

Product Specification

产品规格承认书

Customer Code 客户代码: _____

Customer Part Number.客户产品料号: _____

Coincell Battery cell Model. 科恩电芯型号: _____ **M9440S3**

Coincell Battery Part Number.科恩产品料号: _____ **209-00XXX-000**

Prepared by 制作人	Checked by 审核人	Approved by 批准人
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Customer Approval 客户承认	Customer Signature/Date 客户签名/日期	Customer Company Stamp 客户公司盖章

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Revision History

版本履历表

Revision 版本	Description 内容描述	Issued by 发行人	Approved by 审批人	Date 日期
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1. Scope 概述

This document describes the specification of rechargeable Li-ion battery cell which is designed and manufactured by **Shenzhen Coincell Battery Co., Ltd.**

这文件描述由**深圳市科恩瑟尔电池有限公司**设计制造的可充电锂离子电芯的规格。

2. Battery cell specification 电芯规格:

No.	Item 项目	Parameters 参数	
1	Battery cell model 电芯型号	M9440S3	
2	Minimum capacity 最小容量 (0.2C discharge current 放电电流)	30mAh (1mA discharge 30.5mAh) (4.2V discharge 25.5mAh)	
3	Typical capacity 典型容量 (0.2C discharge current 放电电流)	32mAh (1mA discharge 32.5mAh) (4.2V discharge 27mAh)	
4	Nominal voltage 标称电压	3.73V	
5	Shipment voltage 出货电压	3.6~3.8V	
6	Shipment Status of charge 出货容量状态	≤30%	
7	Charge ending voltage 充电限制电压	4.35V	
8	Discharge ending voltage 放电终止电压	3.00V	
9	Maximum cell dimension 电芯最大尺寸	D: 9.5mm , H:4.0mm	
10	Cell weight 电芯重量	Appr 0.8g	$\leq 1100\text{m}\Omega$ (备注: 出厂时间小于6个月, 循环次数小于30次; Cycle < 30, when shipping < 6 months)
11	Cell Impedance 内阻 (V=3.6-3.8V)	30mA, 1C 15mA, 0.5C	
12	Max charge current 最大充电电流	30mA, 1C 15mA, 0.5C	
13	Max discharge current 最大放电电流	30mA, 1C 6.0mA, 0.2C	15°C≤T≤60°C -20°C≤T<15°C
14	Operating temperature 工作温度范围	Charge 充电: 0-45°C / Discharge 放电: -20-60°C	
15	Cycle life 循环寿命 (RT: 25±3°C) (0.5C charge 充电, 0.5C discharge 放电)	1200次充放电后, 电池恢复80%的初始容量, 电芯膨胀率≤1%。 After 1200 cycles charge/discharge, battery can recover 80% of its initial capacity Cell swell ≤1%.	
16	Storage Method 储存方式 (相对湿度RH≤85%)	1 Month at -20 to 60 °C 3 Month at -20 to 45 °C 1 Year at -20 to 30 °C	Capacity Recovery Rate > 85% Capacity Recovery Rate > 90% Capacity Recovery Rate > 90%
17	Certification requirement 认证要求	UL1642, IEC62133, UN38.3, Reach, RoHS	

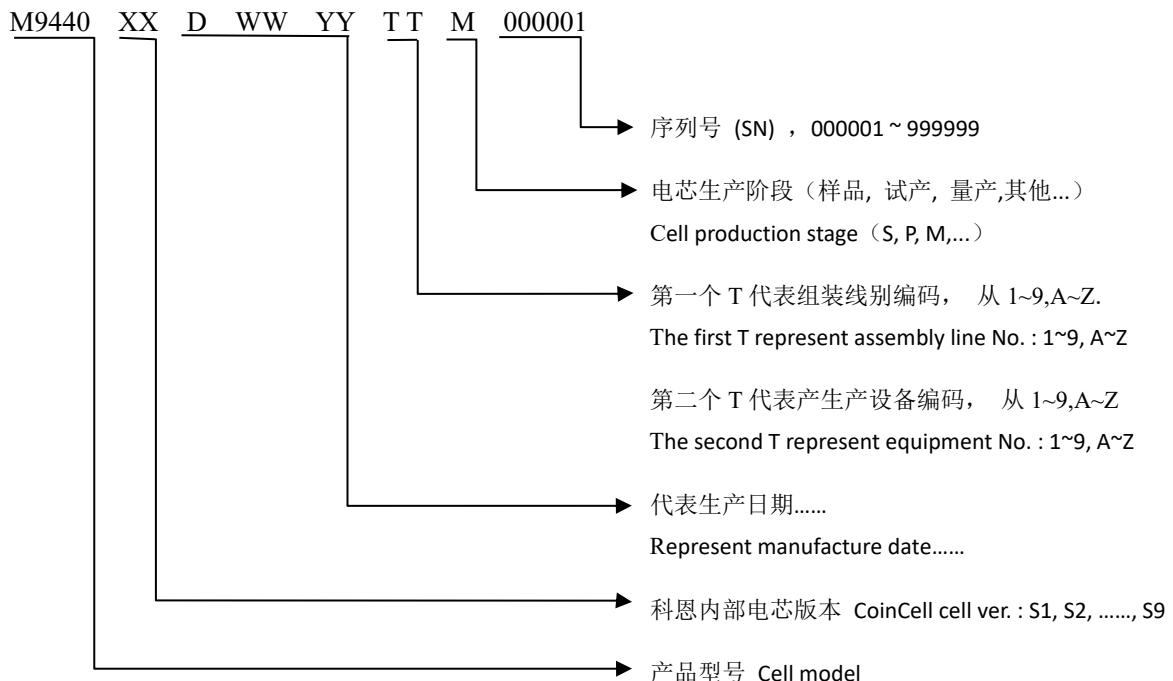
2.1 Tracking No. DM code laser etching content 电池跟踪二维码激光蚀刻内容:



