



中国认可  
国际互认  
检测  
TESTING  
CNAS L4065



Report No.:  
报告编号: NBHT20160520U01

# 检 验 报 告

## TEST REPORT

NAME OF SAMPLE: Li-ion Battery

产品名称: 锂离子电池

CLIENT: Ningbo Huitong New Energy Technology Co., Ltd

委托单位: 宁波慧通新能源科技有限公司

CLASSIFICATION OF TEST: Commission test

检验类别: 委托检测

广州邦来检测技术有限公司

Guangzhou MCM Certification and Testing Co., Ltd



| General information<br>基本资料     |                                                                                                                                                            |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name of samples<br>样品名称         | Li-ion Battery<br>锂离子电池                                                                                                                                    |
| Type/ Model<br>型号规格             | WT14500 3,7V 750mAh 2,77Wh                                                                                                                                 |
| Trade mark<br>商标                | —                                                                                                                                                          |
| Commission by<br>委托单位           | Ningbo Huitong New Energy Technology Co., Ltd<br>宁波慧通新能源科技有限公司                                                                                             |
| Commissioner address<br>委托单位地址  | Room 1303, Block B, Building Liyuanshangdu, No39, Lane158, South Section,<br>Huan Cheng West Road, Ningbo, China<br>浙江省宁波市环城西路南段 158 弄 39 号丽园尚都 B 座 1303 室 |
| Manufacturer<br>制造商             | Ningbo Huitong New Energy Technology Co., Ltd<br>宁波慧通新能源科技有限公司                                                                                             |
| Manufacturer address<br>制造商地址   | Room 1303, Block B, Building Liyuanshangdu, No39, Lane158, South Section,<br>Huan Cheng West Road, Ningbo, China<br>浙江省宁波市环城西路南段 158 弄 39 号丽园尚都 B 座 1303 室 |
| Factory<br>生产厂                  | Ningbo Huitong New Energy Technology Co., Ltd<br>宁波慧通新能源科技有限公司                                                                                             |
| Factory address<br>生产厂地址        | Room 1303, Block B, Building Liyuanshangdu, No39, Lane158, South Section,<br>Huan Cheng West Road, Ningbo, China<br>浙江省宁波市环城西路南段 158 弄 39 号丽园尚都 B 座 1303 室 |
| Appearance:<br>样品外观颜色           | Blue<br>蓝色                                                                                                                                                 |
| Sample status<br>样品状态           | Good<br>完好                                                                                                                                                 |
| Package of goods<br>样品外包装       | —                                                                                                                                                          |
| Quantity of sample<br>样品数量      | 43pcs                                                                                                                                                      |
| Sample identification<br>样品标识序号 | c1#~c43#                                                                                                                                                   |
| Reference standard<br>参考标准      | MH/T1052-2013 《Tests for lithium batteries transported by air》<br>MH/T1052-2013 《航空运输锂电池测试规范》                                                              |
| Receiving date<br>接样日期          | 2016.05.20                                                                                                                                                 |
| Completing date<br>完成日期         | 2016.06.02                                                                                                                                                 |

