

检测报告

Test Report

报告编号： MTI150416001RU
Report No. MTI150416001RU

日期： 2015年04月28日
Date: Apr. 28, 2015

第 1 页 共 15 页
Page 1 of 15

委托方 Client	福建金柏夷能源科技有限公司 Fujian Jinbaiyi Energy and Technology Co.,Ltd.
委托方地址 Address	南平市武夷新区童游组团工业园区3期F—01号 No. F-01, 3 Period, Tongyouzutuan Industrial Zone, Wuyi New Area, Nanping, Fujian, China.
样品名称 Description	锂离子电芯 Lithium ion cell
型号规格 Model/Type	18650/2.2Ah
制造厂 Manufacturer	福建金柏夷能源科技有限公司 Fujian Jinbaiyi Energy and Technology Co.,Ltd
制造厂地址 Address	南平市武夷新区童游组团工业园区3期F—01号 No. F-01, 3 Period, Tongyouzutuan Industrial Zone, Wuyi New Area, Nanping, Fujian, China
接收日期 Date of Receipt	2015-04-16 Apr.16, 2015
检测日期 Date of Test	2015-04-16~2015-04-28 Apr. 16, 2015 ~ Apr. 28, 2015

实验室名称 Testing Laboratory	深圳市微测技术服务有限公司 Shenzhen Microtest Technology Co., Ltd. Tel: +86-755-8885 0135 Fax: +86-755-8885 0136 E-mail: mti@microtest.cc
-----------------------------	--

检测 Tested by

陈亚川

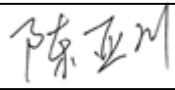

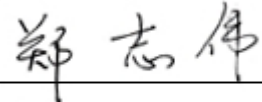
审核 Reviewed by

陈国洪

批准 Approved by

郑志伟



Test Report 测试报告 ST/SG/AC.10/11 Rev.5 / Amend.1&ST/SG/AC.10/11 Rev.5 / Amend.2 AMENDMENTS TO THE FIFTH REVISED EDITION OF THE RECOMMENDATIONS ON THE TRANSPORT OF DANGEROUS GOODS, MANUAL OF TEST AND CRITERIA 联合国《关于危险货物运输的建议书, 试验和标准手册》 (第五次修订) (Section 38.3: Lithium batteries) (38.3章节: 锂电池)		
Report reference No	MTI150416001RU	
报告号		
Tested by (+ signature).....	陈亚川	
测试(签名)		
Checked by (+ signature).....	宋国庆	
审核(签名)		
Approved by (+ signature).....	郑志伟	
批准(签名)		
Date of issue	Apr. 28, 2015	
签发日期	2015-04-28	
Testing Laboratory Name	Shenzhen Microtest Technology Co., Ltd.	
测试实验室	深圳市微测技术服务有限公司	
Address	6F, ZhongbaoBuilding, Xiawayuan, Gushu, Bao'an District, Shenzhen, P.R. China. 中国深圳市宝安区西乡固戍下围园中宝大厦6楼	
Applicant's Name	福建金柏夷能源科技有限公司	
申请商	Fujian Jinbaiyi Energy and Technology Co.,Ltd.	
Address	南平市武夷新区童游组团工业园区3期F—01号	
地址	No. F-01, 3 Period, Tongyouzutuan Industrial Zone, Wuyi New Area, Nanping, Fujian, China.	
Manufacturer.....	福建金柏夷能源科技有限公司	
制造商	Fujian Jinbaiyi Energy and Technology Co.,Ltd.	
Address	南平市武夷新区童游组团工业园区3期F—01号	
地址	No. F-01, 3 Period, Tongyouzutuan Industrial Zone, Wuyi New Area, Nanping, Fujian, China.	
Standard.....	ST/SG/AC.10/11 Rev.5 Section 38.3/ Amend.1 & ST/SG/AC.10/11 Rev.5 Section 38.3/ Amend.2 AMENDMENTS TO THE FIFTH REVISED EDITION OF THE RECOMMENDATIONS ON THE TRANSPORT OF DANGEROUS GOODS, MANUAL OF TEST AND CRITERIA 《关于危险品货物运输的建议书》第五修订版修正1与修正2 第 38.3 节	
标准		
Test item description	Lithium ion cell	
测试项目描述	锂离子电芯	

