately from the battery it is part of needs only to be tested according to tests T.1 to T.6 and T.8.		
	作为设备组成部分的用作设备电源的电芯或电池，如果只能在设备中运输，可按照装在设备中的适用测试要求进行试验。 A cell or battery that is an integral part of the equipment it is intended to power that is transported only when installed in the equipment may be in accordance with the applicable tests when installed in the equipment.	电芯/电池可能单独运输 Batteries may be shipped separately	
38.3.3(d)	未安装过充电保护装置、按设计要求只能在另一个带过充保护装置的电池组或设备中的电芯或单电芯电池，无需 T.7 试验。 Batteries or single cell batteries not equipment with battery overcharge protection that are design for use only as a component in another battery or in equipment, which affords such protection, are not subjected to the requirement of T.7.	不带过充电保护装置 Without overcharge protection	
38.3.3(f)	当试验集成电池时，如果集成电池在完全充电时所有阳极的合计锂含量不大 500g，或在锂离子电池组的情况下，额定瓦特-小时不超过 6200Wh 时，并且是用通过所有试验的电池集合而成的，须对一个完全充电状态的集成电池做试验 T.3、T.4 和 T5，另外，如果是可充电电池，则还需进行 T.7 试验。 When testing a battery assembly in which the aggregate lithium content of all anodes when fully charged, is not more than 500g, or in the case of a lithium battery, with a Watt-hour rating of not more than 6200Wh, that is assembled from batteries that have passed all applicable tests, one assembled battery in a fully charged state shall be tested under tests T3, T4 and T5, and in addition, test T7 in the case of a rechargeable battery.	非集成电池 Not battery assembly	
38.3.3(g)	对于已通过所有适用试验的若干电池组成的集成电池，如在完全充电时所有阳极的总锂含量超过 500g，或在锂离子电池的情况下，如额定的瓦特-小时数超过 6200Wh 时，当集成电池如经过验证属于可防止下列情况，即无需进行试验： - 过充电； - 短路；且 - 电池之间的过放。 When batteries that have passed all applicable tests are electrically connected to form battery in which the aggregate lithium content of all anodes, when fully charged more than 500g, or in the case of a lithium ion battery, with a Watt-hour rating of more than 6200Wh, the assembled battery does not need to be tested if the assembled battery is of a type that has been verified as preventing： - Overcharge; - Short circuits; and - Over discharge between the batteries.	非集成电池 Not battery assembly	

38.3.4	Procedure 程序		
	小型电芯或电池应按顺序进行试验 T.1 至 T.5。 Test T.1 to T.5 shall be conducted in sequence on the same cell or battery. 试验 T.6 和 T.8 应使用未试验过的电芯或电池。 Test T.6 and T.8 shall be conducted using not otherwise tested cells or batteries. 试验 T.7 可以使用原先在试验 T.1 至 T.5 中使用过的未损坏电池进行。 Test T.7 may be conducted using undamaged batteries previously used in tests T.1 to T.5 for purpose of testing on cycled batteries.		

3. 测试过程 Test process

3.1 测试项目：高度模拟

Test Item：Altitude simulation

（1） **测试信息**

Test conditions

环境温度 Environment Temperature	22.3℃~22.4℃	环境湿度 Environmental Humidity	58%~59%RH
测试工程师 Test Engineer	丁硕 Ding Shuo	测试日期 Test Date	2023/6/5

（2） **测试结果**

Test results

样品编号 Sample No.	P23K04103831~ P23K04103834
依据标准 According to the standard	UN 38.3 T.1
检测方法 Test methods	测试电池和电池组应在压力等于或低于 11.6 kPa 和环境温度(20±5℃)下储存至少 6 小时。 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℃).
接受标准 Acceptance Criteria	不漏液、不泄放、不解体、不破裂、不着火(测试完电池的开路电压不小于测试前电压的 90%，质量损失限值 0.1%)。 No leakage, no venting, no disassembly, no rupture and no fire. 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. Mass loss limit 0.1%.
检测结果 Test results	不漏液、不泄放、不解体、不破裂、不着火。 No leakage, no venting, no disassembly, no rupture and no fire.
符合性判定 Pass/Fail determine	P