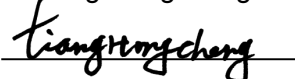
| Test Conclusion<br>测试结论                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                |                                                                                                                                                  |                          |                    |               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------|---------------|
| No.序号                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Name of test<br>测试项目名称         | Testing standard<br>测试标准                                                                                                                         | Test result<br>测试结果      | Conclusion<br>本项结论 | Remarks<br>备注 |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Altitude simulation<br>高度模拟    | UN Manual of Tests and Criteria<br>ST/SG/AC.10/11/Rev.5,<br>amend.2, 38.3.<br>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/<br>Rev. 5, amend. 2 38.3. | See Appendix 1 见<br>附表 1 | Passed<br>合格       | /             |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Thermal test<br>温度试验           |                                                                                                                                                  | See Appendix 2 见<br>附表 2 | Passed<br>合格       | /             |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Vibration<br>振动                |                                                                                                                                                  | See Appendix 3 见<br>附表 3 | Passed<br>合格       | /             |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Shock<br>冲击                    |                                                                                                                                                  | See Appendix 4 见<br>附表 4 | Passed<br>合格       | /             |
| 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | External Short-circuit<br>外部短路 |                                                                                                                                                  | See Appendix 5 见<br>附表 5 | Passed<br>合格       | /             |
| 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Impact<br>撞击                   |                                                                                                                                                  | /                        | /                  | N/A<br>不适用    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Crush<br>挤压                    |                                                                                                                                                  | See Appendix 6 见<br>附表 6 | Passed<br>合格       | /             |
| 7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Overcharge<br>过度充电             |                                                                                                                                                  | See Appendix 7 见<br>附表 7 | Passed<br>合格       | /             |
| 8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Forced discharge<br>强制放电       | See Appendix 8 见<br>附表 8                                                                                                                         | Passed<br>合格             | /                  |               |
| <b>Conclusion/结论:</b><br><br><p>The Li-ion Batteries submitted by Ningbo Huitong New Energy Technology Co., Ltd had passed the test items of UNITED NATIONS "Recommendations on the Transport of Dangerous Goods, Manual of Test and Criteria ST/SG/AC, 10/11/Rev.5 amend.2, 38.3.</p> <p>由宁波慧通新能源科技有限公司送检的锂离子电池符合联合国《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.5 amend. 2, 38.3 的要求。</p> <p style="text-align: center;">Seal/公章: </p> <p style="text-align: right;">Date of issue:/日期: Jun. 06, 2016</p> |                                |                                                                                                                                                  |                          |                    |               |
| <b>WARM PROMPT:</b> This test report can be used worldwide (including apply for the certification for safe transport of Shanghai Research Institute of Chemical Industry).<br><b>温馨提示:</b> 此份报告全球通用 (包含申请上海化工鉴定书)。                                                                                                                                                                                                                                                                                                                                                                           |                                |                                                                                                                                                  |                          |                    |               |

Approver: Liang Hongcheng

Checker: Fu Ziwen

Tester: Huang Yining

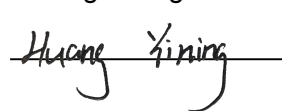
批准:



审核:

