UN38.3 Test Report

UN38.3 检测报告

Report No.: 报告编号：	P24052705801
Name of Products: 产品名称：	Rechargeable Li-ion Battery 可充式锂离子电池组
Model and Spec.: 型号规格：	462836PF5, 3.87V 635mAh 2.46Wh
Applicant: 委托单位：	Chongqing VDL Electronics Co., Ltd. 重庆市紫建电子股份有限公司
Manufacturer: 生产厂商：	Chongqing VDL Electronics Co., Ltd. 重庆市紫建电子股份有限公司
Date of issue： 签发日期：	2024-06-12

Shenzhen NTEK New Energy Technology Co., Ltd.

深 圳 市 北 测 新 能 源 技 术 有 限 公 司

TEST REPORT ST/SG/AC.10/11/Rev.8 Manual of Tests and Criteria, PART III, section 38.3 Lithium metal, lithium ion and sodium ion batteries	
Report Number 报告编号.....:	P24052705801
Total number of pages 总页数 .....:	23 pages
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Applicant委托单位 .....:	Chongqing VDL Electronics Co., Ltd. 重庆市紫建电子股份有限公司
Address of Applicant 委托单位地址 .....:	Building 1-4, Puli Industrial New Area, Zhaojia Street, Kaizhou District, Chongqing, China 重庆市开州区赵家街道浦里工业新区 1-4 号楼
Manufacturer 生产厂商 .....:	Chongqing VDL Electronics Co., Ltd. 重庆市紫建电子股份有限公司
Address of manufacturer 生产厂商地址 .....:	Building 1-4, Puli Industrial New Area, Zhaojia Street, Kaizhou District, Chongqing, China 重庆市开州区赵家街道浦里工业新区 1-4 号楼
Test specification 测试规范:	
Test standard 测试标准 .....:	ST/SG/AC.10/11/Rev.8
Test procedure测试程序.....:	Test Report 检测报告
Name of Products 产品名称.....:	Rechargeable Li-ion Battery 可充式锂离子电池组
Model/Type 型号.....:	462836PF5
Ratings 额定参数.....:	3.87V, 635mAh, 2.46Wh

Summary of testing 测试概要:	
Tests performed (name of test and test clause): 试验项目（试验项目名称及条款）	Test result 试验结论
Test T.1: Altitude simulation 高度模拟	Pass 合格
Test T.2: Thermal Test 温度试验	Pass 合格
Test T.3: Vibration 振动	Pass 合格
Test T.4: Shock 冲击	Pass 合格
Test T.5: External short circuit 外部短路	Pass 合格
Test T.6: Impact 撞击	N/A 不适用
Test T.6: Crush 挤压	Pass 合格
Test T.7: Overcharge 过度充电	Pass 合格
Test T.8: Forced discharge 强制放电	Pass 合格

Test Conclusion 试验结论:

The Rechargeable Li-ion Battery submitted by Chongqing VDL Electronics Co., Ltd. is tested according to the United Nations Manual of Tests and Criteria, PART III, section 38.3 Lithium metal, lithium ion and sodium ion batteries, the eighth revised edition *(ST/SG/AC.10/11/Rev.8).*

Test results: PASS

由重庆市紫建电子股份有限公司提交的可充式锂离子电池组按照联合国《试验和标准手册》，第三部分，38.3 节锂金属、锂离子和钠离子电池要求，第八修订版 (ST/SG/AC.10/11/Rev.8)进行测试。

测试结果：合格

Tested by: 主检人：	Luz Lu 陆灸倖	陆灸倖
Reviewed by: 审核人：	Snow Liu 刘雪娟	刘雪娟
Approved by: 批准人：	Jesse Zhang 张士杰	张士杰

报告单位（盖章）：
Seal of NTEK

深圳市北测新能源技术有限公司 Shenzhen NTEK New Energy Technology Co., Ltd.
NTEK
报告专用章
Report Seal

Product particulars产品详情:	
Classification 类别 .....:	Lithium ion single cell battery 锂离子单电芯电池
Appearance外观 .....:	Silvery and Prismatic 银色、棱柱形
Dimension尺寸(mm).....:	Max: 4.62×28.0×37.9mm
Possible test case verdicts可能的试验情况判定:	
Test case does not apply to the test object 试验情况不适用本试验产品 .....:	N/A
Test object does meet the requirement 试验样品满足要求.....:	P (Pass)
Test object does not meet the requirement 试验样品不满足要求 .....:	F (Fail)
Testing测试:	
Date of receipt of test item接收日期 .....:	2024-05-28
Date (s) of performance of tests测试周期 .....:	2024-05-28 ~ 2024-06-11

Sample description 样品说明			
Type 类型	Sample No. 样品编号	Sample Sub-No. 样品子编号	State of samples 样品状态
Batteries 电池	NE240526343011-X*	001~005	Fully charged at first cycle 首次循环满电状态
		021~024	
		006~010	Fully charged after 25 cycles 25 次循环后满电状态
		025~028	
Component cells 元件电池芯		011~015	50% of the design rated capacity at first cycle 首次循环 50%电荷状态
		016~020	50% of the design rated capacity after 25 cycles 25 次循环后 50%电荷状态
		029~038	Fully discharged at first cycle 首次循环完全放电状态
		039~048	Fully discharged after 25 cycles 25 次循环后完全放电状态
* “X” contained in Sample No. represents Sample Sub-No., it consists of three digit. 包含在样品编号中的“X”表示样品子编号，由 3 位数字组成。			