Trade Mark..... 商标	N/A
Model/type reference..... 型号/引用型号	18650/2.2Ah
Ratings 额定值	3.6Vdc, 2200mAh, 7.92Wh
Classification 类别	N/A
Type of cell 电池芯形状	Cylindrical
Limited charge Voltage..... 充电限制电压	4.2V
Possible test case verdicts: 报告中可能用到的结论标识:	
Test case does not apply to the test object..... 测试项目不适用于该产品:	N/A 不适用
Test item does meet the requirement. 测试项目符合标准的要求	P(ass) 合格
Test item does not meet the requirement..... 测试项目不符合标准的要求	F(ail) 不合格
Testing: 测试:	
Date of sample received..... 样品接收日期:	2015-04-16 Apr.16, 2015
Date(s) of performance of test..... 测试执行日期	2015-04-16~2015-04-28 Apr. 16, 2015 ~ Apr. 28, 2015
Test conclusion:检验结论 <p>The Lithium-ion cell submitted by Fujian Jinbaiyi Energy and Technology Co.,Ltd.are tested according to Section 38.3 of the Fifth Revised Edition of the Recommendations on the Transport of Dangerous Goods, Manual of Test and Criteria (ST/SG/AC.10/11 Rev.5 Section 38.3/ Amend.1&ST/SG/AC.10/11 Rev.5 Section 38.3/ Amend.2).</p> <p>由福建金柏夷能源科技有限公司送检的锂离子电芯，依据《关于危险品货物运输的建议书》第五修订版修正1与修正2 第38.3 节进行检测。</p> <p>Test result: Pass 检验结果: 通过</p>	

I、CONCLUSION 结论

ITEM项目	SAMPLE NUMBER样品号	STANDARD 标准	CONCLUSION结论
Altitude simulation 高空模拟	C1-C10	Section 38.3 of the Fifth Revised Edition of the Recommendations on the Transport of Dangerous Goods, Manual of Test and Criteria (ST/SG/AC.10/11 Rev.5 Section 38.3/ Amend.1&ST/SG/AC.10/11 Rev.5 Section 38.3/ Amend.2)	PASS 合格
Thermal test 热冲击			PASS 合格
Vibration 振动			PASS 合格
Shock 冲击			PASS 合格
External short circuit 外部短路			PASS 合格
Impact/ Crush 重物冲击/挤压	C31-C35	《关于危险品货物运输的建议书》第五修订版修正1与修正2 第38.3节	PASS 合格
Forced discharge 强制放电	C11-C20,C21-C30		PASS 合格

Notes备注:

The conditions of the cells of sample No. C1# to C10# are after one cycle, in fully charged state;

样品编号C1-C10的状态为在一个交替充电放电周期完全充电状态的电芯;

The conditions of component cells of sample No. C31# to C35# are at first cycle at 50% of the design rated capacity, in fully charged state;

样品编号C31-C35的状态为第一个交替充电放电周期完全充电状态电芯容量设计值的50%;

The conditions of the cells of sample No.C11# to C20# are at first cycle, in fully discharged state;