（3） **测试数据**

Test data

样品编号 Sample No.	试验前 Before Test		试验后 After Test		质量损失 Mass loss (%)	电压比 OCV (%)	备注 Remarks
	质量 Mass(g)	电压 OCV(V)	质量 Mass(g)	电压 OCV(V)			
第一次循环充满电 Fully charged at first cycle							
P23K04103831	305015	160.800	305015	160.800	0.00	100.000	-
P23K04103832	305013	158.700	305022	158.700	0.00	100.000	-
25 次循环后完全充电 Fully charged after 25 cycles							
P23K04103833	306010	159.400	306025	158.800	0.00	99.624	-
P23K04103834	306020	157.300	306070	157.400	0.02	100.064	-

3.2 测试项目：温度试验

Test Item：Thermal test

（1） **测试信息**

Test information

环境温度 Environment Temperature	25℃	环境湿度 Environmental Humidity	56%RH
测试工程师 Test Engineer	鲁登 Lu Deng	测试日期 Test Date	2023/6/1-2023/6/11

（2） **测试结果**

Test results

样品编号 Sample No.	P23K04103831~ P23K04103834
依据标准 According to the standard	UN 38.3 T.2
检测方法 Test methods	试验电池和电池组应先在试验温度等于 72±2℃的条件下存放至少 6 小时，接着再在试验温度等于-40±2℃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℃）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。 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.
接受标准 Acceptance Criteria	不漏液、不泄放、不解体、不破裂、不着火(测试完电池的开路电压不小于测试前电压的 90%，质量损失限值 0.1%)。 No leakage, no venting, no disassembly, no rupture and no fire. 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. Mass loss limit 0.1%.
检测结果 Test results	不漏液、不泄放、不解体、不破裂、不着火。 No leakage, no venting, no disassembly, no rupture and no fire.
符合性判定 Pass/Fail determine	P

（3） **测试数据**

Test data

样品编号 Sample No.	试验前 Before Test		试验后 After Test		质量损失 Mass loss (%)	电压比 OCV (%)	备注 Remarks
	质量 Mass(g)	电压 OCV(V)	质量 Mass(g)	电压 OCV(V)			
第一次循环充满电 Fully charged at first cycle							
P23K04103831	305010	160.8	305015	160.8	0.00	100.000	-
P23K04103832	305012	158.7	305020	158.6	0.00	99.937	-
25 次循环后完全充电 Fully charged after 25 cycles							
P23K04103833	306000	159.4	306020	158.8	0.01	99.624	-
P23K04103834	306000	157.3	306080	157.2	0.03	99.936	-

3.3 测试项目：振动

Test Item：Vibration

（1） **测试信息**

Test information

环境温度 Environment Temperature	21.5℃~24.5℃	环境湿度 Environmental Humidity	49.5%~51.7%RH
测试工程师 Test Engineer	陈翰林 Chen Hanlin	测试日期 Test Date	2023/6/17~2023/6/21

（2） **测试结果**

Test results

样品编号 Sample No.	P23K04103831~ P23K04103834
依据标准 According to the standard	UN 38.3 T.3
检测方法 Test methods	电池和电池组紧固于振动机平台，但紧固程度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 1gn 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 8gn（频率约为 50Hz）。将最大加速度保持在 8gn 直到频率增加到 200Hz。 对大型电池组：从 7Hz 开始，保持 1gn 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 2gn（频率约为 25Hz）。将最大加速度保持在 2gn 直到频率增加到 200Hz。 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, is maintained until 18Hz 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 8gn occurs (approximately 50 Hz). A peak acceleration of 8gn is then maintained until the frequency is increased to 200 Hz.

