



**MD600178**  
**M51 Battery MSDS and UN38.3 Report**

REVISION HISTORY

| Rev | Description     | Originator | Date       |
|-----|-----------------|------------|------------|
| A   | Initial release | Rey Liu    | 11/28/2024 |
|     |                 |            |            |
|     |                 |            |            |

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# 1. Material Safety Datasheet



Report No./报告编号:  
P23112321501

## Material Safety Data Sheet 材料安全数据表

Name of Goods: Rechargeable Li-ion Polymer Battery

物品名称: 可充电锂离子聚合物电池

Model and Spec.:

M51, 3.85V 4500mAh 17.33Wh

型号规格:

Applicant: JIADE ENERGY TECHNOLOGY (ZHUHAI) CO LTD

委托单位: 珠海市嘉德电能科技有限公司

Effective date:

2024-01-01

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2023-11-27

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**Shenzhen NTEK New Energy Technology Co., Ltd.**

**深圳市北测新能源技术有限公司**

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**1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION**  
**化学品及企业标识**

|                                   |  |
|-----------------------------------|--|
| Name of Products<br>产品名称          | Rechargeable Li-ion Polymer Battery<br>可充电锂离子聚合物电池   |
| Model/Type<br>型号                  | M51  |
| Ratings<br>额定参数                   | 3.85V 4500mAh 17.33Wh, Mass 质量: 92.2g  |
| Applicant<br>委托单位                 | JIADE ENERGY TECHNOLOGY (ZHUHAI) CO LTD<br>珠海市嘉德电能科技有限公司   |
| Address of Applicant<br>委托单位地址    | #1 Building No.9 The 7th Dingwan Road Sanzao Town Jinwan District<br>Zhuhai, Guangdong 519040 CHINA<br>珠海市金湾区三灶镇定湾七路9号1#厂房 |
| Manufacturer<br>生产厂商              | JIADE ENERGY TECHNOLOGY (ZHUHAI) CO LTD<br>珠海市嘉德电能科技有限公司   |
| Address of manufacturer<br>生产厂商地址 | #1 Building No.9 The 7th Dingwan Road Sanzao Town Jinwan District<br>Zhuhai, Guangdong 519040 CHINA<br>珠海市金湾区三灶镇定湾七路9号1#厂房 |
| Emergency telephone call<br>应急电话  | +86-756-8287188-8842   |
| Prepared by<br>编制人                | Jake Chen<br>陈嘉南   |
| Reviewed by<br>审核人                | Bill Ye<br>叶志标   |
| Approved by<br>批准人                | Jesse Zhang<br>张士杰   |





## 2. Hazards Identification 危险性概述

|                                    |   |
|------------------------------------|---|
| Dangerous classification<br>物品危险分类 |                |
| Explosive risk<br>爆炸危险性            | This article does not belong to the explosion dangerous goods<br>该物品不属于爆炸危险品                    |
| Flammable risk<br>易燃危险性            | This article does not belong to the flammable material<br>该物品不属于易燃危险品                           |
| 氧化危险性<br>Oxidation risk            | This article does not belong to the oxidation of dangerous goods<br>该物品不属于氧化危险品                 |
| Toxic risk<br>毒害危险性                | This article does not belong to the toxic dangerous goods<br>该物品不属于毒害危险品                        |
| Radioactive risk<br>放射危险性          | This article does not belong to the radiation of dangerous goods<br>该物品不属于放射危险品                 |
| Mordant risk<br>腐蚀危险性              | This article does not belong to the corrosion of dangerous goods<br>该物品不属于腐蚀危险品                 |
| Other risk<br>其他危险性                | Lithium-ion batteries, The Watt-hour rating of the battery is 17.33Wh<br>锂离子电池, 该电池额定瓦时为17.33Wh |

## 3. COMPOSITION INFORMATION 成分/组成信息

| Chemical Composition<br>化学成分               | CAS No.<br>CAS号 | Weight (%)<br>重量百分比 |
|--|-----------------|---------------------|
| Aluminum foil                              | 7429-90-5       | 9.42                |
| Copper                                     | 7440-50-8       | 11.77               |
| Styrene-Butadiene rubber 1500              | 9003-55-8       | 1.5                 |
| Polyvinylidene fluoride (PVDF)             | 24937-79-9      | 1.64                |
| Lithium Cobalt Oxide (LiCoO <sub>2</sub> ) | 12190-79-3      | 38.02               |
| Graphite                                   | 7782-42-5       | 22.01               |
| Lithium hexafluorophosphate                | 21324-40-3      | 2.02                |
| Nickel                                     | 7440-02-0       | 1                   |
| Ethylene carbonate (EC)                    | 96-49-1         | 4.27                |
| Dimethyl carbonate                         | 616-38-6        | 5.35                |
| Ethyl methyl carbonate (EMC)               | 623-53-0        | 3                   |

**4. First aid measures**  
**急救措施**

Once battery shell rupture, content contact with the human body will produce harm, once contact, should take the following emergency measures:

电池外壳破裂，内容物接触人体产生危害，一旦发生接触，应采取以下应急措施：

**Eye:**

Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

**眼睛:**

万一接触，立即用大量的清水冲洗至少15分钟，翻起上下眼睑，直到化学的残留物消失为止，迅速就医。

**Skin:**

Remove contaminated clothes and rinse skin with plenty of water or shower for 15 minutes. Get medical aid.

**皮肤:**

万一接触，用大量水冲洗至少15分钟，同时除去污染的衣物和鞋子，迅速就医。

Inhalation: Remove from exposure and move to fresh air immediately. Use oxygen if available.

**吸入:**

立即从暴露处移至空气清新处，如果呼吸困难给予输氧，立即就医。

Ingestion: Give at least 2 glasses of milk or water. Induce vomiting unless patient is unconscious. Call a physician

**食入:**

饮用两杯牛奶或水。如果当事人仍然清醒可以采取催吐的方法，并且立即就医。

**5. Fire-fighting measures**  
**消防措施**

Flash Point: N/A.

燃点: 不适用

Auto-ignition Temperature: N/A.

自燃温度: 不适用

Extinguishing Media: Water, CO<sub>2</sub>.

灭火介质: 大量水(降温), 二氧化碳

Special Fire-Fighting Procedures: Self-contained breathing apparatus.

特殊灭火程序: 自给式呼吸器

Unusual Fire and Explosion Hazards: Cell may vent when subjected to excessive heat-exposing battery contents.

异常火灾或爆炸: 当电芯暴露于过热的环境中时，安全阀可能会打开。

Hazardous Combustion Products: Carbon monoxide, carbon dioxide, lithium oxide fumes.

燃烧产生的危险物品: 一氧化碳, 二氧化碳, 锂氧化物烟气。





## 6. Accidental release measures 泄露应急处理

### Steps to be Taken in case Material is Released or Spilled

If the battery material is released, remove personnel from area until fumes dissipate. Provide maximum ventilation to clear out hazardous gases. Wipe it up with a cloth, and dispose of it in a plastic bag and put into a steel can. The preferred response is to leave the area and allow the battery to cool and vapors to dissipate. Provide maximum ventilation. Avoid skin and eye contact or inhalation of vapors. Remove spilled liquid with absorbent and incinerate.

### 为防止电池材料泄露或释放采取的措施

如果电池内部材料泄露，试验人员应立即撤离试验区直到烟气消散，将通风设备打开吹散危险性气体，用抹布擦净试验区，清除溢出的液体，将泄露电池放进塑料袋中，然后放进钢制容器。避免皮肤和眼睛接触或吸入有害气体。

### Waste Disposal Method

It is recommended to discharge the battery to the end, to use up the metal lithium inside the battery, and to bury the discharged battery in soil.

### 废弃物处置方法

建议将电池完全放电，消耗电池内部的锂金属，并且深埋于土壤中。

## 7. Handling and storage 操作处置和储存

The battery should not be opened, destroyed or incinerate, since they may leak or rupture and release to the environment the ingredients that they contain in the hermetically sealed container. Do not short circuit terminals, or over charge the battery, forced over-discharge, throw to fire. Do not crush or puncture the battery, or immerse in liquids.

禁止打开、毁坏或焚烧电池，因为电池有可能在这些处理过程中发生爆炸、破裂或泄露等事故，禁止将电池短路、过充、强制放电或扔入火中，禁止挤压刺穿电池或将电池浸入液体中。

### Precautions to be taken in handling and storing

Avoid mechanical or electrical abuse. Storage preferably in cool, dry and ventilated area, which is subject to little temperature change. Storage at high temperatures should be avoided. Do not place the battery near heating equipment, nor expose to direct sunlight for long periods.

