Report No.: TSZ25LT034A10-01

中国认证
国际互认
检测
TESTING
CNAS L5138

# UN38.3 检测报告
# UN38.3 Test Report

| | |
|---|---|
| 样品名称: | 锂离子电池组 |
| **Sample name:** | **Li-ion Battery Pack** |
| 样品型号: | **314Ah51.2V** |
| **Sample model:** | |
| 委托单位: | 武汉祥明新能源科技有限公司 |
| **Applicant:** | **Wuhan Xiangming New Energy Technology Co., Ltd.** |

深圳天溯计量检测股份有限公司

**Shenzhen Tiansu Calibration and Testing Co., Ltd.**

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J3-2024-C01-0052

| 通用信息 General information | | | | |
|---|---|---|---|---|
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| 样品名称 Sample name | 锂离子电池组 Li-ion Battery Pack | | 样品型号 Sample model | 314Ah51.2V |
| 类别 Classification | 锂离子电池 Li-ion Battery | | 商标 Trade mark | / |
| 额定值 Ratings | 51.2V/314Ah/16.077kWh | | 样品形状 Shape of sample | 近长方体 Approximate Cuboid |
| 重量能量密度 Weight energy density | 146.15Wh/kg | | | |
| 测试标准 Test standard | 联合国《试验和标准手册》（第 8 版）38.3 节 UN "Manual of Tests and Criteria" ST/SG/AC.10/11/Rev.8/Subsection 38.3 | | | |
| 签发日期 Date of issue | 2026.01.12 | | 收样日期 Receipt date | 2025.12.24 |
| | | | 测试日期 Test date | 2025.12.24 to 2026.01.12 |

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# 样品说明及描述 Sample description

| | 电芯<br>Cell | 电池组<br>Battery |
|---|---|---|
| 型号<br>Model | PF173-314A | 314Ah51.2V |
| 标称电压<br>Nominal voltage | 3.2V | 51.2V |
| 额定容量<br>Rated capacity | 314Ah | 314Ah |
| 充电限制电压<br>Limited charge voltage | 3.65V | 57.6V |
| 放电终止电压<br>Cut-off voltage | 2.5V | 43.2V |
| 标准充电电流<br>Standard charge current | 1C | 100A |
| 标准放电电流<br>Standard discharge current | 1C | 100A |
| 最大持续充电电流<br>Max continuous charge current | 1C | 200A |
| 最大持续放电电流<br>Max continuous discharge current | 1C | 200A |
| 尺寸<br>Dimension | 204.61*173.44*71.92(mm) | 752.00*479.00*232.00(mm) |
| 重量<br>Weight | 5.585kg | 110.0kg |
| 电芯个数<br>Cell numbers | 16PCS, ( 16S 1P ) | |

检测结论
Test conclusion:
武汉祥明新能源科技有限公司送检的样品，依据联合国《试验和标准手册》（第 8 版）38.3 节进行检测，测试结果符合标准相关要求。
The Wuhan Xiangming New Energy Technology Co., Ltd. submitted samples are tested according to UN "Manual of Tests and Criteria" ST/SG/AC.10/11/Rev.8/Subsection 38.3. The test results comply with the relevant requirements of the standard.

修订说明：
Revision note ：
N/A

## 测试概要 Test summary

| 章节 Clause | 测试项目 Test item | Sample No. 样品编号 | 结论 Conclusion |
|---|---|---|---|
| T.1 | 高度模拟 Altitude simulation | B01#-B04# | 通过 Pass |
| T.2 | 温度试验 Thermal test | | 通过 Pass |
| T.3 | 振动 Vibration | | 通过 Pass |
| T.4 | 冲击 Shock | | 通过 Pass |
| T.5 | 外部短路 External short circuit | | 通过 Pass |
| T.6 | 撞击/挤压 Impact/Crush | C01#-C10# | 通过 Pass |
| T.7 | 过度充电 Overcharge | B05#-B08# | 通过 Pass |
| T.8 | 强制放电 Forced Discharge | C11#-C30# | 通过 Pass |

说明 Notes：

| | |
|---|---|
| B01#-B02#, B05#-B06# | 为第一个充放电周期完全充电状态的电池组<br>Batteries at first cycle in fully charged states |
| B03#-B04#, B07#-B08# | 为 25 个充放电周期后完全充电状态的电池组<br>Batteries after 25 cycles ending in fully charged states |
| C01#-C05# | 为第一个充放电周期后 50%设计额定容量状态的电池<br>Cells at first cycle at 50% of the design rated capacity |
| C06#-C10# | 为 25 个充放电周期后 50%设计额定容量状态的电池<br>Cells after 25 cycle at 50% of the design rated capacity |
| C11#-C20# | 为第一个充放电周期后完全放电状态的电池<br>Cells at first cycle in fully discharged states |
| C21#-C30# | 为 25 个充放电周期后完全放电状态的电池<br>Cells after 25 cycles ending in fully discharged states |