	For large batteries: from 7 Hz to a peak acceleration of 1gn 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 2gn occurs (approximately 25 Hz). A peak acceleration of 2ga is then maintained until the frequency is increased to 200 Hz.
接受标准 Acceptance Criteria	不漏液、不泄放、不解体、不破裂、不着火(测试完电池的开路电压不小于测试前电压的 90%，质量损失限值 0.1%)。 No leakage, no venting, no disassembly, no rupture and no fire. 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. Mass loss limit 0.1%.
检测结果 Test results	不漏液、不泄放、不解体、不破裂、不着火。 No leakage, no venting, no disassembly, no rupture and no fire.
符合性判定 Pass/Fail determine	P

（3） **测试数据**

Test data

样品编号 Sample No.	试验前 Before Test		试验后 After Test		质量损失 Mass loss (%)	电压比 OCV (%)	备注 Remarks
	质量 Mass(g)	OCV(V)	质量 Mass(g)	OCV(V)			
第一次循环充满电 Fully charged at first cycle							
P23K04103831	305010	159.8	305015	159.6	0.00	99.875	-
P23K04103832	305012	158.9	305020	158.6	0.00	99.811	-
25 次循环后完全充电 Fully charged after 25 cycles							
P23K04103833	306000	160.4	306020	158.8	0.01	99.002	-
P23K04103834	306000	159.3	306080	157.4	0.03	98.807	-

3.4 测试项目：冲击

Test Item：Shock

（1） **测试信息**

Test information

环境温度 Environment Temperature	21.5℃~23.5℃	环境湿度 Environmental Humidity	49.5%~51.7%RH
测试工程师 Test Engineer	陈翰林 Chen Hanlin	测试日期 Test Date	2023/6/17~2023/6/21

（2） **测试结果**

Test results

样品编号 Sample No.	P23K04103831~ P23K04103834
依据标准 According to the standard	UN 38.3 T.4
检测方法 Test methods	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 150gn 和脉冲持续时间 6ms 的半正弦波冲击。大型电池须经受最大加速度 50gn 和脉冲持续时间 11ms 的半正弦波冲击。 小型电池组以峰值为 150gn（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 6ms，大型电池组须经受最大加速度 50gn（或与$\sqrt{\left(\frac{30000}{mass}\right)}$中的较小值）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。 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 150gn and pulse duration of 6ms. However, large cells may be subjected to a half-sine shock acceleration of 50gn and pulse duration of 11ms. Small batteries shall be subjected to a half-sine shock of peak acceleration of 150gn (or Acceleration(gn)= $\sqrt{\left(\frac{100850}{mass}\right)}$, which is smaller) and pulse duration of 6ms. Large batteries shall be subjected to a half-sine of peak acceleration of 50gn (or Acceleration(gn)= $\sqrt{\left(\frac{30000}{mass}\right)}$, which is smaller) and pulse duration of 11ms. Each battery shall be subjected to three shocks in the positive direction followed by three shocks in the negative direction of three mutually perpendicular mounting positions of the battery for a total of 18 shocks.
接受标准 Acceptance Criteria	不漏液、不泄放、不解体、不破裂、不着火(测试完电池的开路电压不小于测试前电压的 90%，质量损失限值 0.1%)。 No leakage, no venting, no disassembly, no rupture and no fire. 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. Mass loss limit 0.1%.
检测结果 Test results	不漏液、不泄放、不解体、不破裂、不着火。 No leakage, no venting, no disassembly, no rupture and no fire.
符合性判定 Pass/Fail determine	P

（3） **测试数据**

Test data

样品编号 Sample No.	试验前 Before Test		试验后 After Test		质量损失 Mass loss (%)	电压比 OCV (%)	备注 Remarks
	质量 Mass(g)	电压 OCV(V)	质量 Mass(g)	电压 OCV(V)			
第一次循环充满电 Fully charged at first cycle							
P23K04103831	305010	159.8	305015	159.4	0.00	99.750	-
P23K04103832	305012	158.9	305020	157.6	0.00	99.182	-
25 次循环后完全充电 Fully charged after 25 cycles							
P23K04103833	306000	160.4	306020	156.8	0.01	97.756	-
P23K04103834	306000	159.3	306080	157.8	0.03	99.058	-