General product information and other remarks产品通用信息和其它说明:

-Detailed information of the battery and the component cell, as following 电池和内部电池芯的详细信息如下:

Type 类型	Component Cell 锂电池芯	Battery 电池
Model 型号	462836PF5	462836PF5
Rating 额定参数	3.87V, 635mAh	3.87V, 635mAh, 2.46Wh
Limited Charging Voltage 充电限制电压	4.45V	4.45V
Recommend Max. Charging Voltage 推荐的最大充电电压	4.45V	4.45V
Standard Charging Current 标准充电电流	317.5mA	317.5mA
Max. Charging Current 最大充电电流	1270mA	1270mA
Standard Discharge Current 标准放电电流	127mA	127mA
Max. Discharge Current 最大放电电流	635mA	635mA
End of discharge Voltage 放电终止电压	3.0V	3.0V

Test Procedure 测试程序:

Tests T.1 to T.5 are conducted in sequence on the same battery. Tests T.6 and T.8 are conducted using not otherwise tested batteries. 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.

电池必须按顺序在相同的一组电池上进行T.1至T.5的试验。T.6和T.8的试验应使用另外未试验过的电池。T.7的试验可以使用先前在T.1至T.5的试验中使用过的未损坏电池进行，以便测试进行在循环过的电池上。

In order to quantify the mass loss, the following procedure is provided:

$$\text{Mass loss}(\%)=(M_1-M_2)/M_1\times 100$$

为了量化质量损失，使用以下公式计算：

$$\text{质量损失}(\%)=(M_1-M_2)/M_1\times 100$$

Where M_1 is the mass before the test and M_2 is the mass after the test. When mass loss does not exceed the values in Table below, it is considered as "no mass loss".

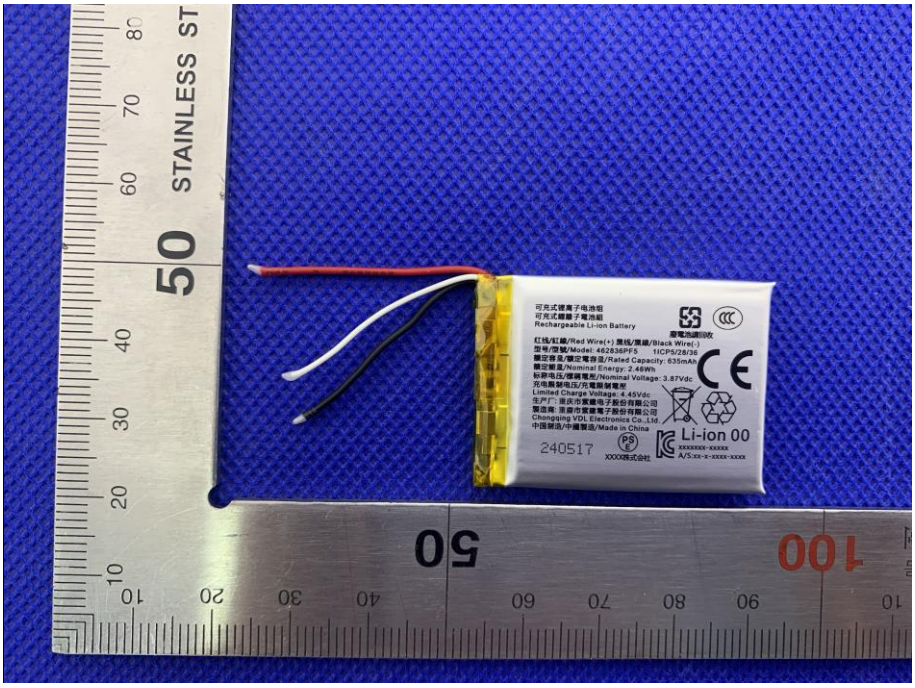
式中：M_1是试验前的质量，M_2是试验后的质量。如果质量损失不超过下表所列的数值，应视为“无质量损失”。