## 样品照片 Photos

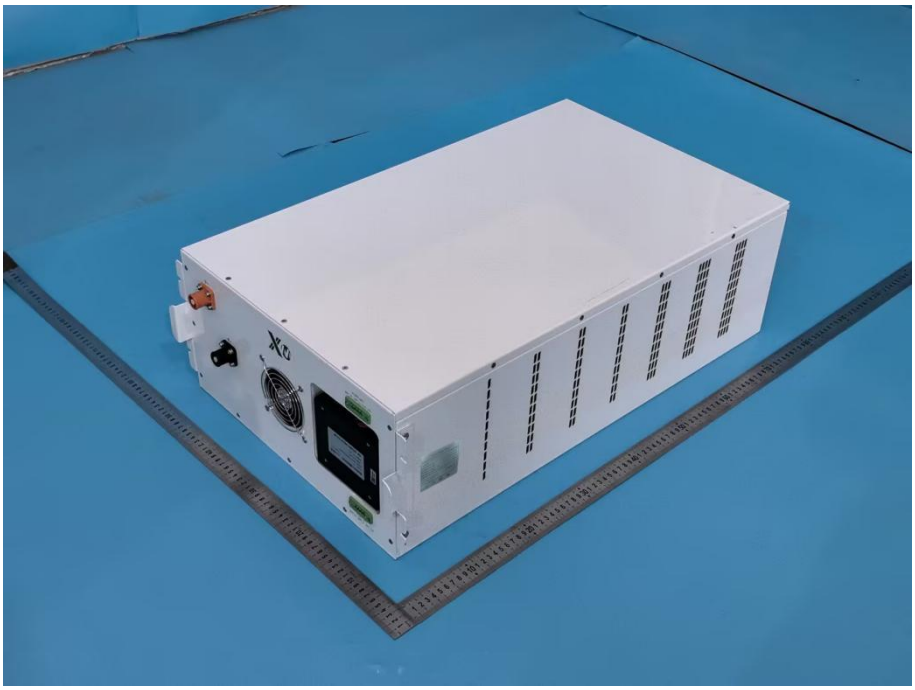

Photo 1 电池组正面 Front view of battery

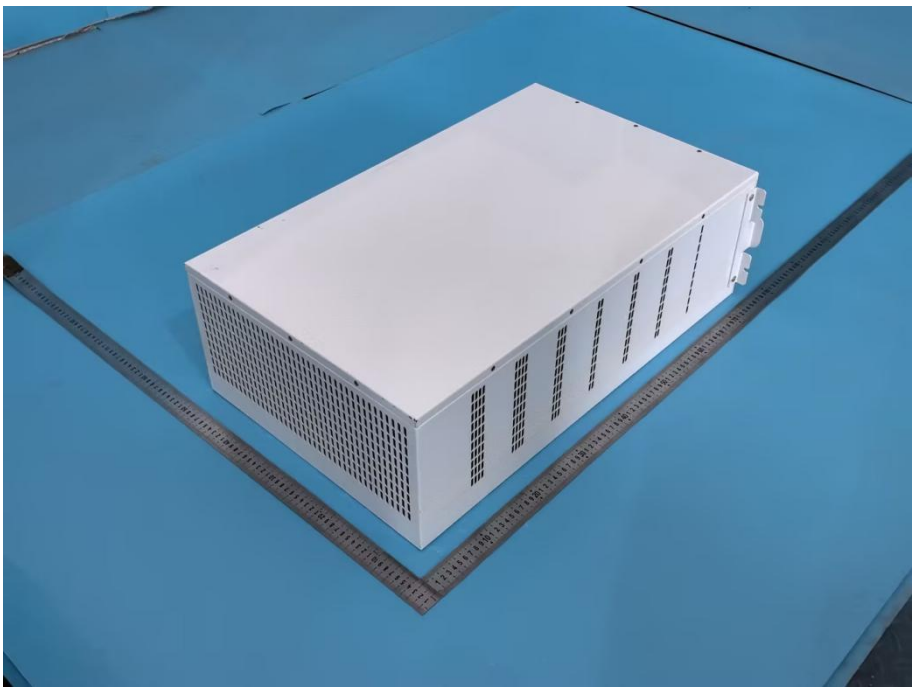

Photo 2 电池组背面 Back view of battery

## 样品照片 Photos

Photo 3 标签特写 Label close-up

## 样品照片 Photos

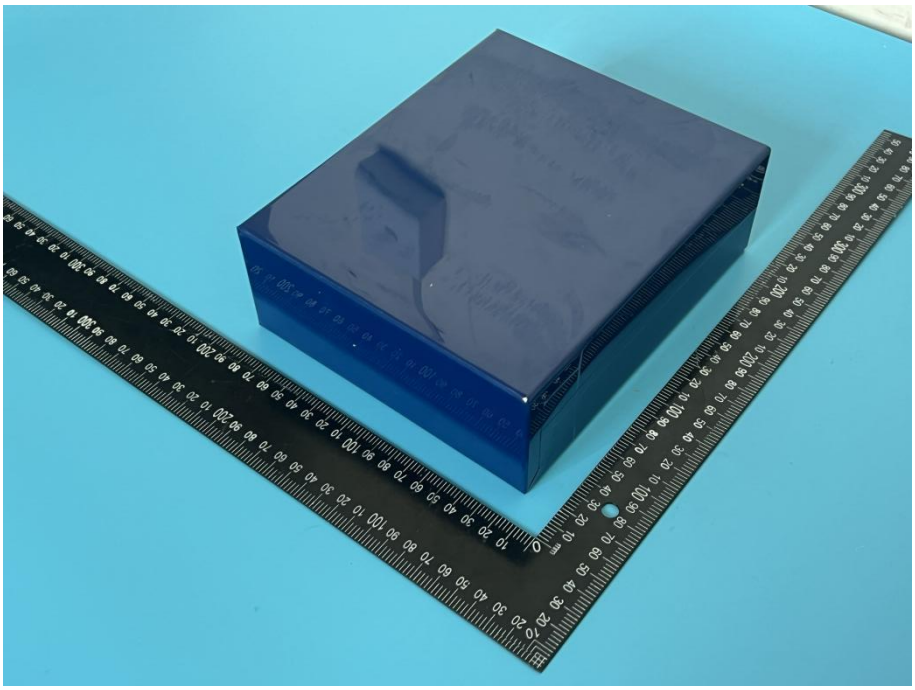

Photo 4 电池正面 Front view of Cell

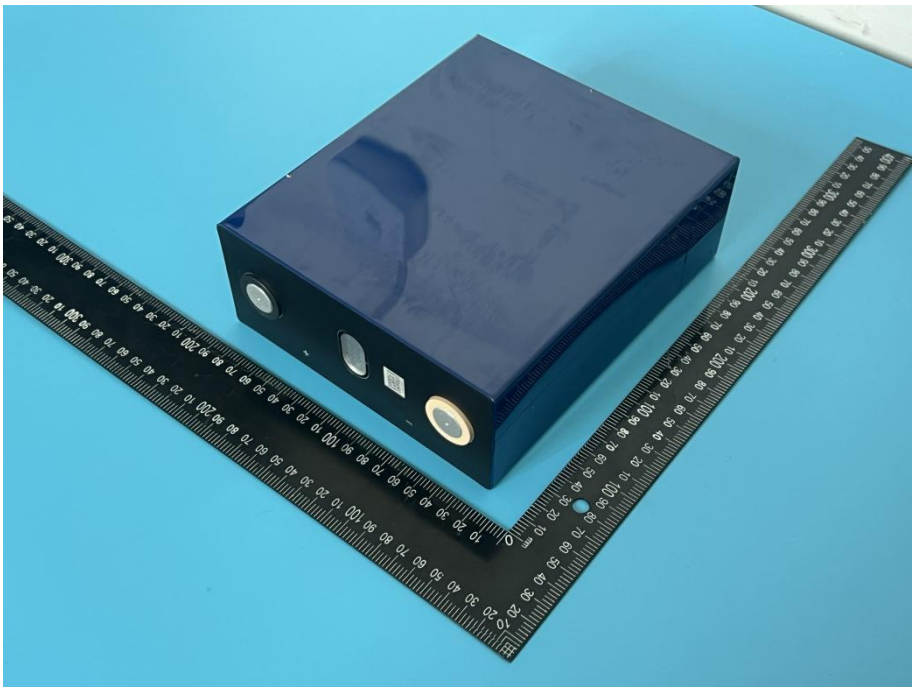

Photo 5 电池背面 Back view of Cell

# 测试程序 Test procedure

**程序**

小型电池或电池组必须按顺序进行试验 T1 至 T5。试验 T6 和 T8 应使用未试验过的电池。试验 T.7 可以使用原先在试验 T.1 至 T.5 中使用过的未损坏电池组进行，以便测试经过充放电的电池组。

**Procedure**

Tests T.1 to T.5 shall be conducted in sequence on the same cell or battery. Tests T.6 and T.8 shall be conducted using not otherwise tested cells. Test T.7 may be conducted using undamaged batteries previously used in Tests T.1 to T.5 for purposes of testing on cycled batteries.