### 操作处置和储存中的防范措施

禁止物理或电滥用，禁止高温储存，最好将电池储存在阴凉、干燥、通风等温度变化较小的环境中，禁止将电池接触加热设备或将电池直接暴露与阳光中。

### Other Precautions

The battery may explode or cause burns, if disassembled, crushed or exposed to fire or high temperatures. Do not short or install with incorrect polarity.

### 其他要注意的防范措施

拆解、挤压、直接放入火中或高温条件下，电池可能发生爆炸和燃烧，禁止短接或将电池正负极错误的安装在设备中。



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### 8. Exposure controls/personal protection 接触控制/个人防护

**Respiratory Protection:** In case of battery venting, provide as much ventilation as possible. Avoid confined areas with venting cell cores. Respiratory Protection is not necessary under conditions of normal use.

**呼吸防护:** 当电池排气阀打开时, 应尽量使通风设备开至最大, 避免将打开排气阀的电芯局限在某一狭窄空间内。正常操作条件下, 呼吸保护是不必要的。

**Ventilation:** Not necessary under conditions of normal use.

**通风条件:** 正常使用条件下不需要。

**Protective Gloves:** Not necessary under conditions of normal use.

**防护手套:** 正常使用条件下不需要。

**Other Protective Clothing or Equipment:** Not necessary under conditions of normal use.

**其他防护服装或设备:** 正常使用条件下不需要。

**Personal Protection is recommended for venting battery:** Respiratory Protection, Protective Gloves, Protective Clothing and safety glass with side shields.

**电池开阀试验时应做好个人防护:** 呼吸防护, 防护手套, 防护服装和有护边的安全玻璃罩都是要准备的。

### 9. Physical and chemical properties 物理和化学特性

**Appearance:** Prismatic

**外形:** 棱柱形

**Odors:** If leaking, smells of medical ether.

**气味:** 泄漏时, 有醚的气味。

**PH:** Not applicable as supplied.

**酸碱度:** 不适用

**Flash Point:** Not applicable unless individual components exposed.

**燃点:** 除单个电芯暴露试验外其他不适用。

**Flammability:** Not applicable unless individual components exposed.

**可燃性:** 除单个电芯暴露试验外其他不适用。

**Relative density:** Not applicable unless individual components exposed.

**相对密度:** 除单个电芯暴露试验外其他不适用。

**Solubility (water):** Not applicable unless individual components exposed.

**溶解性 (水溶性):** 除单个电芯暴露试验外其他不适用。

**Solubility (other):** Not applicable unless individual components exposed.

**溶解性 (其他):** 除单个电芯暴露试验外其他不适用。

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### 10. Stability and reactivity 稳定性和反应活性

**Stability:** Product is stable under conditions described in Section 7.

**稳定性:** 产品在第7节所述的条件下稳定。

**Conditions to Avoid:** Heat above 70°C or incinerate. Deform. Mutilate. Crush. Disassemble. Overcharge. Short circuit. Expose over a long period to humid conditions.

**应避免的条件:** 加热 70°C 以上或焚烧, 变形, 毁坏, 粉碎, 拆卸, 过充电, 短路, 长时间暴露在潮湿的条件下。

**Materials to avoid:** Oxidising agents, alkalis, water.

**应避免的材料:** 氧化剂, 碱, 水。

**Hazardous Decomposition Products:** Toxic Fumes, and may form peroxides.

**危险分解物:** 有毒烟雾, 并可能形成过氧化物。

**Hazardous Polymerization:** N/A.

**聚合危害:** 不适用

If leaked, forbidden to contact with strong oxidizers, mineral acids, strong alkalies, halogenated hydrocarbons.

如果发生泄露, 避免与强氧化剂, 无机酸, 强碱, 卤代烃接触。

### 11. Toxicological information 毒理学资料

**Signs & symptoms:** None, unless battery ruptures.

**标志及症状:** 无, 除非电池破裂。

In the event of exposure to internal contents, vapour fumes may be very irritating to the eyes and skin.

内部物质暴露的情况下, 蒸汽烟雾可能对眼睛和皮肤的刺激性。

**Inhalation:** Lung irritant.

**吸入:** 对肺有刺激性。

**Skin contact:** Skin irritant.

**皮肤接触:** 对皮肤刺激性。

**Eye contact:** Eye irritant.

**眼睛接触:** 对眼睛有刺激性。

**Ingestion:** Poisoning if swallowed.

**食入:** 吞下中毒。

**Medical conditions generally aggravated by exposure:** In the event of exposure to internal contents, moderate to severe irritation, burning and dryness of the skin may occur. Target organs nerves, liver and kidneys.

下列情况下健康状况会恶化: 万一发生与电池内部材料接触的事故, 轻微或严重的刺激, 都可能使皮肤出现干燥和灼烧的感觉, 并且损坏靶器官(肝脏, 肾脏)的神经。

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### 12. Ecological information 生态学资料

Mammalian effects: None known at present.  
对哺乳动物的影响: 目前未知。  
Eco-toxicity: None known at present.  
生态毒性: 目前未知。  
Bioaccumulation potential: Slowly Bio-degradable.  
生物体内积累: 慢慢地生物降解。  
Environmental fate: None known environmental hazards at present.  
环境危害: 目前没有已知的环境危害。

### 13. Disposal consideration 废弃处置

Do not incinerate, or subject cells to temperature in excess of 70°C. Such abuse can result in loss of seal leakage, and/or cell explosion. Dispose of in accordance with appropriate local regulations.  
不要焚烧, 或使电池温度超过 70°C。这种滥用可导致泄漏和/或电池爆炸。按照相应的地方性法规处理。

### 14. Transport information 运输信息

UN No. and Shipping name:  
UN 3480 Lithium ion batteries  
UN 3481 Lithium ion batteries packed with equipment  
UN 3481 Lithium ion batteries contained in equipment  
UN编号及运输专有名称:  
UN 3480 Lithium ion batteries  
UN 3481 Lithium ion batteries packed with equipment  
UN 3481 Lithium ion batteries contained in equipment  
Label for conveyance: Lithium Battery Mark, class 9 lithium battery hazard label (Only for UN3480), Cargo Aircraft Only Label (Only for UN3480)  
运输标签: 锂电池标记, 第 9 类锂电池危险品标签 (只适用UN3480), 仅限货机标签 (只适用UN3480)  
Packaging Group/包装等级: N/A/不适用  
EmS No./EmS 编号: F-A, S-I  
Marine pollutants/海洋污染物: No/否

|           |   |   |
|-----------|---|---|
| ICAO/IATA | Shipped by air in accordance with International Civil Aviation Organization (ICAO), TI or International Air Transport Association (IATA), DRG Packing<br>Instructions PI 965 IB, PI 966 II, PI 967 II<br>根据国际民用航空组织(ICAO), TI或者国际航空协会(IATA), DGR包装说明PI 965 IB, PI 966 II, PI 967 II相关规定进行空运 | DGR 65 <sup>th</sup> (2024)<br>ICAO (2023-2024 edition) |
| IMDG CODE | Shipped by sea in accordance with International Maritime Dangerous Code (IMDG CODE) Special Provision 188<br>根据《国际海运危险货物规则》(IMDG CODE)特殊规定188条款相关规定运输   | IMDG CODE (Amdt. 41-22)                                 |



| 15. Regulation information<br>法规信息  |
|---|
| <p>Law information 法律信息<br/>(Dangerous Goods Regulations)<br/>(危险品规则)<br/>(Recommendations on the Transport of Dangerous Goods Model Regulations)<br/>(关于危险货物运输的建议书 规章范本)<br/>(International Maritime Dangerous Goods Code)<br/>(国际海运危险货物规则)<br/>(Technical Instructions for the Safe Transport of Dangerous Goods)<br/>(危险品安全运输技术指令)</p>   |
| 16. Other Information<br>其他信息   |
| <p>This file is only effective to the batteries (M51) provided by commissioner (JIADE ENERGY TECHNOLOGY (ZHUHAI) CO LTD) which manufactured by JIADE ENERGY TECHNOLOGY (ZHUHAI) CO LTD The commissioner provides the composition information of batteries, and promises its integrity and accuracy. Users should read this file carefully, and use the batteries in correct method. Shenzhen NTEK New Energy Technology Co., Ltd. doesn't assume responsibility for any damage or loss because of misuse of batteries.</p> <p>本文件仅对由委托方《珠海市嘉德电能科技有限公司》提供的，并由珠海市嘉德电能科技有限公司生产的电池（M51）有效。该电池的成分信息由委托方提供并承诺其完整性和准确性。用户应仔细阅读此文件，并按照正确的方法使用电池。如因电池使用不当造成的损害或损失，深圳市北测新能源技术有限公司不承担任何责任。</p> |