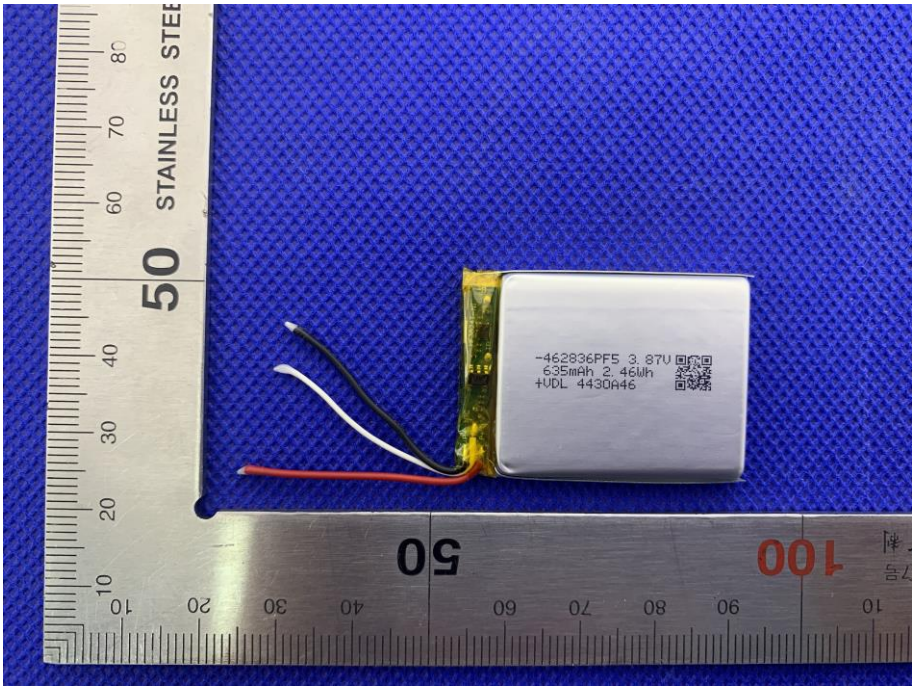
Mass M of cell or battery 电芯或电池的质量	Mass loss limit 质量损失限值
M＜1g	0.5%
1g≤M≤75g	0.2%
M＞75g	0.1%

In tests T.1 to T.4, 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 battery after testing is not less than 90% of its voltage immediately prior to this procedure.

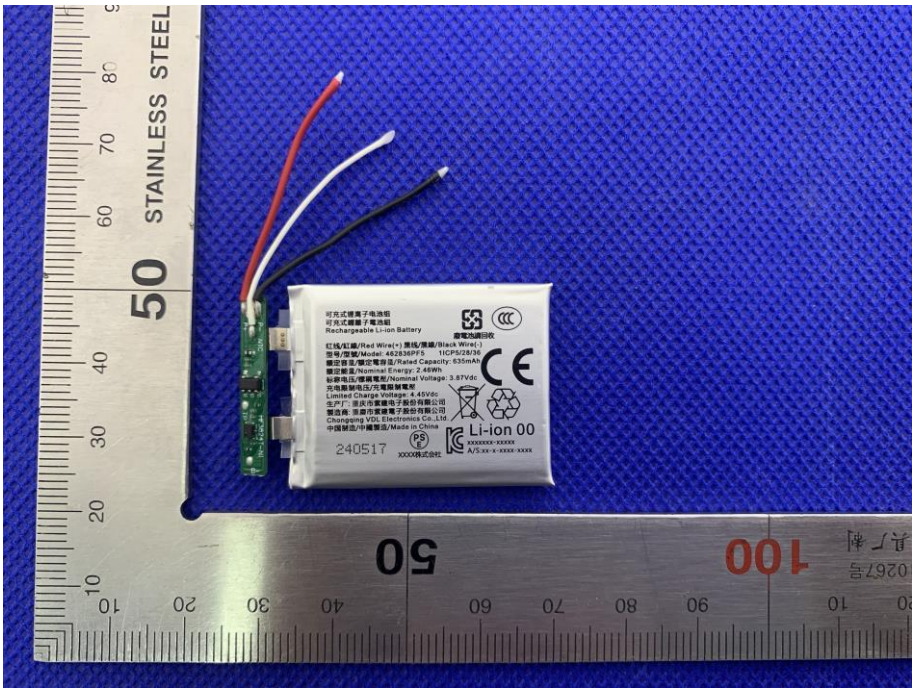
在T.1至T.4的试验中，电池须满足无渗漏、无泄气、无解体、无破裂和无起火，并且每个试验电池在试验后的开路电压不小于其在进行这一试验前电压的90%。