质量损失依照下式计算：

$$质量损失=（M_1-M_2）/M_1\times100\%$$

式中 $M_1$ 是试验前的质量，$M_2$ 是试验后的质量。如质量损失不超过下表所列数值，即视为“无质量损失”。

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

$$mass\ loss=（M_1-M_2）/M_1\times100\%$$

Where $M_1$ is the mass before the test and $M_2$ is the mass after the test, when mass loss does not exceed the values in Table below, it shall be considered as “no mass loss”.

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

**T.1： 高度模拟：Altitude simulation**

试验电池和电池组应在压力等于或低于 11.6 千帕和环境温度(20±5)℃下存放至少 6 小时。

如果无渗漏、无排气、无解体、无破裂和无起火，并且每个试验电池或电池组在试验后的开路电压不小于其在进行这一试验前电压的 90%，电池和电池组即符合这一要求。有关电压的要求不适用于完全放电状态的试验电池和电池组。

Test cells and batteries shall be stored at a pressure of 11.6 kPa or less for at least six hours at ambient temperature (20 ± 5 °C).

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

**T.2： 温度试验：Thermal test**

试验电池和电池组应先在试验温度等于 (72±2)℃的条件下存放至少 6 小时，接着再在试验温度等于-40±2℃的条件下存放至少 6 小时。两个极端试验温度之间的最大时间间隔为 30 分钟。此程序重复进行，共完成 10 次，接着将所有试验电池和电池组在环境温度(20±5)℃下存放 24 小时。对于大型电池和电池组，暴露于极端试验温度的时间至少应为 12 小时。

如果无渗漏、无排气、无解体、无破裂和无起火，并且每个试验电池或电池组在试验后的开路电压不小于其在进行这一试验前电压的 90%，电池和电池组即符合这一要求。有关电压的要求不适用于完全放电状态的试验电池和电池组。

Test cells and batteries are to be stored for at least six hours at a test temperature equal to 72 ± 2 °C, followed by storage for at least six hours at a test temperature equal to - 40 ± 2 °C. The maximum time interval between test temperature extremes is 30 minutes. This procedure is to be repeated until 10 total cycles are complete, after which all test cells and batteries are to be stored for 24 hours at ambient temperature (20 ± 5 °C). For large cells and batteries the duration of exposure to the test temperature extremes should be at least 12 hours.

Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90 % of its voltage immediately prior

# 测试程序 Test procedure

to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.

**T.3： 振动：Vibration**

电池和电池组紧固于振动机平台，但紧固程度不能造成电池变形以致不能准确传递振动。振动应是正弦波形，对数频率扫描从 7 赫兹到 200 赫兹，再回到 7 赫兹，跨度为 15 分钟。这一振动过程须对三个互相垂直的电池安装方位的每一方向重复进行 12 次，总共为时 3 小时。其中一个振动方向必须与端面垂直。

作对数式频率扫描，对总质量不足 12 千克的电池和电池组(电池和小型电池组)，和对 12 千克及更大的电池组(大型电池组)应有所不同。

对电池和小型电池组：从 7 赫兹开始，保持 1 gn 的最大加速度，直到频率达到 18 赫兹。然后将振幅保持在 0.8 毫米(总偏移 1.6 毫米)，并增加频率直到最大加速度达到 8 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。

对大型电池组：从 7 赫兹开始，保持 1 gn 的最大加速度，直到频率达到 18 赫兹。然后将振幅保持在 0.8 毫米(总偏移 1.6 毫米)，并增加频率直到最大加速度达到 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。

如果试验中和试验后无渗漏、无排气、无解体、无破裂和无起火，并且每个试验电池或电池组在第三个垂直安装方位上的试验后立即测得的开路电压不小于在进行这一试验前电压的 90%，电池和电池组即符合本项要求。有关电压的要求不适用于完全放电状态的试验电池和电池组。

Cells and batteries are firmly secured to the platform of the vibration machine without distorting the cells in such a manner as to faithfully transmit the vibration. The vibration shall be a sinusoidal waveform with a logarithmic sweep between 7 Hz and 200 Hz and back to 7 Hz traversed in 15 minutes. This cycle shall be repeated 12 times for a total of 3 hours for each of three mutually perpendicular mounting positions of the cell. One of the directions of vibration must be perpendicular to the terminal face.