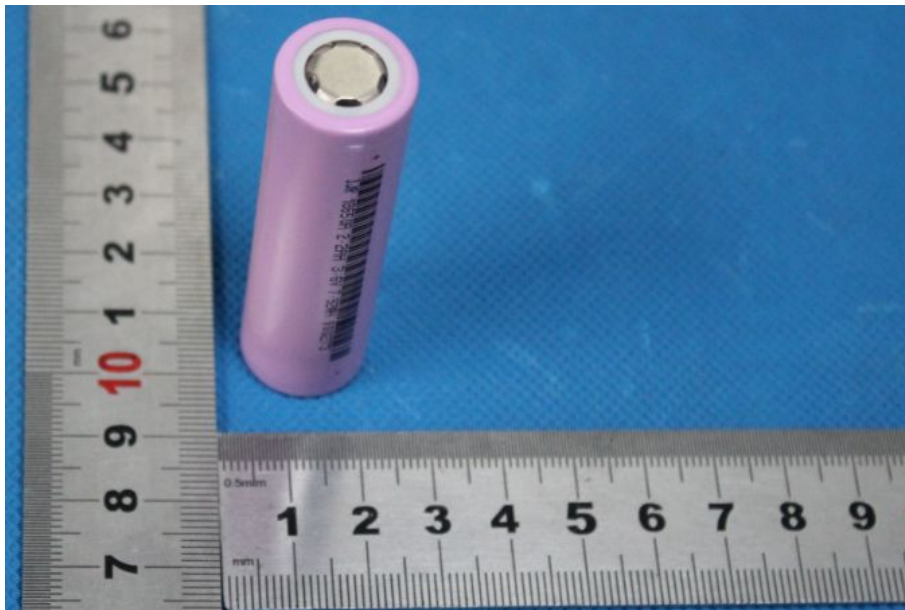
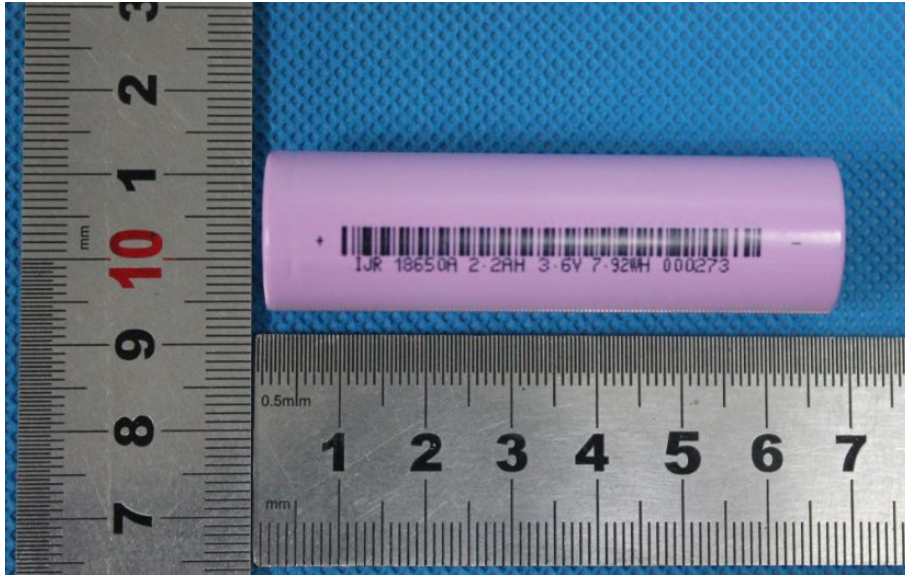
样品编号C11-C20的状态为第一个交替充电放电周期完全放电状态的电芯;

The conditions of the cells of sample No.C21# to C30# are after fifty cycles ending in fully discharged state.

样品编号C21-C30的状态为在五十个交替充电放电周期结束后完全放电状态的电芯。

II、Photos Of The Sample 样品图片

Lithium ion cell 锂离子电芯



III、MAIN TEST EQUIPMENT 主要测试设备

NO. 编号	Instrument Name 仪器名称
E11	万用表 Multimeter
E29	重物冲击试验机 Impact Tester
E30	挤压试验机 Crush Tester
E38	烤箱 Oven
E43	高低温冲击试验箱 High-Low Temperature Chamber
E48	电子天平 Electronic balance
E49	低气压试验箱 Low Pressure Chamber
E58	电池充放电系统 10V/10A Battery Charger System
E59	电池充放电系统 25V/10A Battery Charger System
E60	液压冲击试验台 Hydraulic Shock Tester
E61	电磁动态振动测试系统 Electro-dynamic Vibration Test System
E70	直流电子负载 Dc electronic load
E73	温度记录仪 Temperature Recorder

IV、 TEST METHOD AND DATA 测试方法和数据

Tests T.1 to T.5 shall be conducted in sequence on the same cell or battery. Tests T.6 and T.7 shall be conducted using not otherwise tested cells or batteries..