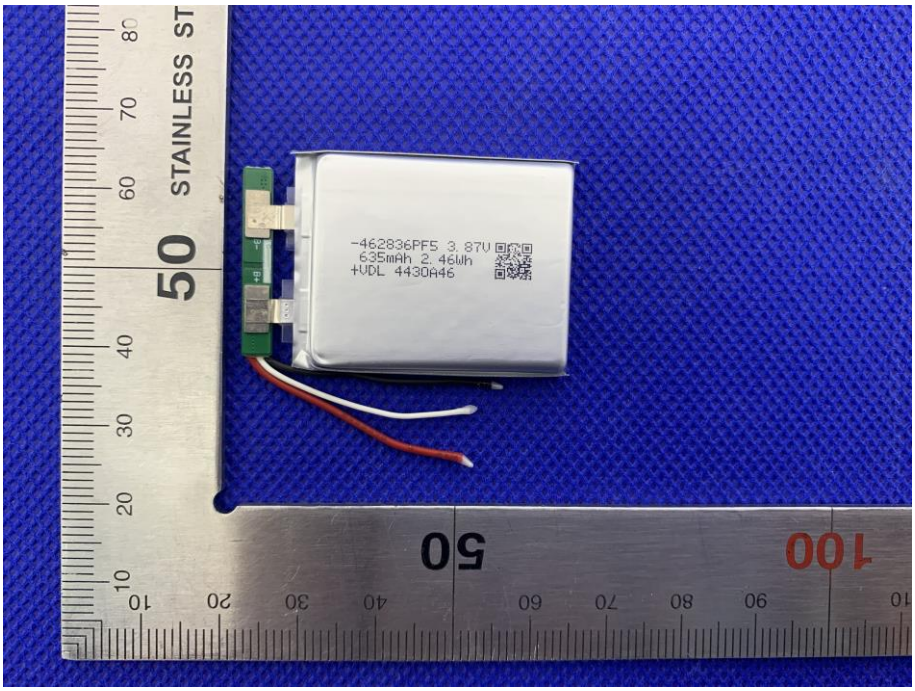
Photos of sample 样品照片



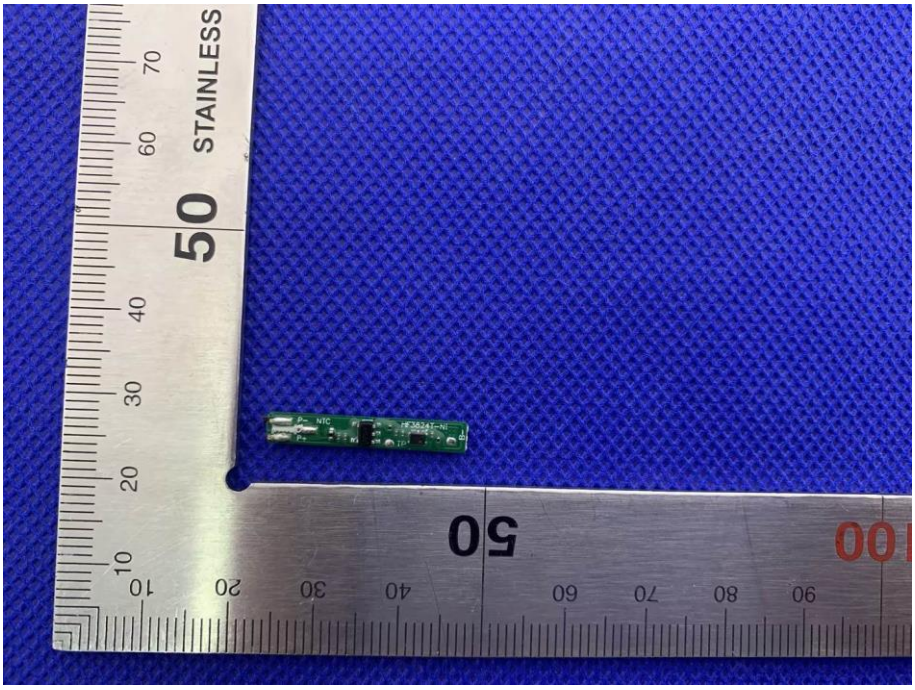


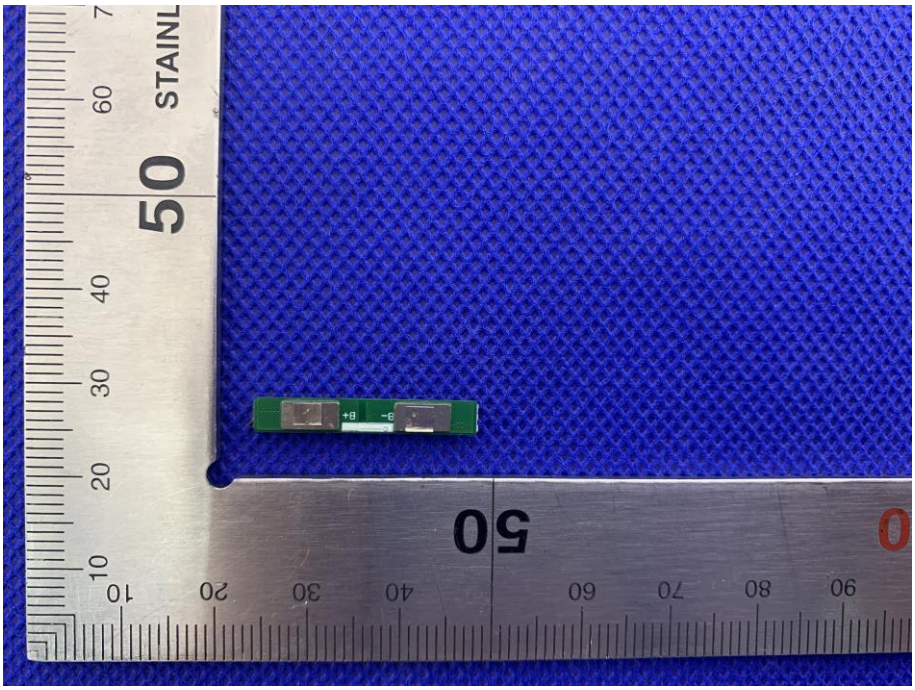
Photos of sample 样品照片





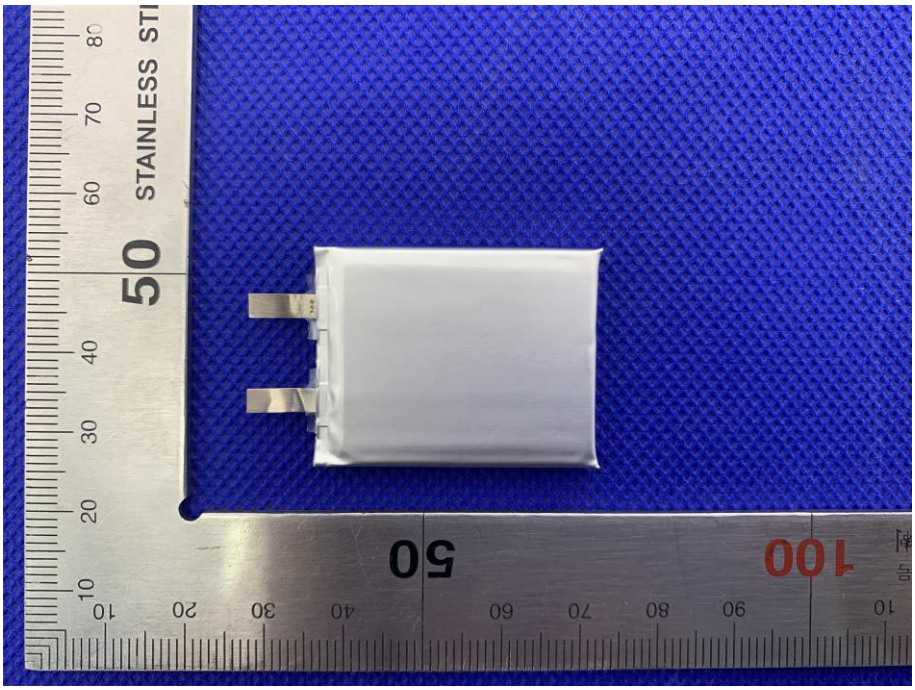
Photos of sample 样品照片





Photos of sample 样品照片





ST/SG/AC.10/11/Rev.8			
Clause	Requirement +Test	Result - Remark	Verdict
38.3.4.1	**Test T.1: Altitude simulation 高度模拟**		P
38.3.4.1.2	Test cells and batteries are stored at a pressure of 11.6 kPa or less for at least six hours at ambient temperature (20°C±5°C). 试验电池和电池组被放置在压力等于或低于 11.6 kPa 和环境温度(20°C±5°C)下存放至少 6 小时。		P
38.3.4.1.3	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 battery after testing is not less than 90% of its voltage immediately prior to this procedure. 电池芯电池组无渗漏、无泄气、无解体、无破裂和无起火，并且每个试验电池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%。		P
38.3.4.2	**Test T.2: Thermal test 温度试验**		P
38.3.4.2.2	Test cells and batteries are to be stored for at least six hours at a test temperature equal to 72°C±2°C, followed by storage for at least six hours at a test temperature equal to -40°C±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°C±5°C). 试验电池和电池组应先在试验温度等于 72°C±2°C 的条件下存放至少 6 小时，接着再在试验温度等于-40°C±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°C±5°C）下存放 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。		N/A

ST/SG/AC.10/11/Rev.8			
Clause	Requirement +Test	Result - Remark	Verdict