3.5 测试项目：外部短路

Test Item：External short circuit

（1） **测试信息**

Test information

环境温度 Environment Temperature	23.5℃	环境湿度 Environmental Humidity	65%RH
测试工程师 Test Engineer	于强 Yu Qiang	测试日期 Test Date	2023/6/28~2023/6/29

（2） **测试结果**

Test results

样品编号 Sample No.	P23K04103831~ P23K04103834
依据标准 According to the standard	UN 38.3 T.5
检测方法 Test methods	电池和电池组的外壳温度稳定在 57±4℃后，在此温度下对电池进行外部短路，外电路的总阻值应小于 0.1Ω，持续短路至样品外壳温度回落到 57±4℃后至少再继续短路 1 h，观察 6 h 结束试验。 When the temperature of the shell of the battery and battery pack is stable at 57±4℃, the battery is short-circuited externally at this temperature, and the total resistance of the external circuit should be less than 0.1Ω. The short-circuit is continued until the shell temperature of the sample drops to 57±4℃ for at least 1 h, and the test is finished after 6 h observation.
接受标准 Acceptance Criteria	如果外壳温度不超过 170℃，并且在试验过程中及试验后 6 小时内无解体、无破裂，无起火。 Cells and batteries meet this requirement if their external temperature does not exceed 170℃ and there is no disassembly, no rupture and no fire during the test and within six hours after the test.
检测结果 Test results	外壳温度不超过 170℃，不解体、不破裂、不着火。 External temperature does not exceed 170℃. No disassembly, no rupture and no fire.
符合性判定 Pass/Fail determine	P

（3） **测试数据**

Test data

样品编号 Sample No.	试验前电压 Voltage before test (V)	初始温度 Initial Temperature (℃)	最高温度 Max Temperature (℃)	备注 Remarks
第一次循环充满电 Fully charged at first cycle				
P23K04103831	160.2	57.5	58.9	-
P23K04103832	160.2	58.2	60.5	-
25 次循环后完全充电 Fully charged after 25 cycles				
P23K04103833	160.1	57.8	60.8	-
P23K04103834	160.2	59.5	61.2	-

3.6 测试项目：撞击/挤压

Test Item：Impact/Crush

（1） **测试信息**

Test information

环境温度 Environment Temperature	24.5℃	环境湿度 Environmental Humidity	51%RH
测试工程师 Test Engineer	于强 Yu Qiang	测试日期 Test Date	2023/6/19

（2） **测试结果**

Test results

样品编号 Sample No.	P23K04103801~ P23K04103810
依据标准 According to the standard	UN 38.3 T.6
检测方法 Test methods	□撞击（适用于直径不小于 18.0mm 的圆柱形电池） 1. Impact (applicable to cylindrical cells not less than 18.0 mm in diameter) 将样品电池置于平板上，将一直径为 15.8mm±0.1mm 的不锈钢棒横放在样品中心，一块 9.1kg±0.1kg 的重锤从 61±2.5 cm 高度落到试样上。圆柱形电池受撞击时，其长轴应平行于平板并且垂直于放在受检电池中心的直径为 15.8mm 的棒。每一试样只经受一次撞击，电池必须再观察 6h 结束试验。 The sample cell or component cell is to be placed on a flat smooth surface. A 15.8 mm ± 0.1mm diameter 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 on to the sample. 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. The battery must be observed for a further six hours for the test to be concluded.
	✡挤压（适用于棱柱形、袋装、硬币/纽扣电池和直径小于 18.0mm 的圆柱形电池） 2. Crush (applicable to prismatic, pouch, coin/button cells and cylindrical cells less than 18.0 mm in diameter 将试样电池放在两个平面之间挤压，挤压力度逐渐增大，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。棱柱形和袋装电池应从最宽的一面施压。硬币/纽扣电池应从平坦表面施压。圆柱形电池应从与纵轴垂直的方向施压。每个试样电池只做一次挤压试验，电池必须再观察 6h 结束试验。 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 13kN ± 0.78kN; (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. 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 battery must be observed for a further six hours for the test to be concluded.
接受标准 Acceptance Criteria	外壳温度不超过 170℃，试验过程中及试验后 6 小时内无解体、无破裂，无起火。 The temperature of the shell shall not exceed 170℃, and there will be no disassembly, rupture or fire during the test and within 6 hours after the test.
检测结果 Test results	外壳温度不超过 170℃，不解体、不破裂、不着火。 External temperature does not exceed 170℃. No disassembly, no rupture and no fire.
符合性判定 Pass/Fail determine	P