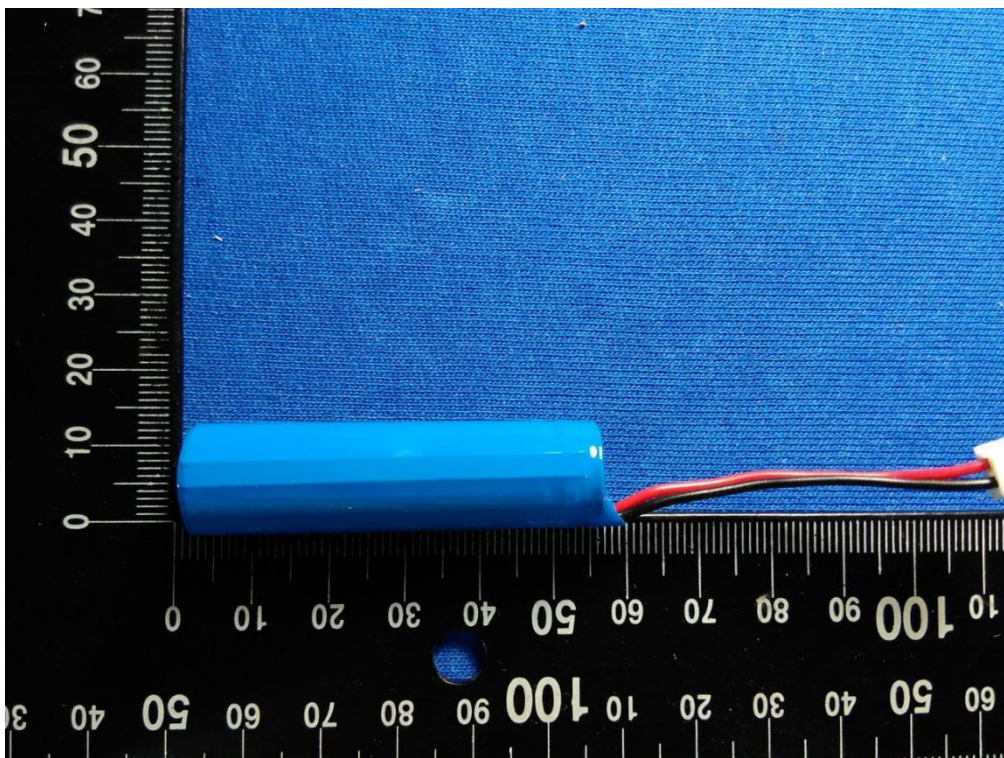
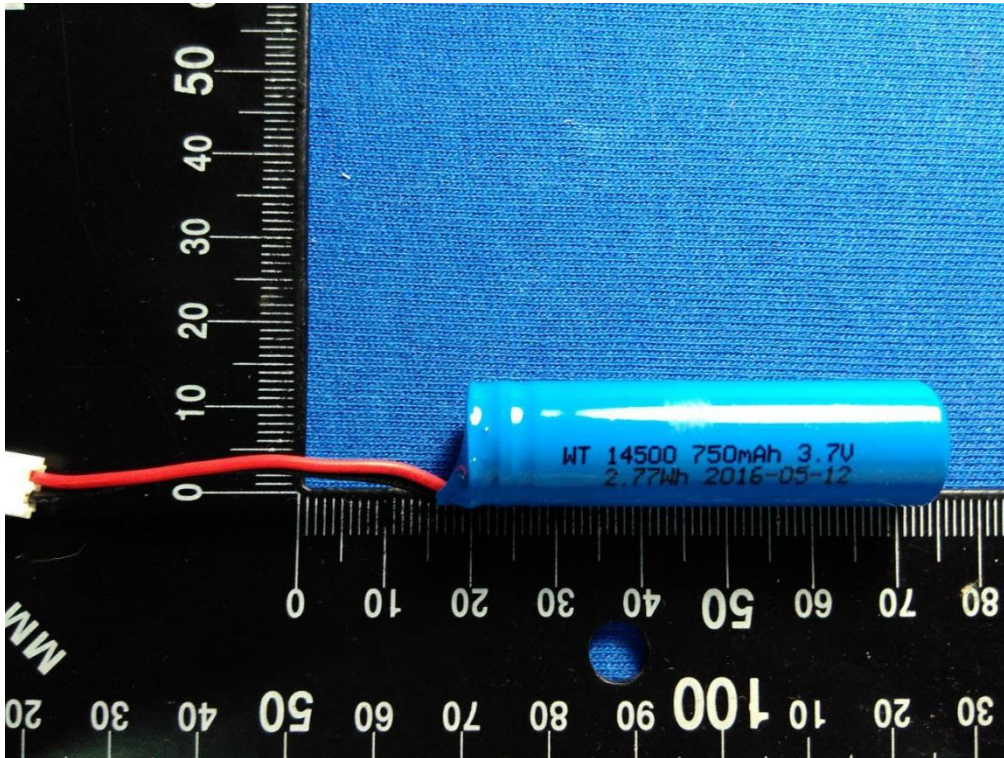


测试:



Photos of samples and markings  
样品及标识照片

Battery (WT14500 3,7V 750mAh 2,77Wh)