38.3.4.2.3	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 battery after testing is not less than 90% of its voltage immediately prior to this procedure. 电池和电池组无渗漏、无泄气、无解体、无破裂和无起火，并且每个试验电池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%。		P
38.3.4.3	**Test T.3: Vibration 振动**		P
38.3.4.3.2	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. 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 7 赫兹到 200 赫兹，再回到 7 赫兹，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。		P
	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. 对电池和小型电池组：从 7 赫兹开始，保持 1g_n 的最大加速度，直到频率达到 18 赫兹。然后将振幅保持在 0.8 毫米(总偏移 1.6 毫米)，并增加频率直到最大加速度达到 8 g_n (频率约为 50 赫兹)。将最大加速度保持在 8g_n 直到频率增加到 200 赫兹。		P

ST/SG/AC.10/11/Rev.8			
Clause	Requirement +Test	Result - Remark	Verdict
	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. 对大型电池组：从 7 赫兹开始，保持 1g_n 的最大加速度，直到频率达到 18 赫兹。然后将振幅保持在 0.8 毫米(总偏移 1.6 毫米)，并增加频率直到最大加速度达到 2g_n (频率约为 25 赫兹)。将最大加速度保持在 2g_n 直到频率增加到 200 赫兹。		N/A
38.3.4.3.3	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 battery directly after testing in its third perpendicular mounting position is not less than 90% of its voltage immediately prior to this procedure. 测试中和测试后电池和电池组无渗漏、无泄气、无解体、无破裂和无起火，并且每个试验电池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在进行这一试验前电压的 90%。		P
38.3.4.4	**Test T.4: Shock 冲击**		P
38.3.4.4.2	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. 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。		P
	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. 每个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。不过，大型电池须经受最大加速度 50g_n 和脉冲持续时间 11 毫秒的半正弦波冲击。		P