The logarithmic frequency sweep shall differ for cells and batteries with a gross mass of not more than 12 kg (cells and small batteries), and for batteries with a gross mass of more than 12 kg (large batteries).

For cells and small batteries: from 7 Hz a peak acceleration of 1 gn is maintained until 18 Hz is reached. The amplitude is then maintained at 0.8 mm (1.6 mm total excursion) and the frequency increased until a peak acceleration of 8 gn occurs (approximately 50 Hz). A peak acceleration of 8 gn is then maintained until the frequency is increased to 200 Hz.

For large batteries: from 7 Hz to a peak acceleration of 1 gn is maintained until 18 Hz is reached. The amplitude is then maintained at 0.8 mm (1.6 mm total excursion) and the frequency increased until a peak acceleration of 2 gn occurs (approximately 25 Hz). A peak acceleration of 2 gn is then maintained until the frequency is increased to 200 Hz.

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

**T.4：冲击：Shock**

试验电池和电池组用坚固支架紧固在试验机上，支架支撑着每个试验电池组的所有安装面。

每个电池须经受最大加速度 150 gn 和脉冲持续时间 6 毫秒的半正弦波冲击。不过，大型电池须经受最大加速度 50 gn 和脉冲持续时间 11 毫秒的半正弦波冲击。

每个电池须经受的正弦波冲击的最大加速度取决于电池组的质量。小型电池组的脉冲持续时间 6 毫秒，大型电池组的脉冲持续时间 11 毫秒。以下公式用于计算合适的最低限度最大加速度。

每个电池或电池组须在三个互相垂直的电池或电池组安装方位的正极方向经受三次冲击，接着在负极方向经受三次冲击，总共经受 18 次冲击。

如果无渗漏、无排气、无解体、无破裂和无起火，并且每个试验电池或电池组在试验后的开路电压不小于其在进行这一试验前电压的 90%，电池和电池组即符合这一要求。有关电压的要求不适用于完全放电状态的试验电池和电池组。

Test cells and batteries shall be secured to the testing machine by means of a rigid mount which will support all mounting surfaces of each test battery.

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Each cell shall be subjected to a half-sine shock of peak acceleration of 150 gn and pulse duration of 6 milliseconds. Alternatively, large cells may be subjected to a half-sine shock of peak acceleration of 50 gn and pulse duration of 11 milliseconds.

Each battery shall be subjected to a half-sine shock of peak acceleration depending on the mass of the battery. The pulse duration shall be 6 milliseconds for small batteries and 11 milliseconds for large batteries. The formulas below are provided to calculate the appropriate minimum peak accelerations.

Each cell or battery shall be subjected to three shocks in the positive direction and to three shocks in the negative direction in each of three mutually perpendicular mounting positions of the cell or battery for a total of 18 shocks.

| Battery | Minimum peak acceleration | Pulse duration |
|---|---|---|
| Small batteries | 150 $g_n$ or result of formula<br>Acceleration ($g_n$) $= \sqrt{\left(\frac{100850}{mass*}\right)}$<br>whichever is smaller | 6 ms |
| Large batteries | 50 $g_n$ or result of formula<br>Acceleration ($g_n$) $= \sqrt{\left(\frac{30000}{mass*}\right)}$<br>whichever is smaller | 11 ms |

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

**T.5：外部短路：External short circuit**

对于待试电池或电池组，应加温一段必要的时间，使从外壳测量的温度达到均匀的稳定温度（57±4）℃。这段时间的长短取决于电池或电池组的大小和设计，对于这个持续时间应加以评估和记录。如无法进行这种评估，则小型电池和小型电池组的暴露时间应至少 6 小时，大型电池和小型电池组的暴露时间应至少 12 小时。然后，电池或电池组应在（57±4）℃条件下经受总外电阻小于 0.1 欧姆的短路条件。

这一短路条件应在电池或电池组外壳温度回到（57±4）℃后继续至少 1 小时，或在大型电池组的情况下外壳温度降幅达试验中所观察的最高温升幅的二分之一并保持低于该数值。短路和降温阶段的温度应至少相当于环境温度。

如果外壳温度不超过 170℃，并且在试验过程中及试验后 6 小时内无解体、无破裂，无起火，电池和电池组即符合本项要求。

The cell or battery to be tested shall be heated for a period of time necessary to reach a homogeneous stabilized temperature of 57 ± 4 °C, measured on the external case. This period of time depends on the size and design of the cell or battery and should be assessed and documented. If this assessment is not feasible, the exposure time shall be at least 6 hours for small cells and small batteries, and 12 hours for large cells and large batteries. Then the cell or battery at 57 ± 4 °C shall be subjected to one short circuit condition with a total external resistance of less than 0.1 ohm.