--End of Material Safety Data Sheet 材料安全数据表结束--

|  |               |                          |  |
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## 2. UN38.3 Test Summary



### UN38.3 试验概要 UN38.3 Test Summary



812300800655451

| 单位信息 Company information           |   |                                |   |
|------------------------------------|---|--------------------------------|---|
| 委托单位<br>Consignor                  | 珠海市嘉德电能科技有限公司 Jiade Energy Technology (Zhuhai) Co., Ltd.<br>珠海市金湾区三灶镇定湾七路9号1#厂房 #1 Building, No.9 The 7th Dingwan Road,<br>Sanzao Town, Jinwan District, Zhuhai, China<br>0756-8287186 zhengju@blbattery.com www.blbattery.com  |                                |   |
| 生产单位<br>Manufacturer               | 珠海市嘉德电能科技有限公司 Jiade Energy Technology (Zhuhai) Co., Ltd.<br>珠海市金湾区三灶镇定湾七路9号1#厂房 #1 Building, No.9 The 7th Dingwan Road,<br>Sanzao Town, Jinwan District, Zhuhai, China<br>0756-8287186 zhengju@blbattery.com www.blbattery.com  |                                |   |
| 测试单位<br>Test lab                   | 苏州 UL 美华认证有限公司广州分公司 UL-CCIC Company Limited Guangzhou<br>Branch<br>广东省广州市黄埔区南云二路8号电子大楼B座101、201、301、401 Rm101, 201, 301,<br>401, Block B, Electronic Building, No. 8 Nanyun Er Road Huangpu District, Guangzhou<br>China<br>020-32131000 Robert.Cen@ul.com China.ul.com |                                |   |
| 电池信息 Battery information           |   |                                |   |
| 名称<br>Name                         | 二次聚合物锂离子电池组   | 品牌<br>Brand                    | /   |
| 型号<br>Type                         | M51   | 原始测试型号<br>Original tested type | /   |
| 标称电压(V)<br>Nominal voltage         | 3.85  | 容量/能量<br>Capacity/energy       | 4500mAh/17.33Wh   |
| 描述<br>Description                  | 可充电锂离子单电芯电池<br>Rechargeable Li-ion single cell<br>battery   | 锂含量(g)<br>Li content           | /   |
| 质量(kg)<br>Mass                     | 0.0919  | 外观<br>Appearance               | 黑色, 银色双色塑胶及金属<br>外壳 Black and silvery<br>plastics cement and metal<br>shell |
| 测试信息 Test information              |   |                                |   |
| 原报告编号<br>Original test report No.  | 4790877212-2  | 测试报告日期<br>Date of test report  | 2023-08-18  |
| 测试标准<br>Test standard              | 联合国《试验和标准手册》第38.3章 UNITED<br>NATIONS Manual of Tests and Criteria 38.3 ST/SG/AC.10/11/Rev.7&Am<br>end.1   |                                |   |
| T.1 高度模拟<br>Altitude simulation    | 合格 Passed   | T.2 温度测试<br>Thermal test       | 合格 Passed   |
| T.3 振动测试<br>Vibration              | 合格 Passed   | T.4 冲击测试<br>Shock              | 合格 Passed   |
| T.5 外部短路<br>External short circuit | 合格 Passed   | T.6 挤压<br>Crush                | 合格 Passed   |
| T.7 过度充电<br>Overcharge             | 合格 Passed   | T.8 强制放电<br>Forced discharge   | 合格 Passed   |
| 38.3.3 (f)                         | /   | 38.3.3 (g)                     | /   |

上海化工检测有限公司

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1/2


 国家质量监督检验检疫总局  
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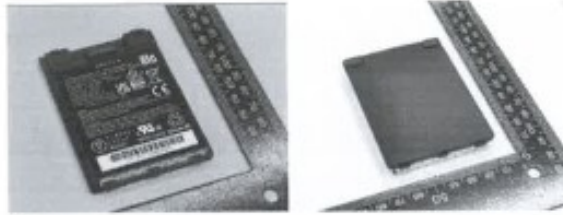


UN38.3 试验概要  
UN38.3 Test Summary



812300800655451

样品图片 Sample Picture



|                                |  |                                       |
|--------------------------------|--|---------------------------------------|
| 结论<br>Conclusion               | 测试样品符合联合国《试验和标准手册》ST/SG/AC.10/11/Rev.7&Amend.1 38.3 标准要求。The tested samples meet the requirements of test items of the UNITED NATIONS Manual of Tests and Criteria ST/SG/AC.10/11/Rev.7&Amend.1 38.3 |                                       |
| 备注<br>Remark                   | /  |                                       |
| 签名<br>Signature<br>职务<br>Title | <br>王寅<br>副总工程师 Vice chief engineer  | 签发日期<br>Issued date<br>2023-09-19<br> |

-验证码:034842-

\*\*\*报告结束\*\*\*



### 3. UN38.3 Test Report

Page 1 of 19 Pages

Report No.: 4790877212-2

Test Report issued under the responsibility of:  
检测报告负责发行机构:



中国认可  
检测  
TESTING  
CNAS L2065



## 检测报告 TEST REPORT

样品信息: 二次聚合物锂离子电池组, 型号 M51, 3.85V, 4500mAh, 17.33Wh  
SAMPLE INFORMATION: Rechargeable Li-ion Polymer Battery, Model M51, 3.85V, 4500mAh, 17.33Wh

申请单位: 珠海市嘉德电能科技有限公司  
APPLICANT: Jiade Energy Technology (Zhuhai) Co., Ltd.

检测类别: 商业委托检测  
TYPE OF TEST: Commercial Inspection and Testing Services

苏州UL美华认证有限公司广州分公司  
UL-CCIC Company Limited Guangzhou Branch

Form-ULID-002352 (DCS: 10-CA-F0867) 3.1

Date Issued: 2021-01-05  
Date Revision: 2023-08-14

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| Test Summary<br>测试总览                            |   |
|---|---|
| 样品名称<br>Name of Samples                         | 二次聚合物锂离子电池组<br>Rechargeable Li-ion Polymer Battery  |
| 型号规格<br>Type/ Model                             | 电池型号 M51, 3.85V, 4500mAh, 17.33Wh<br>Battery Model M51, 3.85V, 4500mAh, 17.33Wh   |
| 商标<br>Trade Mark                                | 不适用<br>N/A  |
| 申请单位<br>Applicant                               | 珠海市嘉德电能科技有限公司<br>Jiade Energy Technology (Zhuhai) Co., Ltd.   |
| 申请单位地址<br>Applicant Address                     | 珠海市金湾区三灶镇定湾七路9号1#厂房<br>#1 Building, No.9 The 7th Dingwan Road, Sanzao Town, Jinwan, District, Zhuhai, China   |
| 生产单位<br>Manufacturer                            | 珠海市嘉德电能科技有限公司<br>Jiade Energy Technology (Zhuhai) Co., Ltd.   |
| 生产单位地址<br>Manufacturer Address                  | 珠海市金湾区三灶镇定湾七路9号1#厂房<br>#1 Building, No.9 The 7th Dingwan Road, Sanzao Town, Jinwan, District, Zhuhai, China   |
| 联系电话 Telephone:<br>电子邮箱 Email:<br>公司网址 Website: | 郑菊, 0756-8287186<br><a href="mailto:Zhengju@blbattery.com">Zhengju@blbattery.com</a><br><a href="http://www.blbattery.com">www.blbattery.com</a>  |
| 样品外观颜色<br>Appearance                            | 黑色<br>Black   |
| 样品数量<br>Quantity of Sample                      | 电池组 Battery Pack: 18 pcs<br>电池 Battery Cell: 30 pcs   |
| 样品标识序号<br>Sample Identification                 | 电池组 Battery Pack: 6304941-S1~6304941-S10, 6151258-S11~6151258-S18<br>电池 Battery Cell: 6151261-S1~6151261-S30  |
| 测试标准<br>Testing Standard                        | 联合国《关于危险货物运输的建议书》试验和标准手册第七修订版修正 1 (2021), 第38.3节: 锂电池<br>United Nations: Recommendations on the Transport of Dangerous Goods - Manual of Tests and Criteria, Amendment 1 to Seventh Revised Edition, 2021 (ST/SG/AC.10/11/Rev.7/Amend.1), Section 38.3: Lithium Batteries |
| 接样日期<br>Samples Received Date                   | 2023-06-06, 2023-07-27  |
| 测试开始日期<br>Test Start Date                       | 2023-06-08  |
| 测试完成日期<br>Test Completed Date                   | 2023-08-16  |
| 备注 Remark:                                      | N/A   |