ST/SG/AC.10/11/Rev.8			
Clause	Requirement +Test	Result - Remark	Verdict
	Each battery shall be subjected to a half-sine shock of peak acceleration depending on the mass of the battery. 每个电池须经受的正弦波冲击的最大加速度取决于电池组的质量。		P
	For small batteries: the minimum peak acceleration shall be 150 g_n or result of formula, whichever is smaller. And the pulse duration shall be 6 milliseconds. $Acceleration(g_n) = \sqrt{\left(\frac{100850}{mass^a}\right)}$ Mass is expressed in kilograms. 小型电池组：最低限度最大加速度是 150g_n 或公式计算，取数值较小者。脉冲持续时间为 6 毫秒。 $Acceleration(g_n) = \sqrt{\left(\frac{100850}{mass^a}\right)}$ 质量为千克。	150g_n	P
	For large batteries: the minimum peak acceleration shall be 50 g_n or result of formula, whichever is smaller. And the pulse duration shall be 11 milliseconds. $Acceleration(g_n) = \sqrt{\left(\frac{30000}{mass^a}\right)}$ Mass is expressed in kilograms. 大型电池组：最低限度最大加速度是 50g_n 或公式计算，取数值较小者。脉冲持续时间为 11 毫秒。 $Acceleration(g_n) = \sqrt{\left(\frac{30000}{mass^a}\right)}$ 质量为千克。		N/A
	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极方向经受三次冲击，接着在负极方向经受三次冲击，总共经受 18 次冲击。		P

ST/SG/AC.10/11/Rev.8			
Clause	Requirement +Test	Result - Remark	Verdict
38.3.4.4.3	Cell 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 battery after testing is not less than 90% of its voltage immediately prior to this procedure. 电池和电池组无渗漏、无泄气、无解体、无破裂和无起火，并且每个试验电池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%。		P
38.3.4.5	**Test T.5: External short circuit 外部短路**		P
38.3.4.5.2	The cell or battery to be tested are heated for a period of time necessary to reach a homogeneous stabilized temperature of 57°C±4°C, measured on the external case. This period of time depends on the size and design of the battery and is 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. 对于待试电池或电池组，应加温一段必要的时间，使从外壳测量的温度达到均匀的稳定温度57°C±4°C。这段时间的长短取决于电池或电池组的大小和设计，对于这个持续时间应加以评估和记录。如无法进行这种评估，则小型电池和小型电池组的暴露时间应至少6小时，大型电池和小型电池组的暴露时间应至少12小时。		P
	Then the battery at 57°C±4°C is subjected to one short circuit condition with a total external resistance of less than 0.1ohm. 然后，电池或电池组应在57°C±4°C条件下经受总外电阻小于0.1欧姆的短路条件。		P
	This short circuit condition is continued for at least one hour after the battery external case temperature has returned to 57°C±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. 这一短路条件应在电池或电池组外壳温度回到57°C±4°C后继续至少1小时，或在大型电池组的情况下外壳温度降幅达试验中所观察的最高温升幅的二分之一并保持低于该数值。		P

ST/SG/AC.10/11/Rev.8			
Clause	Requirement +Test	Result - Remark	Verdict
38.3.4.5.3	Cells and battery 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 test. 电池电池组外壳温度不超过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。		P
38.3.4.6	**Test T.6: Impact/Crush 撞击/挤压**		P
38.3.4.6.2	Test procedure – Impact (applicable to cylindrical cells not less than 18.0 mm in diameter) 试验程序——撞击(适用于直径不小于18.0毫米的圆柱形电池)		N/A
	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 9.1 kg ± 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. 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15.8毫米±0.1毫米，长度至少6厘米，或电池最长端的尺寸，取二者之长者。将一块9.1千克±0.1千克的重锤从61厘米±2.5厘米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。		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 ± 0.1 mm 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15.8毫米±0.1毫米弯曲表面的纵轴垂直。每一试样只经受一次撞击。		N/A

ST/SG/AC.10/11/Rev.8			
Clause	Requirement +Test	Result - Remark	Verdict
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) 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 18.0毫米的圆柱形电池)		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1.5厘米/秒。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; a) 施加的力量达到13千牛顿±0.78千牛顿；		P
	b) The voltage of the cell drops by at least 100 mV; or b) 电池的电压下降至少100毫伏；或		N/A
	c) The cell is deformed by 50% or more of its original thickness. c) 电池变形达原始厚度的50%或以上。		N/A
	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. 一旦达到最大压力、电压下降100毫伏或更多，或电池变形至少达原厚度的50%，即可解除压力。		P
	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。		P

ST/SG/AC.10/11/Rev.8			
Clause	Requirement +Test	Result - Remark	Verdict
	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。		P
38.3.4.6.4	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. 如果外壳温度不超过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。		P
38.3.4.7	**Test T.7: Overcharge过度充电**		P
38.3.4.7.2	The charge current shall be twice the manufacturer's recommended maximum continuous charge current. The minimum voltage of the test shall be as follows: 充电电流必须是制造商建议的最大持续充电电流的两倍。试验的最小电压如下：		P
	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. a) 制造商建议的充电电压不大于18伏时，试验的最小电压应是电池组最大充电电压的两倍或22伏两者中的较小者。		P
	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. b) 制造商建议的充电电压大于18伏时，试验的最小电压应为最大充电电压的1.2倍。		N/A
	Tests are to be conducted at ambient temperature. The duration of the test shall be 24 hours. 试验应在环境温度下进行。进行试验的时间应为24小时。		P