## Appendix 1

附表 1

|                                                                                                                                                                                                  |                                                                                                                                                                                      |                        |                     |                        |                          |                                |                     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------------|------------------------|--------------------------|--------------------------------|---------------------|
| Test Items<br>测试项目                                                                                                                                                                               | Altitude simulation<br>高度模拟                                                                                                                                                          |                        |                     |                        |                          |                                |                     |
| 1,1                                                                                                                                                                                              | Test procedure<br>测试步骤                                                                                                                                                               |                        |                     |                        |                          |                                |                     |
|                                                                                                                                                                                                  | Test cells and batteries shall be stored at a pressure of 11,6kPa or less for at least six hour at ambient temperature (20±5℃).<br>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。 |                        |                     |                        |                          |                                |                     |
| 1,2                                                                                                                                                                                              | Sample status<br>样品状态                                                                                                                                                                |                        |                     |                        |                          |                                |                     |
|                                                                                                                                                                                                  | C1#~C10#, at first cycle in fully charged states;<br>C1#~C10#, 在第一个循环完全充电状态；                                                                                                         |                        |                     |                        |                          |                                |                     |
| 1,3                                                                                                                                                                                              | Result<br>测试结果                                                                                                                                                                       |                        |                     |                        |                          |                                |                     |
| Sample No.<br>样品编号                                                                                                                                                                               | Before 测试前                                                                                                                                                                           |                        | After 测试后           |                        | Mass loss<br>质量损失<br>(%) | Residual<br>OCV<br>剩余电压<br>(%) | Test result<br>测试结果 |
|                                                                                                                                                                                                  | Mass<br>样品质量<br>(g)                                                                                                                                                                  | Voltage<br>开路电压<br>(V) | Mass<br>样品质量<br>(g) | Voltage<br>开路电压<br>(V) |                          |                                |                     |
| C1#                                                                                                                                                                                              | 20,808                                                                                                                                                                               | 4,17                   | 20,808              | 4,17                   | 0,000                    | 100,00                         | O                   |
| C2#                                                                                                                                                                                              | 20,802                                                                                                                                                                               | 4,18                   | 20,802              | 4,18                   | 0,000                    | 100,00                         | O                   |
| C3#                                                                                                                                                                                              | 20,946                                                                                                                                                                               | 4,18                   | 20,946              | 4,18                   | 0,000                    | 100,00                         | O                   |
| C4#                                                                                                                                                                                              | 20,997                                                                                                                                                                               | 4,17                   | 20,997              | 4,17                   | 0,000                    | 100,00                         | O                   |
| C5#                                                                                                                                                                                              | 21,033                                                                                                                                                                               | 4,17                   | 21,033              | 4,17                   | 0,000                    | 100,00                         | O                   |
| C6#                                                                                                                                                                                              | 20,858                                                                                                                                                                               | 4,17                   | 20,858              | 4,17                   | 0,000                    | 100,00                         | O                   |
| C7#                                                                                                                                                                                              | 20,940                                                                                                                                                                               | 4,17                   | 20,939              | 4,17                   | 0,005                    | 100,00                         | O                   |
| C8#                                                                                                                                                                                              | 21,037                                                                                                                                                                               | 4,18                   | 21,037              | 4,18                   | 0,000                    | 100,00                         | O                   |
| C9#                                                                                                                                                                                              | 21,031                                                                                                                                                                               | 4,17                   | 21,030              | 4,17                   | 0,005                    | 100,00                         | O                   |
| C10#                                                                                                                                                                                             | 21,054                                                                                                                                                                               | 4,17                   | 21,055              | 4,17                   | 0,000                    | 100,00                         | O                   |
| Note: L-Leakage, V-Venting, D -Disassembly, R -Rupture, F-Fire, O-No leakage, no venting, no disassembly, no rupture, no fire.<br>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。 |                                                                                                                                                                                      |                        |                     |                        |                          |                                |                     |

## Appendix 2

## 附表 2

|                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                        |                     |                        |                          |                                |                     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------------|------------------------|--------------------------|--------------------------------|---------------------|
| Test Items<br>测试项目                                                                                                                                                                               | Thermal test<br>温度试验                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                        |                     |                        |                          |                                |                     |
| 1,1                                                                                                                                                                                              | Test procedure<br>测试步骤                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                        |                     |                        |                          |                                |                     |
|                                                                                                                                                                                                  | Test cells and batteries are to be stored for at least six hours at a test temperature equal to 72±2℃, followed by storage for at least six hours at a test temperature equal to -40±2℃, 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℃).<br>将电芯和电池在温度为 72±2℃的条件下贮存不少于 6 个小时，然后，在温度-40±2℃条件下贮存不少于 6 个小时，两个温度间的间隔最长为 30min, 重复操作上述步骤直到 10 次，然后，将其在环境温度为 20±5℃的条件下放置 24 个小时。 |                        |                     |                        |                          |                                |                     |
| 1,2                                                                                                                                                                                              | Sample status<br>样品状态                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                        |                     |                        |                          |                                |                     |
|                                                                                                                                                                                                  | C1#~C10#, at first cycle in fully charged states;<br>C1#~C10#, 在第一个循环完全充电状态；                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                        |                     |                        |                          |                                |                     |
| 1,3                                                                                                                                                                                              | Result<br>测试结果                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                        |                     |                        |                          |                                |                     |
| Sample No.<br>样品编号                                                                                                                                                                               | Before 测试前                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                        | After 测试后           |                        | Mass loss<br>质量损失<br>(%) | Residual<br>OCV<br>剩余电压<br>(%) | Test result<br>测试结果 |
|                                                                                                                                                                                                  | Mass<br>样品质量<br>(g)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Voltage<br>开路电压<br>(V) | Mass<br>样品质量<br>(g) | Voltage<br>开路电压<br>(V) |                          |                                |                     |
| C1#                                                                                                                                                                                              | 20,808                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4,17                   | 20,810              | 4,12                   | 0,000                    | 98,80                          | O                   |
| C2#                                                                                                                                                                                              | 20,802                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4,18                   | 20,801              | 4,13                   | 0,005                    | 98,80                          | O                   |
| C3#                                                                                                                                                                                              | 20,946                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4,18                   | 20,946              | 4,12                   | 0,000                    | 98,56                          | O                   |
| C4#                                                                                                                                                                                              | 20,997                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4,17                   | 20,996              | 4,12                   | 0,005                    | 98,80                          | O                   |
| C5#                                                                                                                                                                                              | 21,033                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4,17                   | 21,034              | 4,12                   | 0,000                    | 98,80                          | O                   |
| C6#                                                                                                                                                                                              | 20,858                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4,17                   | 20,855              | 4,12                   | 0,014                    | 98,80                          | O                   |
| C7#                                                                                                                                                                                              | 20,939                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4,17                   | 20,934              | 4,12                   | 0,024                    | 98,80                          | O                   |
| C8#                                                                                                                                                                                              | 21,037                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4,18                   | 21,035              | 4,13                   | 0,010                    | 98,80                          | O                   |
| C9#                                                                                                                                                                                              | 21,030                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4,17                   | 21,027              | 4,12                   | 0,014                    | 98,80                          | O                   |
| C10#                                                                                                                                                                                             | 21,055                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4,17                   | 21,053              | 4,12                   | 0,009                    | 98,80                          | O                   |
| Note: L-Leakage, V-Venting, D -Disassembly, R -Rupture, F-Fire, O-No leakage, no venting, no disassembly, no rupture, no fire.<br>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。 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                        |                     |                        |                          |                                |                     |