| Test Conclusion<br>测试结论  |                                      |   |                  |                    |
|--|--------------------------------------|---|------------------|--------------------|
| Clause<br>章节   | Name of test<br>测试项目名称               | Sample Condition<br>样品状态  | Conclusion<br>结论 | Remarks<br>备注      |
| 38.3.4.1   | 试验T.1 Altitude Simulation<br>高度模拟    | First cycle in fully charged state/<br>第一个交替充电放电周期完全充电            | Pass<br>通过       | --                 |
|  |                                      | 25th cycle ending in fully charged state/<br>第二十五个交替充电放电周期完全充电    |                  |                    |
| 38.3.4.2   | 试验T.2 Thermal Test<br>温度试验           | First cycle in fully charged state/<br>第一个交替充电放电周期完全充电            | Pass<br>通过       | --                 |
|  |                                      | 25th cycle ending in fully charged state/<br>第二十五个交替充电放电周期完全充电    |                  |                    |
| 38.3.4.3   | 试验T.3 Vibration<br>振动                | First cycle in fully charged state/<br>第一个交替充电放电周期完全充电            | Pass<br>通过       | --                 |
|  |                                      | 25th cycle ending in fully charged state/<br>第二十五个交替充电放电周期完全充电    |                  |                    |
| 38.3.4.4   | 试验T.4 Shock<br>冲击                    | First cycle in fully charged state/<br>第一个交替充电放电周期完全充电            | Pass<br>通过       | --                 |
|  |                                      | 25th cycle ending in fully charged state/<br>第二十五个交替充电放电周期完全充电    |                  |                    |
| 38.3.4.5   | 试验T.5 External Short-Circuit<br>外部短路 | First cycle in fully charged state/<br>第一个交替充电放电周期完全充电            | Pass<br>通过       | --                 |
|  |                                      | 25th cycle ending in fully charged state/<br>第二十五个交替充电放电周期完全充电    |                  |                    |
| 38.3.4.6   | 试验T.6 Impact/Crush<br>撞击/挤压          | First cycle in 50% charged state /<br>第一个交替充电放电周期半充电              | Pass<br>通过       | Pouch Cell<br>软包电芯 |
|  |                                      | 25th cycle ending in 50% charged state/<br>第二十五个交替充电放电周期半充电       |                  |                    |
| 38.3.4.7   | 试验T.7 Overcharge<br>过度充电             | First cycle in fully charged state/<br>第一个交替充电放电周期完全充电            | Pass<br>通过       | --                 |
|  |                                      | 25th cycle ending in fully charged state/<br>第二十五个交替充电放电周期完全充电    |                  |                    |
| 38.3.4.8   | 试验T.8 Forced Discharge<br>强制放电       | First cycle in fully discharged state/<br>第一个交替充电放电周期完全放电         | Pass<br>通过       | --                 |
|  |                                      | 25th cycle ending in fully discharged state/<br>第二十五个交替充电放电周期完全放电 |                  |                    |
| <p>Test Conclusion/检验结论:</p> <p>由珠海市嘉德电能科技有限公司送检的二次聚合物锂离子电池组, 型号 M51, 3.85V, 4500mAh, 17.33Wh, 依据联合国《关于危险品货物运输的建议书》试验和标准手册第七修订版修正 1第38.3节进行全项目测试。</p> <p>当采用简单接受判定规则时, 被测样品符合规范的要求。</p> <p>The Rechargeable Li-ion Polymer Battery, Model M51, 3.85V, 4500mAh, 17.33Wh submitted by Jiade Energy Technology (Zhuhai) Co., Ltd. is tested according to Section 38.3 of the Amendment 1 to Seventh</p> |                                      |   |                  |                    |

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Date Issued: 2021-01-05

Date Revision: 2023-08-14

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Revised Edition of the United Nations: Recommendations on the Transport of Dangerous Goods, Manual of Test and Criteria (ST/SG/AC.10/11/Rev.7/Amend.1, Section 38.3). The test items are full items.

The sample received complies with Specification when Simple Acceptance decision rule is applied.

测试结果：通过。

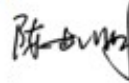
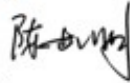
The test results: Pass.

签发日期/Date of issue: 2023-08-18

Approved by: Simon Chen  
批准：陈世明  
Title: Operations Leader  
职衔：工程主管

Reviewed by: Simon Chen  
审核：陈世明  
Title: Operations Leader  
职衔：工程主管

Test Report by: Ade Su  
检测：苏祥德  
Title: Project Engineer  
职衔：项目工程师





| T.1 Altitude Simulation<br>高度模拟   |                          |                                   |                                  |                                    |                                    |                                   |   |               |
|---|--------------------------|-----------------------------------|----------------------------------|------------------------------------|------------------------------------|-----------------------------------|---|---------------|
| Test Method 测试方法  |                          |                                   |                                  |                                    |                                    |                                   |   |               |
| The samples were stored for at least 6 hours at a pressure of 11.6 kPa (1.68 psi) or less and a temperature of 20 ± 5°C (68 ± 9°F). The samples were weighed before and after the exposure. The cell/battery voltage was also determined before and after the test. 将测试样品放在温度为20±5°C，大气压力为不大于11.6kpa的环境中贮存不少于6个小时。对样品在测试前后进行称重，并记录电压。 |                          |                                   |                                  |                                    |                                    |                                   |   |               |
| Test Results/测试结果   |                          |                                   |                                  |                                    |                                    |                                   |   |               |
| Sample No.<br>样品编号  | Sample Condition<br>样品状态 | Weight Before Test(g)<br>测试前质量(克) | Weight After Test(g)<br>测试后质量(克) | Percentage of Weight Loss<br>质量损失% | Voltage Before Test(V)<br>测试前电压(伏) | Voltage After Test(V)<br>测试后电压(伏) | Percentage of residual Voltage<br>残余电压% | Results<br>结果 |
| 6304941-S1  | (C)                      | 91.550                            | 91.554                           | 0.000                              | 4.3827                             | 4.3657                            | 99.612                                  | (6), (7)      |
| 6304941-S2  | (C)                      | 91.933                            | 91.943                           | 0.000                              | 4.3754                             | 4.3683                            | 99.838                                  | (6), (7)      |
| 6304941-S3  | (C)                      | 91.742                            | 91.750                           | 0.000                              | 4.3755                             | 4.3687                            | 99.845                                  | (6), (7)      |
| 6304941-S4  | (C)                      | 91.488                            | 91.494                           | 0.000                              | 4.3614                             | 4.3545                            | 99.842                                  | (6), (7)      |
| 6304941-S5  | (C)                      | 91.520                            | 91.525                           | 0.000                              | 4.3752                             | 4.3679                            | 99.833                                  | (6), (7)      |
| 6304941-S6  | (D)                      | 91.308                            | 91.315                           | 0.000                              | 4.3745                             | 4.3671                            | 99.831                                  | (6), (7)      |
| 6304941-S7  | (D)                      | 91.400                            | 91.400                           | 0.000                              | 4.3755                             | 4.3690                            | 99.851                                  | (6), (7)      |
| 6304941-S8  | (D)                      | 91.595                            | 91.594                           | 0.001                              | 4.3740                             | 4.3670                            | 99.840                                  | (6), (7)      |
| 6304941-S9  | (D)                      | 91.381                            | 91.380                           | 0.001                              | 4.3737                             | 4.3665                            | 99.835                                  | (6), (7)      |
| 6304941-S10   | (D)                      | 91.835                            | 91.837                           | 0.000                              | 4.3747                             | 4.3673                            | 99.831                                  | (6), (7)      |
| Results/结果:<br>(1) Leakage/漏液.<br>(2) Venting/排气.<br>(3) Disassembly/解体.<br>(4) Rupture/破裂.<br>(5) Fire/着火.<br>(6) No leakage, no venting, no disassembly, no rupture, no fire/无漏液, 无排气, 无解体, 无破裂, 无着火.<br>(7) The open circuit voltage of each cell after testing was greater than 90%/开路电压不低于试验前开路电压的90%.                           |                          |                                   |                                  |                                    |                                    |                                   |   |               |