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.

必须用相同的电芯或电池按照顺序进行试验1到试验5。试验T6和T7应使用没进行过其他试验的电芯或电池。

要求电池和电池组无渗漏、无排气、无解体、无破裂和无起火并且每个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%。有关电压的要求不适用于完全放电状态的电池和电池组。

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

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

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 blow, it shall be considered as "no mass loss".

质量损失依照下式计算:

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

式中M1是试验前的质量, M2是试验后的质量。如质量损失不超过下表所列数值, 即视为“无质量损失”。

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

Test T1: Altitude simulation 高度模拟

Test procedure 试验程序:

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). 试验电池和电池组在压力不大于11.6kPa和温度20°C±5°C的环境下存放至少6小时。

Requirement 要求:

Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.

电芯或电池满足以下要求: 无漏液、无排气、无分解、无破裂以及无着火现象的发生。样品试验后开路电压应不低于试验前开路电压的90%,此要求不适用于完全放电状态的电池和电芯。

Data 数据如下表:

No. 编号	Pre-test 测试前		After test 测试后		Mass loss 质量损失 (%)	Voltage after test/ Voltage pre- test 试验后电压/试验 前电压 (%)	Status 结论
	Mass 质量 (g)	Voltage 电压 (V)	Mass 质量 (g)	Voltage 电压 (V)			
C1	44.20	4.18	44.20	4.17	0.000	99.76	PASS/合格
C2	44.01	4.17	44.01	4.17	0.000	100.00	PASS/合格
C3	44.46	4.18	44.45	4.18	0.022	100.00	PASS/合格
C4	44.25	4.18	44.24	4.18	0.023	100.00	PASS/合格
C5	44.05	4.18	44.04	4.18	0.023	100.00	PASS/合格
C6	44.45	4.18	44.45	4.18	0.000	100.00	PASS/合格
C7	44.23	4.17	44.23	4.17	0.000	100.00	PASS/合格
C8	44.36	4.18	44.36	4.18	0.000	100.00	PASS/合格
C9	44.36	4.17	44.35	4.17	0.023	100.00	PASS/合格
C10	44.31	4.18	44.30	4.18	0.023	100.00	PASS/合格

#: No leakage, No venting, No disassembly No rupture and no fire

#: 无漏液、无排气、无分解、无破裂以及无着火现象

Test T.2: Thermal test 热冲击

Test procedure 测试程序

Test cells and batteries are to be stored for at least six hours at a test temperature equal to $72 \pm 2^\circ\text{C}$, followed by storage for at least six hours at a test temperature equal to $-40 \pm 2^\circ\text{C}$. 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 ($20 \pm 5^\circ\text{C}$). For large cells and batteries the duration of exposure to the test temperature extremes should be at least 12 hours.

试验电池和电池组在试验温度等于 $72^\circ\text{C} \pm 2^\circ\text{C}$ 下存放至少6小时,接着在试验温度等于 $-40^\circ\text{C} \pm 2^\circ\text{C}$ 下存放至少6小时。两个极端温度之间的最大时间间隔为30分钟。这一过程须重复10次,接着将所有电池在环境温度 $20^\circ\text{C} \pm 5^\circ\text{C}$ 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。

Requirement 要求

Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.