This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to（57±4）°C, or in the case of the large batteries, has decreased by half of the maximum temperature increase observed during the test and remains below that value.

The short circuit and cooling down phases shall be conducted at least at ambient temperature.

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

**T.6: 撞击/挤压 Impact / Crush**

撞击（适用于直径不小于 18.0 毫米的圆柱形电池）Impact (applicable to cylindrical cells not less than 18.0 mm in diameter：

试样电池或元件电池放在平坦光滑的表面上。一根 316 型不锈钢棒横放在试样中心，钢棒直径 15.8 毫米±0.1 毫米，

# 测试程序 Test procedure

长度至少 6 厘米，或电池最长端的尺寸，取二者之长者。将一块 9.1 千克±0.1 千克的重锤从 61±2.5 厘米高处跌落到钢棒和试样交叉处，使用一个几乎没有摩擦的、对落体重锤阻力最小的垂直轨道或管道加以控制。垂直轨道或管道用于引导落锤沿与水平支撑表面呈 90 度落下。

接受撞击的试样，纵轴应与平坦表面平行并与横放在试样中心的直径 15.8 毫米±0.1 毫米弯曲表面的纵轴垂直。每一试样只经受一次撞击。

The test sample cell or component cell is to be placed on a flat smooth surface. A 15.8 mm ± 0.1 mm diameter, at least 6 cm long, or the longest dimension of the cell, whichever is greater, Type 316 stainless steel bar is to be placed across the centre of the sample. A 9.1 kg ± 0.1kg mass is to be dropped from a height of 61 ± 2.5 cm at the intersection of the bar and sample in a controlled manner using a near frictionless, vertical sliding track or channel with minimal drag on the falling mass. The vertical track or channel used to guide the falling mass shall be oriented 90 degrees from the horizontal supporting surface.

The test sample is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8 mm ± 0.1 mm diameter curved surface lying across the centre of the test sample. Each sample is to be subjected to only a single impact.

挤压(适用于棱柱形、袋装、硬币/纽扣电池和直径小于 18.0 毫米的圆柱形电池) Crush (applicable to prismatic, pouch, coin/button cells and cylindrical cells less than 18.0 mm in diameter)：

将电池或元件电池放在两个平面之间挤压，挤压力度逐渐加大，在第一个接触点上的速度大约为 1.5 厘米/秒。挤压持续进行，直到出现以下三种情况之一：

(a) 施加的力量达到 13 千牛顿±0.78 千牛顿；

例如：用一个活塞直径 32 毫米的液压顶施力，直到液压顶的压力达到 17 兆帕。

(b) 电池的电压下降至少 100 毫伏；或

(c) 电池变形达原始厚度的 50%或以上。

一旦达到最大压力、电压下降 100 毫伏或更多，或电池变形至少达原厚度的 50%，即可解除压力。

棱柱形或袋装电池应从最宽的一面施压。纽扣/硬币形电池应从其平坦表面施压。圆柱形电池应从与纵轴垂直的方向施压。

每个试样电池或元件电池只做一次挤压试验。试样应继续观察 6 小时。试验应使用之前未做过其他试验的电池或元件电池进行。

A cell or component cell is to be crushed between two flat surfaces. The crushing is to be gradual with a speed of approximately 1.5 cm/s at the first point of contact. The crushing is to be continued until the first of the three options below is reached.

(a) The applied force reaches 13 kN ± 0.78 kN;

Example: The force shall be applied by a hydraulic ram with a 32 mm diameter piston until a pressure of 17 MPa is reached on the hydraulic ram.

(b) The voltage of the cell drops by at least 100 mV; or

(c) The cell is deformed by 50 % or more of its original thickness

Once the maximum pressure has been obtained, the voltage drops by 100 mV or more, or the cell is deformed by at least 50 % of its original thickness, the pressure shall be released.

A prismatic or pouch cell shall be crushed by applying the force to the widest side. A button/coin cell shall be crushed by applying the force on its flat surfaces. For cylindrical cells, the crush force shall be applied perpendicular to the longitudinal axis.

Each test cell or component cell is to be subjected to one crush only. The test sample shall be observed for a further 6 h. The test shall be conducted using test cells or component cells that have not previously been subjected to other tests.