Samples Condition note for T1 to T8 / 试验T1至T8的样品状态备注：

- (A) Fully discharged state (for Primary Cells and Batteries) / 完全放电状态 (针对原电池和原电池组)。
- (B) Undischarged state (for Primary Cells and Batteries) / 未放电状态 (针对原电池和原电池组)。
- (C) At First cycle in fully charged state / 第一个充放电周期完全充电状态。
- (D) After 25 cycles ending in fully charged state / 25个充放电周期后完全充电状态。
- (E) At First cycle at 50% of the design rated capacity / 第一个充放电周期50%设计额定容量状态。
- (F) After 25 cycles ending at 50% of the design rated capacity / 25个充放电周期后50%设计额定容量状态。
- (G) At First cycle in fully discharged state / 第一个充放电周期完全放电状态。
- (H) After 25 cycles ending in fully discharged state / 25个充放电周期后完全放电状态。



| T.2 Thermal Test<br>温度试验   |                          |   |                                  |                                    |                                    |                                   |   |               |
|--|--------------------------|---|----------------------------------|------------------------------------|------------------------------------|-----------------------------------|---|---------------|
| <p><b>Test Method 测试方法</b></p> <p>The samples were subjected to temperature cycling consisting of the following.<br/>The samples were weighed before and after the exposure. The cell/battery voltage was also determined before and after the test. 测试样品将进行如下温度循环测试。样品测试前后进行称重，并记录电压。</p>                                   |                          |   |                                  |                                    |                                    |                                   |   |               |
| Samples In/<br>样品进箱  |                          | <p>The chamber temperature was raised to 72 ± 2°C (162 ± 4°F) within 30 minutes and maintained at this temperature for X* hours.<br/>烤箱温度在30分钟内上升到72 ± 2°C，并维持此温度X*小时。</p> <p>The chamber temperature was reduced to -40 ± 2°C (-40 ± 4°F) within 30 minutes and maintained at this temperature for X* hours.<br/>烤箱温度在30分钟内降低到-40 ± 2°C，并维持此温度X*小时。</p> <p>Repeat the sequence for 9 additional cycles (total of 10 cycles).<br/>重复此顺序测试额外9个循环（总共10个循环）。</p> |                                  |                                    |                                    |                                   |   |               |
| Samples Out/<br>样品出箱   |                          | <p>After the 10th cycle, store the batteries at ambient temperature 20 ± 5°C (68 ± 9°F) for 24 hours prior to examination.<br/>在第10个循环后，于20 ± 5°C环境下储存24小时，然后检查其状态。</p>   |                                  |                                    |                                    |                                   |   |               |
| <p>Note: The duration of exposure to the test temperature extremes(X*) was determined as below:<br/>注：样品承受极端温度的持续时间（X*）按如下确定：<br/>[X] Small cells and small batteries: 6 hours; 小电芯和小电池为6小时；<br/>[ ] Large cells and large batteries: 12 hours. 大电芯和大电池为12小时。</p>  |                          |   |                                  |                                    |                                    |                                   |   |               |
| Tst Results/测试结果   |                          |   |                                  |                                    |                                    |                                   |   |               |
| Sample No.<br>样品编号   | Sample Condition<br>样品状态 | Weight Before Test(g)<br>测试前质量(克)   | Weight After Test(g)<br>测试后质量(克) | Percentage of Weight Loss<br>质量损失% | Voltage Before Test(V)<br>测试前电压(伏) | Voltage After Test(V)<br>测试后电压(伏) | Percentage of residual Voltage<br>残余电压% | Results<br>结果 |
| 6304941-S1   | (C)                      | 91.554  | 91.491                           | 0.069                              | 4.3657                             | 4.2907                            | 98.282                                  | (6), (7)      |
| 6304941-S2   | (C)                      | 91.943  | 91.880                           | 0.069                              | 4.3683                             | 4.2925                            | 98.265                                  | (6), (7)      |
| 6304941-S3   | (C)                      | 91.750  | 91.696                           | 0.059                              | 4.3687                             | 4.2921                            | 98.247                                  | (6), (7)      |
| 6304941-S4   | (C)                      | 91.494  | 91.436                           | 0.063                              | 4.3545                             | 4.2832                            | 98.363                                  | (6), (7)      |
| 6304941-S5   | (C)                      | 91.525  | 91.459                           | 0.072                              | 4.3679                             | 4.2865                            | 98.136                                  | (6), (7)      |
| 6304941-S6   | (D)                      | 91.315  | 91.260                           | 0.060                              | 4.3671                             | 4.2904                            | 98.244                                  | (6), (7)      |
| 6304941-S7   | (D)                      | 91.400  | 91.353                           | 0.051                              | 4.3690                             | 4.2924                            | 98.247                                  | (6), (7)      |
| 6304941-S8   | (D)                      | 91.594  | 91.537                           | 0.062                              | 4.3670                             | 4.2907                            | 98.253                                  | (6), (7)      |
| 6304941-S9   | (D)                      | 91.380  | 91.327                           | 0.058                              | 4.3665                             | 4.2904                            | 98.257                                  | (6), (7)      |
| 6304941-S10  | (D)                      | 91.837  | 91.779                           | 0.063                              | 4.3673                             | 4.2885                            | 98.196                                  | (6), (7)      |
| <p>Results/结果:</p> <p>(1) Leakage/漏液.<br/>(2) Venting/排气.<br/>(3) Disassembly/解体.<br/>(4) Rupture/破裂.<br/>(5) Fire/着火.<br/>(6) No leakage, no venting, no disassembly, no rupture, no fire/无漏液, 无排气, 无解体, 无破裂, 无着火.<br/>(7) The open circuit voltage of each cell after testing was greater than 90%/开路电压不低于试验前开路电压的90%.</p> |                          |   |                                  |                                    |                                    |                                   |   |               |

|  |               |                          |  |
|--|---------------|--------------------------|--|
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|--|---------------|--------------------------|--|

| T.3 Vibration<br>振动  |   |   |  |  |  |  |   |               |
|--|---|---|--|--|--|--|---|---------------|
| Test Method 测试方法   |   |   |  |  |  |  |   |               |
| <p>The samples were subjected to vibration tests consisting of the following. The samples were weighed before and after the exposure. The cell/battery voltage was also determined before and after the test. 测试样品将进行如下振动测试。样品测试前后进行称重，并记录电压。</p> <p>The samples were 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 was a sinusoidal waveform with a logarithmic sweep between 7 Hz and 200 Hz and back to 7 Hz traversed in 15 minutes. This cycle was repeated 12 times for a total of 3 hours for each of three mutually perpendicular mounting positions of the cell. One of the directions of vibration was perpendicular to the terminal face. 电芯和电池牢固地安装在振动台上。振动以正弦波形式，以7Hz增加至200Hz，然后在减少回到7Hz为一个循环，一个循环持续15分钟的对数前移传递。以振动的其中一个方向必须是垂直样品极性，对每个电芯从三个互相垂直的方向上循环12次，每个方向3个小时。</p> <p>The logarithmic frequency sweep was as follows/对数扫频如下：</p> <p>[X] For cells and small batteries: From 7 Hz a peak acceleration of 1 gn was maintained until 18 Hz is reached. The amplitude was then maintained at 0.8 mm (1.6 mm total excursion) and the frequency increased until a peak acceleration of 8 gn occurred (approximately 50 Hz). A peak acceleration of 8 gn was then maintained until the frequency was increase to 200 Hz. 对于电芯和小电池：7赫兹开始保持1 gn的最大加速度直到频率为18赫兹，然后将振幅保持在0.8毫米（总偏移1.6毫米）并增加频率直到最大加速度达到8 gn（频率约为50赫兹），将最大加速度保持在8 gn直到频率增加到200赫兹。</p> <p>[ ] For large batteries: From 7 Hz a peak acceleration of 1 gn was maintained until 18 Hz is reached. The amplitude was then maintained at 0.8 mm (1.6 mm total excursion) and the frequency increased until a peak acceleration of 2 gn occurred (approximately 25 Hz). A peak acceleration of 2 gn was then maintained until the frequency was increase to 200 Hz. 对于大电池：7赫兹开始保持1 gn的最大加速度直到频率为18赫兹，然后将振幅保持在0.8毫米（总偏移1.6毫米）并增加频率直到最大加速度达到2 gn（频率约为25赫兹），将最大加速度保持在2 gn直到频率增加到200赫兹。</p> |   |   |  |  |  |  |   |               |
| Test Results/测试结果  |   |   |  |  |  |  |   |               |
| Sample No.<br>样品编号   | Sam<br>ple<br>Con<br>dition<br>样品<br>状态 | Weight<br>Before<br>Test(g)<br>测试前质量<br>(克) | Weight<br>After<br>Test(g)<br>测试后质量<br>(克) | Percentag<br>e of<br>Weight<br>Loss<br>质量损失<br>% | Voltage<br>Before<br>Test(V)<br>测试前电压<br>(伏) | Voltage<br>After<br>Test(V)<br>测试后电<br>压 (伏) | Percentag<br>e of<br>residual<br>Voltage<br>残余电压<br>% | Results<br>结果 |
| 6304941-S1   | (C)                                     | 91.491                                      | 91.541                                     | 0.000  | 4.2907                                       | 4.2872                                       | 99.918  | (6), (7)      |
| 6304941-S2   | (C)                                     | 91.880                                      | 91.935                                     | 0.000  | 4.2925                                       | 4.2890                                       | 99.918  | (6), (7)      |
| 6304941-S3   | (C)                                     | 91.696                                      | 91.743                                     | 0.000  | 4.2921                                       | 4.2893                                       | 99.935  | (6), (7)      |
| 6304941-S4   | (C)                                     | 91.436                                      | 91.488                                     | 0.000  | 4.2832                                       | 4.2799                                       | 99.923  | (6), (7)      |
| 6304941-S5   | (C)                                     | 91.459                                      | 91.509                                     | 0.000  | 4.2865                                       | 4.2796                                       | 99.839  | (6), (7)      |
| 6304941-S6   | (D)                                     | 91.260                                      | 91.295                                     | 0.000  | 4.2904                                       | 4.2868                                       | 99.916  | (6), (7)      |
| 6304941-S7   | (D)                                     | 91.353                                      | 91.397                                     | 0.000  | 4.2924                                       | 4.2884                                       | 99.907  | (6), (7)      |
| 6304941-S8   | (D)                                     | 91.537                                      | 91.580                                     | 0.000  | 4.2907                                       | 4.2873                                       | 99.921  | (6), (7)      |
| 6304941-S9   | (D)                                     | 91.327                                      | 91.374                                     | 0.000  | 4.2904                                       | 4.2869                                       | 99.918  | (6), (7)      |
| 6304941-S10  | (D)                                     | 91.779                                      | 91.831                                     | 0.000  | 4.2885                                       | 4.2830                                       | 99.915  | (6), (7)      |
| <p>Results/结果:</p> <p>(1) Leakage/漏液.<br/>                     (2) Venting/排气.<br/>                     (3) Disassembly/解体.<br/>                     (4) Rupture/破裂.<br/>                     (5) Fire/着火.<br/>                     (6) No leakage, no venting, no disassembly, no rupture, no fire/无漏液, 无排气, 无解体, 无破裂, 无着火.</p>   |   |   |  |  |  |  |   |               |