电芯或电池满足以下要求:无漏液、无排气、无分解、无破裂以及无着火现象的发生。样品试验后开路电压应不低于试验前开路电压的90%,此要求不适用于完全放完电状态的电池和电芯。

Data 数据如下表:

No.编号	Pre-test测试前		After test测试后		Mass loss 质量损失 (%)	Voltage after test/ Voltage pre- test 试验后电压/试验 前电压 (%)	Status 结论
	Mass 质量 (g)	Voltage 电压 (V)	Mass 质量 (g)	Voltage 电压 (V)			
C1	44.20	4.17	44.20	4.16	0.000	99.76	PASS/合格
C2	44.01	4.17	44.01	4.16	0.000	99.76	PASS/合格
C3	44.45	4.18	44.45	4.16	0.000	99.52	PASS/合格
C4	44.24	4.18	44.24	4.16	0.000	99.52	PASS/合格
C5	44.04	4.18	44.04	4.16	0.000	99.52	PASS/合格
C6	44.45	4.18	44.44	4.16	0.022	99.52	PASS/合格
C7	44.23	4.17	44.21	4.16	0.045	99.76	PASS/合格
C8	44.36	4.18	44.35	4.16	0.023	99.52	PASS/合格
C9	44.35	4.17	44.35	4.16	0.000	99.76	PASS/合格
C10	44.30	4.18	44.30	4.16	0.000	99.52	PASS/合格

#: No leakage, No venting, No disassembly No rupture and no fire

#: 无漏液、无排气、无分解、无破裂以及无着火现象

Test T.3: Vibration 振动

Test procedure 测试程序:

- 1 Cells and batteries are firmly secured to the platform of the vibration machine /电芯和电池牢固地安装在振动台的台面上。
- 2 The vibration :a sinusoidal waveform with a logarithmic sweep between 7Hz and 200 Hz and back to 7Hz traversed in 15 minutes/振动以正弦波形式，以7Hz增加至200Hz，然后再减少回到7Hz 为一个循环，一个循环持续15分钟的对数前移传送。
- 3 the logarithmic frequency sweep is as follows: from 7 Hz a peak acceleration of 1 gn is maintained until 18 Hz is reached, The amplitude is then maintained at 0,8mm (1,6 mm total excursion) and the frequency increased until a peak acceleration of 8 gn occurs (approximately 50Hz), A peak acceleration of 8 gn is then maintained until the frequency is increased to 200 Hz/对数扫频为:从7赫兹开始保持1gn的最大加速度直到频率为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8gn（频率约为50赫兹），将最大加速度保持在8gn直到频率增加到200赫兹。
- 4 This cycle repeated 12 times for a total of 3 hours for each of three mutually perpendicular mounting position of the cell /以振动的其中一个方向必须是垂直样品极性，对每个电芯从三个互相垂直的方向上循环12次，共3 个小时。

Requirement 要求:

Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire during the test and after the test and if the open circuit voltage of each test cell or battery directly after testing in its third perpendicular mounting position is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.

电芯或电池满足以下要求：无漏液、无排气、无分解、无破裂以及无着火现象的发生。样品试验后开路电压应不低于试验前开路电压的90%，此要求不适用于完全放完电状态的电池和电芯。

Data 数据如下表:

No.编号	Pre-test测试前		After test测试后		Mass loss 质量损失 (%)	Voltage after test/ Voltage pre- test 试验后电压/试验 前电压 (%)	Status 结论
	Mass 质量 (g)	Voltage 电压 (V)	Mass 质量 (g)	Voltage 电压 (V)			
C1	44.20	4.16	44.19	4.16	0.023	100.00	PASS/合格
C2	44.01	4.16	44.01	4.16	0.000	100.00	PASS/合格
C3	44.45	4.16	44.44	4.16	0.022	100.00	PASS/合格
C4	44.24	4.16	44.23	4.16	0.023	100.00	PASS/合格
C5	44.04	4.16	44.04	4.16	0.000	100.00	PASS/合格
C6	44.44	4.16	44.43	4.16	0.023	100.00	PASS/合格
C7	44.21	4.16	44.21	4.16	0.000	100.00	PASS/合格
C8	44.35	4.16	44.35	4.16	0.000	100.00	PASS/合格
C9	44.35	4.16	44.35	4.16	0.000	100.00	PASS/合格
C10	44.30	4.16	44.30	4.16	0.000	100.00	PASS/合格