ST/SG/AC.10/11/Rev.8			
Clause	Requirement +Test	Result - Remark	Verdict
38.3.4.7.3	Rechargeable batteries meet this requirement if there is no disassembly and no fire during the test and within seven days after the test. 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。		P
38.3.4.8	**Test T.8: Forced discharge强制放电**		P
38.3.4.8.2	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. 每个电池应在环境温度下与12伏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。		P
	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). 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)。		P
38.3.4.8.3	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. 原电池或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。		P

ST/SG/AC.10/11/Rev.8			
Clause	Requirement +Test	Result - Remark	Verdict

Test T.1: Altitude simulation 高度模拟

Sample Sub-No. 样品子编号	Prior to test 试验前		After test 试验后		Mass loss 质量损失 (%)	Voltage after test/ voltage prior to test 试验后电压/试验前电压(%)	Results 结果
	Mass 质量 (g/~~Kg~~)	Voltage 电压 (V)	Mass 质量 (g/~~Kg~~)	Voltage 电压 (V)			
001	9.8654	4.431	9.8653	4.430	0.001	99.98	PASS 合格
002	9.8871	4.432	9.8870	4.431	0.001	99.98	PASS 合格
003	9.8642	4.434	9.8641	4.432	0.001	99.95	PASS 合格
004	9.8228	4.436	9.8227	4.435	0.001	99.98	PASS 合格
005	9.8271	4.432	9.8271	4.431	0.000	99.98	PASS 合格
006	9.8482	4.432	9.8480	4.430	0.002	99.95	PASS 合格
007	9.7261	4.434	9.7261	4.432	0.000	99.95	PASS 合格
008	9.8380	4.432	9.8380	4.431	0.000	99.98	PASS 合格
009	9.8398	4.433	9.8397	4.433	0.001	100.0	PASS 合格
010	9.8371	4.431	9.8369	4.430	0.002	99.98	PASS 合格
Notes 注释: After the test, there is no leakage, no venting, no disassembly, no rupture and no fire. 测试后，电池未渗漏、未泄气、未解体、未破裂和未起火。							

Test T.2: Thermal test 温度试验

Sample Sub-No. 样品子编号	Prior to test 试验前		After test 试验后		Mass loss 质量损失 (%)	Voltage after test/ voltage prior to test 试验后电压/试验前电压(%)	Results 结果
	Mass 质量 (g/~~Kg~~)	Voltage 电压 (V)	Mass 质量 (g/~~Kg~~)	Voltage 电压 (V)			
001	9.8653	4.430	9.8632	4.379	0.021	98.85	PASS 合格
002	9.8870	4.431	9.8842	4.380	0.028	98.85	PASS 合格
003	9.8641	4.432	9.8621	4.389	0.020	99.03	PASS 合格
004	9.8227	4.435	9.8208	4.382	0.019	98.80	PASS 合格
005	9.8271	4.431	9.8251	4.386	0.020	98.98	PASS 合格
006	9.8480	4.430	9.8457	4.385	0.023	98.98	PASS 合格
007	9.7261	4.432	9.7242	4.385	0.020	98.94	PASS 合格
008	9.8380	4.431	9.8354	4.382	0.026	98.89	PASS 合格
009	9.8397	4.433	9.8371	4.384	0.026	98.89	PASS 合格
010	9.8369	4.430	9.8342	4.384	0.027	98.96	PASS 合格
Notes 注释: After the test, there is no leakage, no venting, no disassembly, no rupture and no fire. 测试后，电池未渗漏、未泄气、未解体、未破裂和未起火。							

ST/SG/AC.10/11/Rev.8			
Clause	Requirement +Test	Result - Remark	Verdict

Test T.3: Vibration 振动

Sample Sub-No. 样品子编号	Prior to test 试验前		After test 试验后		Mass loss 质量损失 (%)	Voltage after test/ voltage prior to test 试验后电压/试验前电压(%)	Results 结果
	Mass 质量 (g/~~Kg~~)	Voltage 电压 (V)	Mass 质量 (g/~~Kg~~)	Voltage 电压 (V)			
001	9.8632	4.379	9.8631	4.377	0.001	99.95	PASS 合格
002	9.8842	4.380	9.8842	4.380	0.000	100.0	PASS 合格
003	9.8621	4.389	9.8621	4.388	0.000	99.98	PASS 合格
004	9.8208	4.382	9.8207	4.382	0.001	100.0	PASS 合格
005	9.8251	4.386	9.8248	4.385	0.003	99.98	PASS 合格
006	9.8457	4.385	9.8457	4.385	0.000	100.0	PASS 合格
007	9.7242	4.385	9.7242	4.385	0.000	100.0	PASS 合格
008	9.8354	4.382	9.8353	4.381	0.001	99.98	PASS 合格
009	9.8371	4.384	9.8370	4.383	0.001	99.98	PASS 合格
010	9.8342	4.384	9.8338	4.382	0.004	99.95	PASS 合格
Notes 注释: During and after the test, there is no leakage, no venting, no disassembly, no rupture and no fire. 测试中和测试后，电池未渗漏、未泄气、未解体、未破裂和未起火。							