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(7) The open circuit voltage of each cell after testing was greater than 90%/开路电压不低于试验前开路电压的90%。



| T.4 Shock<br>冲击  |                          |                                    |                                   |                                     |                                     |                                    |  |               |
|--|--------------------------|------------------------------------|-----------------------------------|-------------------------------------|-------------------------------------|------------------------------------|--|---------------|
| Test Method 测试方法   |                          |                                    |                                   |                                     |                                     |                                    |  |               |
| <p>The samples were subjected to shock. The samples were weighed before and after the exposure. The cell/battery voltage was also determined before and after the test. The sample cell was secured to the testing machine by means of a rigid mount, which supports all mounting surfaces of the sample. Each sample was subjected to a half-sine shock as below: 样品将进行如下冲击测试。对样品在测试前后进行称重, 并记录电压。以稳固的托架固定住每个电芯和电池样品的全部配件表面。每个样品将进行如下半正弦冲击测试:</p> <p><input checked="" type="checkbox"/> For cells: Peak acceleration of 150 gn and pulse duration of 6 milliseconds. 小电芯: 峰值为 150 gn, 脉冲持续6毫秒。</p> <p><input type="checkbox"/> For large cells: Peak acceleration of 50 gn and pulse duration of 11 milliseconds. 大电芯: 峰值为 50 gn, 脉冲持续11毫秒。</p> <p><input type="checkbox"/> For small batteries: Peak acceleration of the smaller of the following, and pulse duration of 6 milliseconds: 小电池: 取如下较小值为峰值, 脉冲持续6毫秒。</p> <ul style="list-style-type: none"> <li>150 gn.</li> <li><math>\sqrt{(100850 / \text{mass of the battery in kg})}</math></li> </ul> <p><input type="checkbox"/> For large batteries: Peak acceleration of the smaller of the following, and pulse duration of 11 milliseconds: 大电池: 取如下较小值为峰值, 脉冲持续11毫秒。</p> <ul style="list-style-type: none"> <li>50 gn.</li> <li><math>\sqrt{(30000 / \text{mass of the battery in kg})}</math></li> </ul> <p>Each sample was subjected to three shocks in the positive direction followed by three shocks in the negative direction of three mutually perpendicular mounting positions of the cell for a total of 18 shocks. 每个测试样品须在三个互相垂直的电池安装方位的正方向经受三次冲击, 接着在反方向经受三次冲击, 总共经受18次冲击。</p> |                          |                                    |                                   |                                     |                                     |                                    |  |               |
| Test Results/测试结果  |                          |                                    |                                   |                                     |                                     |                                    |  |               |
| Sample No.<br>样品编号   | Sample Condition<br>样品状态 | Weight Before Test(g)<br>测试前质量 (克) | Weight After Test(g)<br>测试后质量 (克) | Percentage of Weight Loss<br>质量损失 % | Voltage Before Test(V)<br>测试前电压 (伏) | Voltage After Test(V)<br>测试后电压 (伏) | Percentage of residual Voltage<br>残余电压 % | Results<br>结果 |
| 6304941-S1   | (C)                      | 91.541                             | 91.537                            | 0.004                               | 4.2872                              | 4.2869                             | 99.993                                   | (6), (7)      |
| 6304941-S2   | (C)                      | 91.935                             | 91.933                            | 0.002                               | 4.2890                              | 4.2888                             | 99.995                                   | (6), (7)      |
| 6304941-S3   | (C)                      | 91.743                             | 91.739                            | 0.004                               | 4.2893                              | 4.2885                             | 99.981                                   | (6), (7)      |
| 6304941-S4   | (C)                      | 91.488                             | 91.482                            | 0.007                               | 4.2799                              | 4.2796                             | 99.993                                   | (6), (7)      |
| 6304941-S5   | (C)                      | 91.509                             | 91.512                            | 0.000                               | 4.2796                              | 4.2789                             | 99.984                                   | (6), (7)      |
| 6304941-S6   | (D)                      | 91.295                             | 91.299                            | 0.000                               | 4.2868                              | 4.2858                             | 99.977                                   | (6), (7)      |
| 6304941-S7   | (D)                      | 91.397                             | 91.399                            | 0.000                               | 4.2884                              | 4.2880                             | 99.991                                   | (6), (7)      |
| 6304941-S8   | (D)                      | 91.580                             | 91.585                            | 0.000                               | 4.2873                              | 4.2869                             | 99.991                                   | (6), (7)      |
| 6304941-S9   | (D)                      | 91.374                             | 91.370                            | 0.004                               | 4.2869                              | 4.2858                             | 99.974                                   | (6), (7)      |
| 6304941-S10  | (D)                      | 91.831                             | 91.826                            | 0.005                               | 4.2830                              | 4.2822                             | 99.981                                   | (6), (7)      |
| <p>Results/结果:</p> <p>(1) Leakage/漏液.</p> <p>(2) Venting/排气.</p> <p>(3) Disassembly/解体.</p> <p>(4) Rupture/破裂.</p> <p>(5) Fire/着火.</p> <p>(6) No leakage, no venting, no disassembly, no rupture, no fire/无漏液, 无排气, 无解体, 无破裂, 无着火.</p>   |                          |                                    |                                   |                                     |                                     |                                    |  |               |