#: No leakage, No venting, No disassembly No rupture and no fire

#: 无漏液、无排气、无分解、无破裂以及无着火现象

Test T4: Shock 冲击

Test procedure测试程序:

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 or battery shall be subjected to a halfsine 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 followed by three shocks in the negative direction of three mutually perpendicular mounting positions of the cell or battery for a total of 18 shocks. However, large cells and large batteries shall be subjected to a half-sine shock of peak acceleration of 50 g_n and pulse duration of 11 milliseconds. Each cell or battery is subjected to three shocks in the positive direction followed by three shocks in the negative direction of each of three mutually perpendicular mounting positions of the cell for a total of 18 shocks.

以稳固的托架固定住每个电芯和电池样品的全部配件表面。对每个电芯或电池以峰值为150gn 的半正弦的加速度冲击,脉冲持续6 毫秒,大型电池和大型电池组须经受最大加速度50gn 和脉冲持续时间11 毫秒的半正弦波冲击。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。

Requirement 要求:

Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.

电芯或电池应满足以下要求:无漏液、无排气、无分解、无破裂以及无着火现象的发生。样品试验后开路电压应不低于试验前开路电压的90%,此要求不适用于完全放完电的电池和电芯。

Data 数据如下表:

No. 编号	Pre-test测试前		After test测试后		Mass loss 质量损失 (%)	Voltage after test/ Voltage pre- test 试验后电压/试验 前电压 (%)	Status 结论
	Mass 质量 (g)	Voltage 电压 (V)	Mass 质量 (g)	Voltage 电压 (V)			
C1	44.19	4.16	44.19	4.16	0.000	100.00	PASS/合格
C2	44.01	4.16	44.01	4.16	0.000	100.00	PASS/合格
C3	44.44	4.16	44.44	4.16	0.000	100.00	PASS/合格
C4	44.23	4.16	44.23	4.15	0.000	99.76	PASS/合格
C5	44.04	4.16	44.04	4.16	0.000	100.00	PASS/合格
C6	44.43	4.16	44.43	4.16	0.000	100.00	PASS/合格
C7	44.21	4.16	44.21	4.16	0.000	100.00	PASS/合格
C8	44.35	4.16	44.35	4.15	0.000	99.76	PASS/合格
C9	44.35	4.16	44.35	4.16	0.000	100.00	PASS/合格
C10	44.30	4.16	44.30	4.16	0.000	100.00	PASS/合格

#: No leakage, No venting, No disassembly No rupture and no fire

#: 无漏液、无排气、无分解、无破裂以及无着火现象

Test T.5: External short circuit 外短路测试

Test procedure 测试程序:

The cell or battery to be tested shall be temperature stabilized so that its external case temperature reaches $(55\pm 2)^{\circ}\text{C}$ and then the cell or battery shall be subjected to a short circuit condition with a total external resistance of less than 0.1 ohm at $(55\pm 2)^{\circ}\text{C}$. This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to $(55\pm 2)^{\circ}\text{C}$.

试验电芯和电池在 $(55\pm 2)^{\circ}\text{C}$ 的环境温度下, 经受外电阻小于0.1欧姆的短路试验, 短路时间持续到电池壳温度恢复到 $(55\pm 2)^{\circ}\text{C}$ 后继续至少1小时。

Requirement 要求:

Cells and batteries meet this requirement if their external temperature does not exceed 170°C and there is no disassembly, no rupture and no fire during the test and within six hours after the test.