## Appendix 3

## 附表 3

|                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                        |                     |                        |                          |                                |                     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------------|------------------------|--------------------------|--------------------------------|---------------------|
| Test Items<br>测试项目                                                                                                                                                                               | Vibration<br>振动                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                        |                     |                        |                          |                                |                     |
| 1,1                                                                                                                                                                                              | Test procedure<br>测试步骤                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                        |                     |                        |                          |                                |                     |
|                                                                                                                                                                                                  | 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 wave form with a logarithmic sweep between 7Hz and 200Hz 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 position of the cell.<br>将电芯和电池牢固地安装在振动台的台面上，然后开始振动。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 分钟的对数扫频。每个电芯和电池从三个互相垂直的方向上循环 12 次，3 个小时。 |                        |                     |                        |                          |                                |                     |
| 1,2                                                                                                                                                                                              | Sample status<br>样品状态                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                        |                     |                        |                          |                                |                     |
|                                                                                                                                                                                                  | C1#~C10#, at first cycle in fully charged states;<br>C1#~C10#, 在第一个循环完全充电状态；                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                        |                     |                        |                          |                                |                     |
| 1,3                                                                                                                                                                                              | Result<br>测试结果                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                        |                     |                        |                          |                                |                     |
| Sample No.<br>样品编号                                                                                                                                                                               | Before 测试前                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                        | After 测试后           |                        | Mass loss<br>质量损失<br>(%) | Residual<br>OCV<br>剩余电压<br>(%) | Test result<br>测试结果 |
|                                                                                                                                                                                                  | Mass<br>样品质量<br>(g)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Voltage<br>开路电压<br>(V) | Mass<br>样品质量<br>(g) | Voltage<br>开路电压<br>(V) |                          |                                |                     |
| C1#                                                                                                                                                                                              | 20,810                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 4,12                   | 20,809              | 4,12                   | 0,005                    | 100,00                         | O                   |
| C2#                                                                                                                                                                                              | 20,801                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 4,13                   | 20,801              | 4,13                   | 0,000                    | 100,00                         | O                   |
| C3#                                                                                                                                                                                              | 20,946                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 4,12                   | 20,946              | 4,12                   | 0,000                    | 100,00                         | O                   |
| C4#                                                                                                                                                                                              | 20,996                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 4,12                   | 20,995              | 4,12                   | 0,005                    | 100,00                         | O                   |
| C5#                                                                                                                                                                                              | 21,034                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 4,12                   | 21,033              | 4,11                   | 0,005                    | 99,76                          | O                   |
| C6#                                                                                                                                                                                              | 20,855                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 4,12                   | 20,855              | 4,12                   | 0,000                    | 100,00                         | O                   |
| C7#                                                                                                                                                                                              | 20,934                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 4,12                   | 20,934              | 4,12                   | 0,000                    | 100,00                         | O                   |
| C8#                                                                                                                                                                                              | 21,035                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 4,13                   | 21,035              | 4,12                   | 0,000                    | 99,76                          | O                   |
| C9#                                                                                                                                                                                              | 21,027                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 4,12                   | 21,027              | 4,12                   | 0,000                    | 100,00                         | O                   |
| C10#                                                                                                                                                                                             | 21,053                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 4,12                   | 21,053              | 4,12                   | 0,000                    | 100,00                         | O                   |
| Note: L-Leakage, V-Venting, D -Disassembly, R -Rupture, F-Fire, O-No leakage, no venting, no disassembly, no rupture, no fire.<br>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。 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                        |                     |                        |                          |                                |                     |