如果外壳温度不超过 170℃，并且在试验过程中及试验后 6 小时内无解体、无破裂，无起火，电池和电池组即符合本项要求。

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

**T7：过度充电：Overcharge**

充电电流必须是制造商建议的最大持续充电电流的两倍。试验的最小电压如下：

(a) 制造商建议的充电电压不大于 18 伏时，试验的最小电压应是电池组最大充电电压的两倍或 22 伏两者中的较小者。

(b) 制造商建议的充电电压大于 18 伏时，试验的最小电压应为最大充电电压的 1.2 倍。

# 测试程序 Test procedure

试验应在环境温度下进行。进行试验的时间应为 24 小时。

可充电电池组如在试验过程中和试验后 7 天内无解体，无起火，即符合本项要求。

The charge current shall be twice the manufacturer's recommended maximum continuous charge current. The minimum voltage of the test shall be as follows:

(a) when the manufacturer's recommended charge voltage is not more than 18 V, the minimum voltage of the test shall be the lesser of two times the maximum charge voltage of the battery or 22 V.

(b) when the manufacturer's recommended charge voltage is more than 18 V, the minimum voltage of the test shall be 1.2 times the maximum charge voltage.

Tests are to be conducted at ambient temperature. The duration of the test shall be 24 hours.

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

**T8：强制放电：Forced discharge**

每个电池应在环境温度下与 12 伏直流电源串联在起始电流等于制造商给定的最大放电电流的条件下强制放电。

将适当大小和额定值的电阻负荷与试验电池串联，计算得出给定的放电电流。对每个电池进行强制放电，放电时间(小时)应等于其额定容量除以初始试验电流(安培)。

原电池或可充电电池如在试验过程中和试验后 7 天内无解体，无起火，即符合本项要求。

Each cell shall be forced discharged at ambient temperature by connecting it in series with a 12V D.C. power supply at an initial current equal to the maximum discharge current specified by the manufacturer.

The specified discharge current is to be obtained by connecting a resistive load of the appropriate size and rating in series with the test cell. Each cell shall be forced discharged for a time interval (in hours) equal to its rated capacity divided by the initial test current (in ampere).

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

测试数据：

| 38.3.4.1 | T.1： 高度模拟：Altitude simulation | | | | | | P |
|---|---|---|---|---|---|---|---|
| 样品编号 Sample No. | 测试前 Before test | | 测试后 After Test | | 质量损失 Mass loss (%) | 剩余电压 Residual OCV (%) | 测试结果 Test result |
| | 样品质量 $M_1$ Mass | 开路电压 Voltage | 样品质量 $M_2$ Mass | 开路电压 Voltage | | | |
| B1# | 110.0kg | 54.48V | 110.0kg | 54.24V | 0.00 | 99.56 | O |
| B2# | 109.6kg | 54.58V | 109.6kg | 54.32V | 0.00 | 99.52 | O |
| B3# | 109.7kg | 54.51V | 109.7kg | 54.44V | 0.00 | 99.87 | O |
| B4# | 109.9kg | 54.54V | 109.9kg | 54.49V | 0.00 | 99.91 | O |
| 其他补充：测试结果“O”代表判定该测试无渗漏，无排气，无解体，无破裂，无起火。<br>Supplements：Test result "O" decides that the test no leakage, no venting, no disassembly, no rupture, no fire. | | | | | | | |

| 38.3.4.2 | T.2： 温度试验：Thermal test | | | | | | P |
|---|---|---|---|---|---|---|---|
| 样品编号 Sample No. | 测试前 Before test | | 测试后 After Test | | 质量损失 Mass loss (%) | 剩余电压 Residual OCV (%) | 测试结果 Test result |
| | 样品质量 $M_1$ Mass | 开路电压 Voltage | 样品质量 $M_2$ Mass | 开路电压 Voltage | | | |
| B1# | 110.0kg | 54.24V | 110.0kg | 52.86V | 0.00 | 97.46 | O |
| B2# | 109.6kg | 54.32V | 109.6kg | 53.31V | 0.00 | 98.14 | O |
| B3# | 109.7kg | 54.44V | 109.7kg | 53.06V | 0.00 | 97.47 | O |
| B4# | 109.9kg | 54.49V | 109.9kg | 53.16V | 0.00 | 97.56 | O |
| 其他补充：测试结果“O”代表判定该测试无渗漏，无排气，无解体，无破裂，无起火。<br>Supplements：Test result "O" decides that the test no leakage, no venting, no disassembly, no rupture, no fire. | | | | | | | |