电芯或电池应满足以下要求: 在试验过程中以及试验后6个小时内不起火、不解体、无破裂、表面温度不超过 170°C

Data 数据如下表:

No.编号	Peak temperature($^{\circ}\text{C}$) 表面最高温度($^{\circ}\text{C}$)	Status 结论
C1	82.2	PASS/合格
C2	80.4	PASS/合格
C3	83.9	PASS/合格
C4	83.0	PASS/合格
C5	83.7	PASS/合格
C6	83.2	PASS/合格
C7	79.0	PASS/合格
C8	80.9	PASS/合格
C9	77.2	PASS/合格
C10	82.0	PASS/合格

Test T.6: Impact (applicable to cylindrical cells not less than 18.0mm in diameter) / Crush (applicable to prismatic, pouch, coin/button cells and cylindrical cells less than 18.0mm in diameter)

重物冲击(适用于直径不小于18.0mm的圆柱形电池)/挤压(适用于棱形、袋状、硬币/纽扣电芯和直径小于18.0mm的圆柱形电芯)

Test procedure 测试程序– Impact重物冲击: The sample cell or component cell is to be placed on a flat smooth surface. A (15.8 ± 0.1)mm diameter, at least 6cm 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 ± 0.1)kg mass is to be dropped from a height of (61 ± 2.5)cm at the intersection of the bar and sample in a controlled manner using a near frictionless, vertical sliding track or channel with minimal drag on the falling mass. The vertical track or channel used to guide the falling mass shall be oriented 90 degrees from the horizontal supporting surface.

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 ± 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.

将试验电池或元件电池放在平坦光滑平面上,将一根直径为(15.8 ± 0.1)mm的长度取6cm或比电池更长的尺寸中的最长那个的不锈钢棒横放在样品中心,将一质量为(9.1 ± 0.1)kg 的重锤从(61 ± 2.5)cm 的高度跌落到钢棒与试验样品交叉点上。重锤跌落由一个滑摩擦的、对重锤阻力最小的垂直轨道或管道加以控制用以引导落锤沿水平支撑表面呈90度落下。

待试电池纵轴与平面平行,与横放在试样中心的直径(15.8±0.1)mm弯曲表面的纵轴垂直。每个样品只经受一次撞击。

Test Procedure测试程序 – Crush挤压: 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±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 6 h. The test shall be conducted using test cells of component cells that have not previously been subjected to other tests.

将电芯或电芯组件放在两个平面之间进行挤压。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(13± 0.78)kN;
- (b) 电芯的电压下降至少100mV; 或
- (c) 电芯变形达原始厚度的50%或以上。

棱柱形或袋状电芯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,圆柱形电芯应从与纵轴垂直的方向施压。

每块电芯或组成电芯只进行一次挤压测试,试验样品应持续观察6h。本试验应用从未进行过其它试验的电芯或电芯组件。

Requirement 要求:

Cells and component cells meet this requirement if their external temperature does not exceed 170°C and there is no disassembly and no fire during the test and within six hours after this test.

电芯与电芯组件应满足以下要求: 试验过程中及试验结束后6个小时之内不起火、不解体、表面温度不超过170°C。

Data 数据如下表:

No.编号	Peak temperature(°C) 表面最高温度(°C)	Status 结论
C31	115.8	PASS/合格
C32	65.8	PASS/合格
C33	116.2	PASS/合格
C34	115.7	PASS/合格
C35	85.4	PASS/合格

Test T.7: Forced discharge (for cell)强制放电

Test procedure测试程序

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).

20±5℃的环境温度下, 将电池连接在12V 的直流电源上进行强制放电, 此直流电源提供给每个电芯初始电流为制造厂指定的最大放电电流。

对于指定的放电电流则需要和测试电芯串联一个匹配的电阻器, 每一个电芯的强制放电时间等于额容量除以初始的测试电流。

Requirement要求

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

可充电电池应满足以下要求: 试验样品在试验中和试验后7天内不解体、不起火。

Data 数据如下表:

No.编号	Status 结论
C11	PASS/合格
C12	PASS/合格
C13	PASS/合格
C14	PASS/合格
C15	PASS/合格
C16	PASS/合格
C17	PASS/合格
C18	PASS/合格
C19	PASS/合格
C20	PASS/合格
C21	PASS/合格
C22	PASS/合格
C23	PASS/合格
C24	PASS/合格
C25	PASS/合格
C26	PASS/合格
C27	PASS/合格
C28	PASS/合格
C29	PASS/合格
C30	PASS/合格

***** End of Report*****