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(7) The open circuit voltage of each cell after testing was greater than 90%/开路电压不低于试验前开路电压的90%。



| T.5 External Short-Circuit<br>外部短路   |                          |                                     |  |  |               |
|--|--------------------------|-------------------------------------|--|--|---------------|
| Test Method 测试方法<br>The samples shall be heated for a period of time noted below, to reach a homogeneous stabilized temperature of $57 \pm 4 \text{ }^\circ\text{C}$ , measured on the external case: 为使样品达到均匀稳定的初始温度: $57 \pm 4 \text{ }^\circ\text{C}$ , 样品需在此环境下暴露一段时间。<br><ul style="list-style-type: none"> <li>Small cells and small batteries: 6 hours. 小电芯和小电池至少暴露6小时。</li> <li>Large cells and large batteries: 12 hours. 大电芯和大电池至少暴露12小时。</li> <li>[X] 1 hours, assessed depended on the size and design of the sample. 1小时, 根据样品尺寸设计评估所得。</li> </ul> The samples were then subjected to a short circuit condition with a total external resistance of less than 0.1 ohm, until: 然后将样品正负极用小于0.1欧姆的总电阻回路进行短路, 直到: <ul style="list-style-type: none"> <li>Small cells, small batteries and large cells: 1 hour after the external case temperature of sample has returned to <math>57 \pm 4 \text{ }^\circ\text{C}</math>.<br/>小电芯, 小电池和大电芯: 样品外表温度恢复到<math>57 \pm 4 \text{ }^\circ\text{C}</math>之后保持短路状态1小时以上。</li> <li>Large batteries: After the external case temperature of sample has decreased by half of the maximum temperature increase observed during the test and remains below that value.<br/>大电池: 样品表面温度下降所测最大温升的一半, 并保持低于该数值。</li> </ul> |                          |                                     |  |  |               |
| Test Results/测试结果  |                          |                                     |  |  |               |
| Sample No.<br>样品编号   | Sample Condition<br>样品状态 | Voltage Before Test(V)<br>测试前电压 (伏) | External resistance (mohm)<br>总外部电阻 (毫欧) | Maximum Temperature, $^\circ\text{C}$<br>最高温度 ( $^\circ\text{C}$ ) | Results<br>结果 |
| 6304941-S1   | (C)                      | 4.2869                              | 87.22                                    | 57.0   | (4), (5)      |
| 6304941-S2   | (C)                      | 4.2888                              | 85.40                                    | 57.3   | (4), (5)      |
| 6304941-S3   | (C)                      | 4.2885                              | 84.20                                    | 57.0   | (4), (5)      |
| 6304941-S4   | (C)                      | 4.2796                              | 80.29                                    | 57.2   | (4), (5)      |
| 6304941-S5   | (C)                      | 4.2789                              | 86.34                                    | 57.2   | (4), (5)      |
| 6304941-S6   | (D)                      | 4.2858                              | 80.74                                    | 57.1   | (4), (5)      |
| 6304941-S7   | (D)                      | 4.2880                              | 87.51                                    | 57.4   | (4), (5)      |
| 6304941-S8   | (D)                      | 4.2869                              | 83.22                                    | 57.1   | (4), (5)      |
| 6304941-S9   | (D)                      | 4.2858                              | 89.20                                    | 57.2   | (4), (5)      |
| 6304941-S10  | (D)                      | 4.2822                              | 87.66                                    | 57.2   | (4), (5)      |
| Results/结果:<br>(1) Disassembly/解体.<br>(2) Rupture/破裂.<br>(3) Fire/着火.<br>(4) No disassembly, no rupture, no fire within 6 hours after the test/测试后6小时内无解体, 无破裂, 无着火.<br>(5) The maximum temperature did not exceed $170^\circ\text{C}$ /最高温度不超过170摄氏度.   |                          |                                     |  |  |               |

**T.6 Impact / Crush  
撞击 / 挤压**

**Test Method 测试方法**

**[ ] Impact** (for cylindrical cells not less than 18 mm in diameter)/ 撞击 (适用于直径不小于18毫米的圆柱形电池)

A test sample was placed on a flat surface. A 15.8 mm ± 0.1 mm diameter, at least 8 cm long, or the longest dimension of the cell, whichever is greater, Type 316 stainless steel bar was placed across the center of the sample. A 9.1 kg ± 0.1 kg mass was dropped from a height of 81 ± 2.5 cm at the intersection of the bar and sample in a controlled manner, using a near frictionless, vertical sliding track or channel with minimal drag on the falling mass. The vertical track or channel used to guide the falling mass was oriented 90 degrees from the horizontal supporting surface. 将试验样品放在一个平坦光滑的平面上。将一条316型不锈钢棒，其直径为15.8 mm ± 0.1 mm，长度为至少8 cm，或电芯的最长边长度（两者中较大者），放置在样品中心。将一质量为9.1 kg ± 0.1 kg的物体于81 ± 2.5 cm的高度，无摩擦地从垂直滑轨落向样品。垂直滑轨与横向支承面互相垂直，保持90度。

The test sample was impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of a 15.8 mm ± 0.1 mm diameter curved surface lying across the center of the test sample. Separate samples were used for each test. 接受撞击的试样，纵轴应与平坦的表面平行并与横放在试样中心的直径15.8 mm ± 0.1 mm弯曲表面的纵轴垂直。每一个试样只经受一次撞击。

**[X] Crush** (for prismatic, pouch, coin/button cells and cylindrical cells less than 18 mm in diameter)/挤压 (适用于棱柱形、袋装、硬币/纽扣电池和直径小于18毫米的圆柱形电池)

A sample was crushed between two flat surfaces. The crushing was gradual with a speed of approximately 1.5 cm/s at the first point of contact. The crushing was continued until the first of the three options below has reached/将样品放在两个平面之间挤压。挤压力度逐渐加大，在第一个接触点上的速度大约为1.5厘米/秒。挤压持续进行，直到出现以下三种情况之一：

- The applied force reaches 13 kN ± 0.78 kN/施加的力达到13 kN ± 0.78 kN;
- The voltage of the cell drops by at least 100 mV; or/电池的电压下降至少100毫伏，或者
- The cell is deformed by 50% or more of its original thickness/电池变形达原始厚度的50%以上。

A prismatic or pouch cell was crushed by applying the force to the widest side. A button/coin cell was crushed by applying the force on its flat surfaces. For cylindrical cells, the crush force was applied perpendicular to the longitudinal axis/棱柱形或袋装电池应从最宽的一面施压。纽扣/硬币形电池应从其平坦表面施压。圆柱形应从与纵轴垂直的方向施压。

The test sample was observed for a further 6 hours. Separate samples that have not previously been subjected to other tests were used for each test/测试样品进一步观察6小时。未进行过其他测试的样品用于此测试。

**Test Results/测试结果**

| Sample No.<br>样品编号 | Sample Condition<br>样品状态 | Voltage Before Test(V)<br>测试前电压 (伏) | Maximum Temperature, °C<br>最高温度 (°C) | Results<br>结果 |
|--------------------|--------------------------|-------------------------------------|--------------------------------------|---------------|
| 6151261-S11        | (E)                      | 3.856                               | 26.6                                 | (3), (4)      |
| 6151261-S12        | (E)                      | 3.855                               | 26.9                                 | (3), (4)      |
| 6151261-S13        | (E)                      | 3.854                               | 26.4                                 | (3), (4)      |
| 6151261-S14        | (E)                      | 3.858                               | 26.5                                 | (3), (4)      |
| 6151261-S15        | (E)                      | 3.856                               | 25.9                                 | (3), (4)      |
| 6151261-S26        | (F)                      | 3.857                               | 26.3                                 | (3), (4)      |
| 6151261-S27        | (F)                      | 3.855                               | 26.1                                 | (3), (4)      |
| 6151261-S28        | (F)                      | 3.856                               | 25.8                                 | (3), (4)      |
| 6151261-S29        | (F)                      | 3.859                               | 26.3                                 | (3), (4)      |
| 6151261-S30        | (F)                      | 3.856                               | 26.2                                 | (3), (4)      |

**Results/结果:**

- (1) Disassembly/解体.
- (2) Fire/着火.
- (3) No disassembly, no fire within 6 hours after the test/测试后6小时内无解体, 无着火.
- (4) The maximum temperature did not exceed 170°C/最高温度不超过170摄氏度.



| T.7 Overcharge<br>过度充电   |                          |  |  |               |
|--|--------------------------|--|--|---------------|
| <b>Test Method 测试方法</b>  |                          |  |  |               |
| Batteries were subjected to a charge current of twice the manufacturer's recommended maximum continuous charge current. 2倍制造厂推荐的最大持续充电电流对样品充电。   |                          |  |  |               |
| The minimum voltage of the test was as follows/最小的测试电压由按如下决定:  |                          |  |  |               |
| <ul style="list-style-type: none"> <li>When the manufacturer's recommended charge voltage is not more than 18 V, the minimum voltage of the test was the lesser of 2 times the maximum charge voltage of the battery or 22 V. 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是厂家标定最大充电电压的两倍或者是22V之中的较小者。</li> <li>When the manufacturer's recommended charge voltage is more than 18 V, the minimum voltage of the test was 1.2 times the maximum charge voltage. 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是厂家标定最大充电电压的1.2倍。</li> </ul> |                          |  |  |               |
| Tests were conducted at ambient temperature 20 ± 5°C. The duration of the test was 24 hours. 测试在 20 ± 5°C 的环境温度下进行, 试验持续24小时。  |                          |  |  |               |
| Overcharge Current/过充电流  |                          | 9000mA                                 |  |               |
| Overcharge Voltage/过充电压  |                          | 8.8V                                   |  |               |
| Test Results/测试结果  |                          |  |  |               |
| Sample No.<br>样品编号   | Sample Condition<br>样品状态 | Voltage Before Test,<br>V<br>测试前电压 (伏) | Measured Overcharge Current,<br>mA<br>测量的过充电流 (毫安) | Results<br>结果 |
| 6151258-S11  | (C)                      | 4.369                                  | 0  | (3)           |
| 6151258-S12  | (C)                      | 4.371                                  | 0  | (3)           |
| 6151258-S13  | (C)                      | 4.365                                  | 0  | (3)           |
| 6151258-S14  | (C)                      | 4.363                                  | 0  | (3)           |
| 6151258-S15  | (D)                      | 4.371                                  | 0  | (3)           |
| 6151258-S16  | (D)                      | 4.371                                  | 0  | (3)           |
| 6151258-S17  | (D)                      | 4.371                                  | 0  | (3)           |
| 6151258-S18  | (D)                      | 4.367                                  | 0  | (3)           |
| Results/结果:  |                          |  |  |               |
| (1) Disassembly/解体.  |                          |  |  |               |
| (2) Fire/着火.   |                          |  |  |               |
| (3) No disassembly, no fire within seven days after the test/测试后7天内无解体, 无着火.   |                          |  |  |               |