Test T.4: Shock 冲击

Sample Sub-No. 样品子编号	Prior to test 试验前		After test 试验后		Mass loss 质量损失 (%)	Voltage after test/ voltage prior to test 试验后电压/试验前电压(%)	Results 结果
	Mass 质量 (g/~~Kg~~)	Voltage 电压 (V)	Mass 质量 (g/~~Kg~~)	Voltage 电压 (V)			
001	9.8631	4.377	9.8631	4.376	0.000	99.98	PASS 合格
002	9.8842	4.380	9.8842	4.380	0.000	100.0	PASS 合格
003	9.8621	4.388	9.8620	4.388	0.001	100.0	PASS 合格
004	9.8207	4.382	9.8207	4.382	0.000	100.0	PASS 合格
005	9.8248	4.385	9.8248	4.385	0.000	100.0	PASS 合格
006	9.8457	4.385	9.8456	4.385	0.001	100.0	PASS 合格
007	9.7242	4.385	9.7242	4.384	0.000	99.98	PASS 合格
008	9.8353	4.381	9.8353	4.380	0.000	99.98	PASS 合格
009	9.8370	4.383	9.8370	4.383	0.000	100.0	PASS 合格
010	9.8338	4.382	9.8338	4.382	0.000	100.0	PASS 合格
Notes 注释: After the test, there is no leakage, no venting, no disassembly, no rupture and no fire. 测试后，电池未渗漏、未泄气、未解体、未破裂和未起火。							

ST/SG/AC.10/11/Rev.8			
Clause	Requirement +Test	Result - Remark	Verdict

Test T.5: External short circuit 外部短路

Sample Sub-No. 样品子编号	Max. outer casing temperature 电池表面最高温度 (°C)	Results 结果
001	56.8	PASS 合格
002	56.5	PASS 合格
003	56.7	PASS 合格
004	56.5	PASS 合格
005	56.6	PASS 合格
006	56.8	PASS 合格
007	56.8	PASS 合格
008	56.7	PASS 合格
009	56.9	PASS 合格
010	56.8	PASS 合格
Notes 注释: There is no disassembly, no rupture and no fire during the test and within six hours after test. 电池在测试中和测试后 6 小时内未解体、未破裂，未起火。		

Test T.6: Impact/Crush 撞击/挤压

Sample Sub-No. 样品子编号	Max. outer casing temperature 电池表面最高温度 (°C)	Results 结果
011	23.0	PASS 合格
012	22.9	PASS 合格
013	23.4	PASS 合格
014	23.1	PASS 合格
015	22.7	PASS 合格
016	22.8	PASS 合格
017	22.9	PASS 合格
018	23.0	PASS 合格
019	23.1	PASS 合格
020	22.9	PASS 合格
Notes 注释: There is no disassembly, no rupture and no fire during the test and within six hours after the test. 元件电池芯在测试中和测试后 6 小时内未解体、未起火。		

ST/SG/AC.10/11/Rev.8			
Clause	Requirement +Test	Result - Remark	Verdict

Test T.7: Overcharge 过度充电

Overcharge current 过充电电流(mA).....:	2×1270mA=2540mA
Overcharge voltage 过充电电压(Vdc).....:	2×4.45=8.9V
Duration of the test 过充试验时间(hours) .....:	24 hours

Sample Sub-No.样品子编号	OCV before test 试验前电压 (V)	Results 结果
021	4.432	PASS 合格
022	4.430	PASS 合格
023	4.435	PASS 合格
024	4.430	PASS 合格
025	4.432	PASS 合格
026	4.430	PASS 合格
027	4.428	PASS 合格
028	4.430	PASS 合格

Notes 注释:
There is no disassembly and no fire during the test and within seven days after the test.
电池在测试中和测试后 7 天内未解体，未着火。

Test T.8: Forced discharge 强制放电

Initial current 初始电流(mA).....:	635mA
Supply voltage 试验电压(Vdc) .....:	12Vdc
Time interval 试验时间(Minutes).....:	60 Minutes

Sample Sub-No. 样品子编号	OCV before test 试验前电压 (V)	Results 结果	Sample Sub-No. 样品子编号	OCV before test 试验前电压 (V)	Results 结果
029	3.138	PASS 合格	039	3.135	PASS 合格
030	3.125	PASS 合格	040	3.140	PASS 合格
031	3.139	PASS 合格	041	3.139	PASS 合格
032	3.140	PASS 合格	042	3.132	PASS 合格
033	3.157	PASS 合格	043	3.136	PASS 合格
034	3.139	PASS 合格	044	3.137	PASS 合格
035	3.127	PASS 合格	045	3.135	PASS 合格
036	3.145	PASS 合格	046	3.128	PASS 合格
037	3.130	PASS 合格	047	3.140	PASS 合格
038	3.137	PASS 合格	048	3.135	PASS 合格

Notes 注释:
There is no disassembly and no fire during the test and within seven days after the test.
元件电池芯在测试中和测试后 7 天内未解体，未着火。

*********End of Test Report 检测报告结束*********

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