| 38.3.4.3 | T.3： 振动：Vibration | | | | | | P |
|---|---|---|---|---|---|---|---|
| 样品编号 Sample No. | 测试前 Before test | | 测试后 After Test | | 质量损失 Mass loss (%) | 剩余电压 Residual OCV (%) | 测试结果 Test result |
| | 样品质量 $M_1$ Mass | 开路电压 Voltage | 样品质量 $M_2$ Mass | 开路电压 Voltage | | | |
| B1# | 110.0kg | 52.86V | 110.0kg | 52.60V | 0.00 | 99.51 | O |
| B2# | 109.6kg | 53.31V | 109.6kg | 52.97V | 0.00 | 99.36 | O |
| B3# | 109.7kg | 53.06V | 109.7kg | 52.95V | 0.00 | 99.79 | O |
| B4# | 109.9kg | 53.16V | 109.9kg | 52.92V | 0.00 | 99.55 | O |
| 其他补充：测试结果“O”代表判定该测试无渗漏，无排气，无解体，无破裂，无起火。<br>Supplements：Test result "O" decides that the test no leakage, no venting, no disassembly, no rupture, no fire. | | | | | | | |

| 38.3.4.4 | T.4：冲击：Shock | | | | | | P |
|---|---|---|---|---|---|---|---|
| 样品编号 Sample No. | 测试前 Before test | | 测试后 After Test | | 质量损失 Mass loss (%) | 剩余电压 Residual OCV (%) | 测试结果 Test result |
| | 样品质量 $M_1$ Mass | 开路电压 Voltage | 样品质量 $M_2$ Mass | 开路电压 Voltage | | | |
| B1# | 110.0kg | 52.60V | 110.0kg | 52.45V | 0.00 | 99.71 | O |
| B2# | 109.6kg | 52.97V | 109.6kg | 52.83V | 0.00 | 99.74 | O |
| B3# | 109.7kg | 52.95V | 109.7kg | 52.80V | 0.00 | 99.72 | O |
| B4# | 109.9kg | 52.92V | 109.9kg | 52.75V | 0.00 | 99.68 | O |
| 其他补充：测试结果“O”代表判定该测试无渗漏，无排气，无解体，无破裂，无起火。<br>Supplements：Test result "O" decides that the test no leakage, no venting, no disassembly, no rupture, no fire. | | | | | | | |

| 38.3.4.5 | T.5：外部短路：External short circuit | P |
|---|---|---|
| 样品编号 Sample No. | 样品表面最高温度 Max external temperature（°C） | Test result 测试结果 |
| B1# | 58.6 | O |
| B2# | 57.3 | O |
| B3# | 58.2 | O |
| B4# | 58.6 | O |
| 其他补充：测试结果“O”代表判定该测试无解体，无破裂，无起火。<br>Supplements：Test result "O" decides that the test no disassembly, no rupture, no fire. | | |

| 38.3.4.6 | T.6:挤压 Crush | P |
|---|---|---|
| 样品编号<br>Sample No. | 样品表面最高温度<br>Max external temperature（°C） | 测试结果<br>Test result |
| C1# | 23.3 | O |
| C2# | 23.0 | O |
| C3# | 24.2 | O |
| C4# | 23.6 | O |
| C5# | 24.0 | O |
| C6# | 23.1 | O |
| C7# | 24.8 | O |
| C8# | 24.2 | O |
| C9# | 23.5 | O |
| C10# | 23.5 | O |
| 其他补充：测试结果“O”代表判定该测试无解体，无破裂，无起火。<br>Supplements：Test result "O" decides that the test no disassembly，no fire. | | |

| 38.3.4.7 | T7：过度充电：Overcharge | | P |
|---|---|---|---|
| 样品编号<br>Sample No. | 测试结果<br>Test result | 样品编号<br>Sample No. | 测试结果<br>Test result |
| B5# | O | B7# | O |
| B6# | O | B8# | O |
| 其他补充：测试结果“O”代表判定该测试无解体，无起火。<br>Supplements ：Test result "O" decides that the test no disassembly，no fire. | | | |

| 38.3.4.8 | T8：强制放电:Forced discharge | | P |
|---|---|---|---|
| 样品编号<br>Sample No. | 测试结果<br>Test result | 样品编号<br>Sample No. | 测试结果<br>Test result |
| C11# | O | C21# | O |
| C12# | O | C22# | O |
| C13# | O | C23# | O |
| C14# | O | C24# | O |
| C15# | O | C25# | O |
| C16# | O | C26# | O |
| C17# | O | C27# | O |
| C18# | O | C28# | O |
| C19# | O | C29# | O |
| C20# | O | C30# | O |
| 其他补充：测试结果“O”代表判定该测试无解体，无起火。<br>Supplements ：Test result "O" decides that the test no disassembly，no fire. | | | |

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