（3） **测试数据**

Test data

Crush 挤压				
样品编号 Sample No.	试验前电压 Voltage before test (V)	初始温度 Initial Temperature (℃)	最高温度 Max Temperature (℃)	备注 Remarks
第一次循环时标定额定容量的 50% 50% of the design rated capacity at first cycle				
P23K04103801	3.289	23.1	23.5	-
P23K04103802	3.297	23.2	23.5	-
P23K04103803	3.296	23.5	23.8	-
P23K04103804	3.297	23.5	24.0	-
P23K04103805	3.292	23.6	23.9	-
25 次循环后达到标定额定容量的 50% 50% of the design rated capacity after 25 cycles				
P23K04103806	3.291	23.5	23.6	-
P23K04103807	3.291	23.5	23.7	-
P23K04103808	3.291	23.4	23.9	-
P23K04103809	3.291	23.3	24.0	-
P23K04103810	3.291	23.5	24.0	-

3.7 测试项目：强制放电

Test Item：Forced discharge

（1） **测试信息**

Test information

环境温度 Environment Temperature	26.4℃	环境湿度 Environmental Humidity	54%RH
测试工程师 Test Engineer	于强 Yu Qiang	测试日期 Test Date	2023/5/27-2023/6/26

（2） **测试结果**

Test results

样品编号 Sample No.	P23K04103811~ P23K04103830
依据标准 According to the standard	UN 38.3 T.8
检测方法 Test methods	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）。 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).
接受标准 Acceptance Criteria	不解体、不着火。 No disassembly, no fire.
检测结果 Test results	不解体、不着火。 No disassembly, no fire
符合性判定 Pass/Fail determine	P

（3） **测试数据**

Test data

样品编号 Sample No.	试验前电压 Voltage before test (V)	初始温度 Initial Temperature (℃)	最高温度 Max Temperature (℃)	备注 Remarks
第一次循环完全放电 At first cycle, in fully discharged states				
P23K04103811	2.7463	30.1	34.7	-
P23K04103812	2.7758	33.8	37.9	-
P23K04103813	2.7869	28.1	32.6	-
P23K04103814	2.8949	30.0	35.2	-
P23K04103815	2.9498	29.8	35.0	-
P23K04103816	2.9812	28.9	35.6	-
P23K04103817	2.7633	29.2	34.8	-
P23K04103818	2.9732	30.8	35.4	-
P23K04103819	2.8365	29.6	34.1	-
P23K04103820	2.9914	30.6	35.1	-
25 次循环后完全放电 After 25 cycles ending in fully discharged states				
P23K04103821	2.6834	29.1	34.3	-
P23K04103822	2.6739	29.6	34.3	-
P23K04103823	2.7215	33.7	39.5	-
P23K04103824	2.6521	32.9	35.7	-
P23K04103825	2.6838	29.5	34.6	-
P23K04103826	2.7171	29.7	34.5	-
P23K04103827	2.7265	28.9	33.8	-
P23K04103828	2.6900	29.2	34.2	-
P23K04103829	2.6391	33.0	38.2	-
P23K04103830	2.6437	33.0	38.1	-

---结束---

---END---

声　　明

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