| T.8 Forced Discharge<br>强制放电  |                   |   |  |                                       |               |
|---|-------------------|---|--|---------------------------------------|---------------|
| Test Method 测试方法  |                   |   |  |                                       |               |
| <p>Each cell was forced discharged at ambient temperature by connecting it in series with a 12 V DC power supply at an initial current equal to the maximum discharge current specified by the manufacturer. 在常温环境下，将单个电芯连接在12V的直流电源上进行强制放电，此直流电源提供给每个电芯初始电流为制造厂指定的最大放电电流。</p> <p>The specified discharge current was obtained by connecting a resistive load of the appropriate size and rating in series with the test cell. Each cell was forced discharged for a time interval (in hours) equal to its rated capacity divided by the initial test current (in amperes). 指定的放电电流通过串联在测试电芯上的合适大小和功率的负载来获得，每个电芯的强制放电时间（小时）为额定容量除以初始电流（安培）。</p> |                   |   |  |                                       |               |
| Test Results/测试结果   |                   |   |  |                                       |               |
| Sample No.<br>样品编号  | Condition<br>样品状态 | Initial Discharge Current, mA<br>初始放电电流<br>(毫安) | Voltage of Discharged Cell Before Test(V)<br>测试前电压 (伏) | Voltage After Test(V)<br>测试后电压<br>(伏) | Results<br>结果 |
| 6151261-S1  | (G)               | 4520  | 3.394  | 0                                     | (3)           |
| 6151261-S2  | (G)               | 4521  | 3.395  | 0                                     | (3)           |
| 6151261-S3  | (G)               | 4520  | 3.420  | 0                                     | (3)           |
| 6151261-S4  | (G)               | 4522  | 3.419  | 0                                     | (3)           |
| 6151261-S5  | (G)               | 4520  | 3.411  | 0                                     | (3)           |
| 6151261-S6  | (G)               | 4520  | 3.411  | 0                                     | (3)           |
| 6151261-S7  | (G)               | 4520  | 3.391  | 0                                     | (3)           |
| 6151261-S8  | (G)               | 4520  | 3.391  | 0                                     | (3)           |
| 6151261-S9  | (G)               | 4520  | 3.381  | 0                                     | (3)           |
| 6151261-S10   | (G)               | 4520  | 3.381  | 0                                     | (3)           |
| 6151261-S16   | (H)               | 4520  | 3.401  | 0                                     | (3)           |
| 6151261-S17   | (H)               | 4522  | 3.400  | 0                                     | (3)           |
| 6151261-S18   | (H)               | 4520  | 3.391  | 0                                     | (3)           |
| 6151261-S19   | (H)               | 4520  | 3.391  | 0                                     | (3)           |
| 6151261-S20   | (H)               | 4520  | 3.393  | 0                                     | (3)           |
| 6151261-S21   | (H)               | 4523  | 3.400  | 0                                     | (3)           |
| 6151261-S22   | (H)               | 4529  | 3.400  | 0                                     | (3)           |
| 6151261-S23   | (H)               | 4520  | 3.395  | 0                                     | (3)           |
| 6151261-S24   | (H)               | 4520  | 3.391  | 0                                     | (3)           |
| 6151261-S25   | (H)               | 4521  | 3.393  | 0                                     | (3)           |
| <p>Results/结果:</p> <p>(1) Disassembly/解体.</p> <p>(2) Fire/着火.</p> <p>(3) No disassembly, no fire within seven days after the test/测试后七天内无解体、无着火.</p>  |                   |   |  |                                       |               |

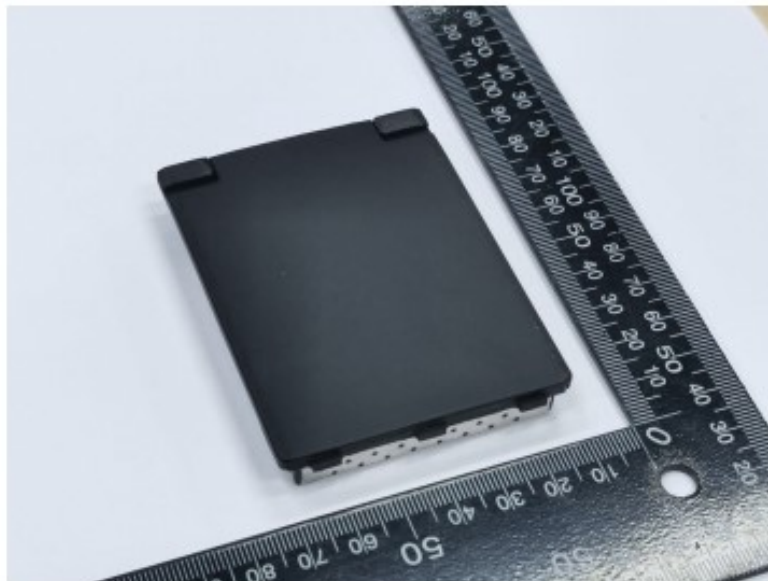
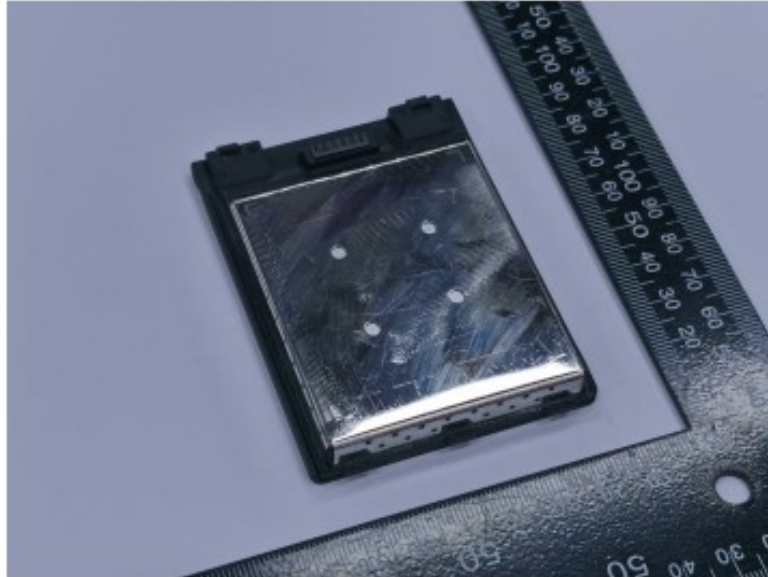
|   |        |                  |   |
|---|--------|------------------|---|
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|---|--------|------------------|---|



Photos of Test Samples

测试样品照片

Rechargeable Li-ion Polymer Battery, Model M51, 3.85V, 4500mAh, 17.33Wh  
二次聚合物锂离子电池组, 型号M51, 3.85V, 4500mAh, 17.33Wh



Photos of Test Samples

测试样品照片

Inner Cell, Model 825262PU, 3.85V, 4520mAh, 17.40Wh, manufactured by Dongguan Veken Battery Co. LTD  
内部电芯, 型号 825262PU, 3.85V, 4520mAh, 17.40Wh, 由东莞维科电池有限公司制造。



Sample Label  
样品标签



Form-ULID-002352 (DCS: 10-CA-F0867) 3.1

Date Issued: 2021-01-05  
Date Revision: 2023-08-14

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The test data and results do not have social proof function.

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\*\*\* 报告结束 \*\*\*  
 \*\*\* Report End \*\*\*

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