## Appendix 4

## 附表 4

[illegible]

## Appendix 5

## 附表 5

| Test Items<br>测试项目                                                                                                                                         | External short circuit<br>外部短路                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                     |              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------|
| 1,1                                                                                                                                                        | <b>Test procedure</b><br>测试步骤                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                     |              |
|                                                                                                                                                            | <p>The cell or battery to be tested shall be temperature stabilized so that its external case temperature reaches <math>55\pm 2^{\circ}\text{C}</math> 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 <math>55\pm 2^{\circ}\text{C}</math>. This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to <math>55\pm 2^{\circ}\text{C}</math>, the cell or battery must be observed for a further six hour for the test to be concluded.</p> <p>保持试验环境温度稳定在 <math>55\pm 2^{\circ}\text{C}</math>，以使电芯或电池样品外表温度达到 <math>55\pm 2^{\circ}\text{C}</math>，然后，在此温度下，将其正负极用小于 0,1 欧姆的线路短接，待电芯或电池的外表温度恢复到 <math>55\pm 2^{\circ}\text{C}</math> 之后再持续 1 小时以上，对电芯或电池必须进一步观察 6 个小时才能下结论。</p> |                     |              |
| 1,2                                                                                                                                                        | <b>Sample status</b><br>样品状态                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                     |              |
|                                                                                                                                                            | C1#~C10#, at first cycle in fully charged states;<br>C1#~C10#, 在第一个循环完全充电状态;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                     |              |
| 1,3                                                                                                                                                        | <b>Result</b><br>测试结果                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                     |              |
| Sample No.<br>样品编号                                                                                                                                         | Max. External Temperature<br>样品表面最高温度<br>( $^{\circ}\text{C}$ )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Test result<br>测试结果 | Remark<br>备注 |
| C1#                                                                                                                                                        | 56,2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | O                   | /            |
| C2#                                                                                                                                                        | 56,7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | O                   | /            |
| C3#                                                                                                                                                        | 55,3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | O                   | /            |
| C4#                                                                                                                                                        | 55,9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | O                   | /            |
| C5#                                                                                                                                                        | 56,3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | O                   | /            |
| C6#                                                                                                                                                        | 55,7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | O                   | /            |
| C7#                                                                                                                                                        | 55,2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | O                   | /            |
| C8#                                                                                                                                                        | 56,0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | O                   | /            |
| C9#                                                                                                                                                        | 55,4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | O                   | /            |
| C10#                                                                                                                                                       | 55,3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | O                   | /            |
| Note: <b>D</b> -Disassembly, <b>R</b> -Rupture, <b>F</b> -Fire, <b>O</b> - no disassembly, no rupture, no fire.<br>注: D- 解体; R- 破裂; F - 起火; O-无解体、无破裂、无起火。 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                     |              |

## Appendix 6

## 附表 6

|                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                     |              |
|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------|
| Test Items<br>测试项目                                                                        | Crush<br>挤压                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                     |              |
| 1,1                                                                                       | <b>Test procedure</b><br>测试步骤                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                     |              |
|                                                                                           | <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 1,5cm/s at the first point of contact. The crushing is to be continued until the first of the three options below is reached.</p> <p>(a) The applied force reaches 13kN±0,78kN;<br/>           (b) The voltage of the cell drops by at least 100 mV; or<br/>           (c) The cell is deformed by 50% or more of its original thickness.</p> <p>Once the maximum pressure has been obtained, the voltage drops by 100mV or more, or the cell is deformed by at least 50% of its original thickness, the pressure shall be released.</p> <p>电池芯或组成电池芯在两个平面间挤压。挤压在第一个接触点以约 1, 5cm/s 的速度慢慢进行，直到下面三个选项之一达到为止：</p> <p>(a) 作用力达到 13kN±0, 78kN;<br/>           (b) 电池芯电压降至少达到 100mV;<br/>           (c) 电池厚度和最初比较变形至少 50%。</p> <p>一旦达到最大压力，电压降超过 100 mV 或者电池芯变形超过 50%，压力应该解除。</p> |                     |              |
| 1,2                                                                                       | <b>Sample status</b><br>样品状态                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                     |              |
|                                                                                           | C11#~C15#, at first cycle at 50% of the design rated capacity;<br>C11#~C15#, 在第一个循环 50%的额定容量；                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                     |              |
| 1,3                                                                                       | <b>Result</b><br>测试结果                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                     |              |
| Sample No.<br>样品编号                                                                        | Max. External Temperature<br>样品表面最高温度<br>(°C)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Test result<br>测试结果 | Remark<br>备注 |
| C11#                                                                                      | 26,3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | O                   | /            |
| C12#                                                                                      | 22,5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | O                   | /            |
| C13#                                                                                      | 23,1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | O                   | /            |
| C14#                                                                                      | 22,7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | O                   | /            |
| C15#                                                                                      | 23,4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | O                   | /            |
| Note: D -Disassembly, F-Fire, O- no disassembly, no fire.<br>注: D- 解体; F - 起火; O-无解体、无起火。 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                     |              |

## Appendix 7

### 附表 7

|                                                                                           |                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                         |              |
|-------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| Test Items<br>测试项目                                                                        | Overcharge<br>过度充电                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                         |              |
| 1,1                                                                                       | Test procedure<br>测试步骤                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                         |              |
|                                                                                           | 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 or 22V<br>如果厂家推荐的充电电压不超过 18V，本测试的最小充电电压应该是两倍的厂家推荐的最大充电电压或者是 22V | The manufacturer's recommended maximum charge voltage is 4,25V. The manufacturer's recommended maximum continuous charge current is 375mA.The voltage of the test is 8,50V. And the Current is 750mA.<br>厂家推荐最大充电电压为 4, 25V，厂家推荐最大充电电流为 375mA. 测试的电压为 8, 50V，电流为 750mA。 |              |
|                                                                                           | When the manufacturer's recommended charge voltage is more than 18V, the minimum voltage of the test shall be 1,2 times maximum charge voltage<br>如果厂家推荐的充电电压超过 18V，本测试的最小充电电压应该为 1, 2 倍的厂家推荐的最大充电电压                                        | /                                                                                                                                                                                                                                                                       |              |
| 1,2                                                                                       | Sample status<br>样品状态                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                         |              |
|                                                                                           | C16#~C19#, at first cycle in fully charged states;<br>C16#~C19#, 在第一个循环完全充电状态;                                                                                                                                                              |                                                                                                                                                                                                                                                                         |              |
|                                                                                           | C20#~C23#, after 50 cycles ending in fully charged states;<br>C20#~C23#, 在第五十个循环完全充电状态;                                                                                                                                                     |                                                                                                                                                                                                                                                                         |              |
| 1,3                                                                                       | Result<br>测试结果                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                         |              |
| Sample No.<br>样品编号                                                                        | Voltage Before test (V)<br>测试前开路电压 (V)                                                                                                                                                                                                      | Test result<br>测试结果                                                                                                                                                                                                                                                     | Remark<br>备注 |
| C16#                                                                                      | 4,17                                                                                                                                                                                                                                        | O                                                                                                                                                                                                                                                                       | /            |
| C17#                                                                                      | 4,18                                                                                                                                                                                                                                        | O                                                                                                                                                                                                                                                                       | /            |
| C18#                                                                                      | 4,18                                                                                                                                                                                                                                        | O                                                                                                                                                                                                                                                                       | /            |
| C19#                                                                                      | 4,17                                                                                                                                                                                                                                        | O                                                                                                                                                                                                                                                                       | /            |
| C20#                                                                                      | 4,17                                                                                                                                                                                                                                        | O                                                                                                                                                                                                                                                                       | /            |
| C21#                                                                                      | 4,18                                                                                                                                                                                                                                        | O                                                                                                                                                                                                                                                                       | /            |
| C22#                                                                                      | 4,18                                                                                                                                                                                                                                        | O                                                                                                                                                                                                                                                                       | /            |
| C23#                                                                                      | 4,18                                                                                                                                                                                                                                        | O                                                                                                                                                                                                                                                                       | /            |
| Note: D -Disassembly, F-Fire, O- no disassembly, no fire.<br>注: D- 解体; F - 起火; O-无解体、无起火。 |                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                         |              |

## Appendix 8

## 附表 8

|                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                     |                    |                                       |                     |
|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|---------------------------------------|---------------------|
| Test Items<br>测试项目                                                                        | Forced discharge<br>强制放电                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                     |                    |                                       |                     |
| 1,1                                                                                       | <b>Test procedure</b><br>测试步骤                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                     |                    |                                       |                     |
|                                                                                           | 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).<br>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。 |                     |                    |                                       |                     |
| 1,2                                                                                       | <b>Sample status</b><br>样品状态                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                     |                    |                                       |                     |
|                                                                                           | C24#~C33#, at first cycle in fully discharged states;<br>C24#~C33#, 在第一个循环完全放电状态;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                     |                    |                                       |                     |
|                                                                                           | C34#~C43#, after 50 cycles ending in fully discharged states;<br>C34#~C43#, 在第五十个循环完全放电状态;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                     |                    |                                       |                     |
| 1,3                                                                                       | <b>Result</b><br>测试结果                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                     |                    |                                       |                     |
| Sample No.<br>样品编号                                                                        | Voltage Before test<br>测试前开路电压<br>(V)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Test result<br>测试结果 | Sample No.<br>样品编号 | Voltage Before test<br>测试前开路电压<br>(V) | Test result<br>测试结果 |
| C24#                                                                                      | 3,292                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | O                   | C34#               | 3,290                                 | O                   |
| C25#                                                                                      | 3,302                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | O                   | C35#               | 3,301                                 | O                   |
| C26#                                                                                      | 3,307                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | O                   | C36#               | 3,307                                 | O                   |
| C27#                                                                                      | 3,296                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | O                   | C37#               | 3,305                                 | O                   |
| C28#                                                                                      | 3,298                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | O                   | C38#               | 3,298                                 | O                   |
| C29#                                                                                      | 3,305                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | O                   | C39#               | 3,296                                 | O                   |
| C30#                                                                                      | 3,301                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | O                   | C40#               | 3,297                                 | O                   |
| C31#                                                                                      | 3,302                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | O                   | C41#               | 3,305                                 | O                   |
| C32#                                                                                      | 3,304                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | O                   | C42#               | 3,317                                 | O                   |
| C33#                                                                                      | 3,311                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | O                   | C43#               | 3,304                                 | O                   |
| Note: D -Disassembly, F-Fire, O- no disassembly, no fire.<br>注: D- 解体; F - 起火; O-无解体、无起火。 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                     |                    |                                       |                     |

## 注 意 事 项

### Important

1. 本报告无检验单位检验专用章、骑缝章无效。

The test report is invalid without the special seal for testing and Paging seal of Guangzhou MCM Certification and Testing Co., Ltd.

2. 未经本试验室书面同意，不得部分地复制本报告。

Nobody is allowed to photocopy or partly photocopy this test report without written permission of Guangzhou MCM Certification and Testing Co., Ltd.

3. 本报告无批准人、审核人及检测人签名无效。

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

4. 本报告涂改无效。

The test report is invalid if altered.

5. 对检验报告若有异议，应于收到报告之日起十五天内向检验单位提出。

Objections to the test report must be submitted to Guangzhou MCM Certification and Testing Co., Ltd. Within 15 days.

6. 本报告中以逗号代替小数点。

Throughout this report a comma is used as the decimal separator.

7. 本报告仅对来样负责。

The test report is valid for the tested samples only.

**检测单位：**广州邦禾检测技术有限公司

Laboratory: Guangzhou MCM Certification and Testing Co., Ltd

**地 址：**中国 广州市番禺区市广路钟三路段 13 号之一

Address: 1 F No.13, Zhong San Section, ShiGuang Road, Panyu District, Guangzhou City, Guangdong Province, China.

**电 话：**0086-20-34777662

0086-20-34777663

**传 真：**0086-20-34777665-609

**Email:** [mark.miao@mcmtek.com](mailto:mark.miao@mcmtek.com)

**Web:** [Http://www.mcmtek.com](http://www.mcmtek.com)