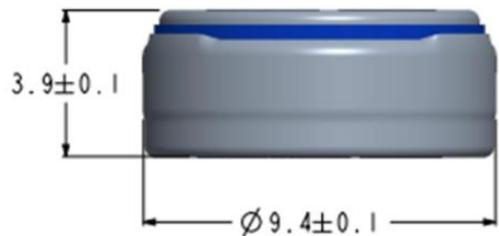
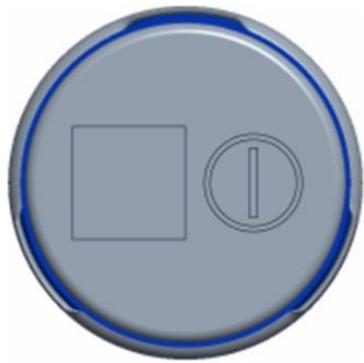
代表生产批次号
Represent the production batch number

DM Size 尺寸: $3.0 \pm 0.5\text{mm}$

DM code 二维码内容:



2.2 Cell drawing 电芯示意图



3. Environmental characteristics 环境特性

No.	Test item 测试项目	Test Method 测试方法	Pass Criteria 合格标准
1	Charged Storage Characteristics 荷电保持能力	<p>At ambient temperature of $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$, after the battery is fully charged with a charge of 0.2C current, and is discharged at a constant current of 0.2C down to the end voltage cycle once, this discharge capacity is initial capacity; The cell is fully charged with a charge of 0.2C current, then standby for 10 minutes, measure the cell Voltage $V1$, impedance $R1$ and thickness $T1$; After fully charged, the cell is left open for 28 days under the condition of $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$, then take it out and put it at room temperature for 2h, then measure the cell voltage $V2$, impedance $R2$, thickness $T2$; Then the cell shall be discharged at a constant current of 0.2C down to the end voltage and record the capacity as the retention capacity; After the battery cell is fully charged with a charge of 0.2C current, and is discharged at a constant current of 0.2C down to the end voltage, and record the discharge capacity as recovery capacity;</p> <p>在 $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$ 的环境下, 电芯按照 0.2C 电流充电方式充满电后, 0.2C 放电至终止电压循环 1 次, 记为初始容量; 电芯再次按照 0.2C 电流充电方式充满电, 然后静置 10min, 测试电芯电压、内阻、厚度; 充满电后电芯在 $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$ 的条件下开路搁置 28 天后, 取出在室温搁置 2h 后, 测试电芯电压、内阻、厚度; 以 0.2C 恒流放电至终止电压, 记录该容量为保持容量电芯再以 0.2C 电流充电方式充满电后, 以 0.2C 放电至终止电压, 记录该放电容量为恢复容量;</p>	<p>Cap.-Retention $\geq 85\% \text{Cini}$</p> <p>Cap.-Recovery $\geq 95\% \text{Cini}$</p> <p>Expansion Rate $< 3\%$</p> <p>保持容量 \geq 初始容量的 85%</p> <p>恢复容量 \geq 初始容量的 95%</p> <p>存储膨胀小于 3%</p>
2	Rate discharge 不同倍率放电	<p>The battery shall be fully charged with a charge of 0.2C current, Then discharge at $0.2\text{C}/0.5\text{C}/1\text{C}/2\text{C}$ current to the termination voltage, and record the discharge capacity</p> <p>电芯以 0.2C 电流充电方式充满电; 再分别以 $0.2\text{C}/0.5\text{C}/1\text{C}/2\text{C}$ 电流放电至终止电压, 并记录放电容量</p>	<p>0.2C Cap. $\geq 100\% \text{Cini}$</p> <p>0.5C Cap. $\geq 95\% \text{Cini}$</p> <p>1.0C Cap. $\geq 92\% \text{Cini}$</p> <p>0.2C 放电容量 $\geq 100\%$ 初始容量</p> <p>0.5C 放电容量 $\geq 95\%$ 初始容量</p> <p>1C 放电容量 $\geq 92\%$ 初始容量</p>
3	High Temperature Test 高温试验	<p>At an ambient temperature of $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$, test initial capacity with standard charge and discharge, then it is fully charged with a charge of 0.2C current. Adjusting the temperature humidity chamber to $55 \pm 2^{\circ}\text{C}$ and mantaning the battery at the temperature for 2h, then the battery is discharged at a constant current of 0.2C down to the final voltage, record the discharge time and discharge capacity; take out the battery cell and leave it at room temperature for 2h, and then visually inspect the appearance of the battery cell.</p> <p>在环境温度 $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$ 的条件下, 以标准充放电测试初始容量, 然后 0.2C 恒流恒压充满电。调节恒温箱至 55°C, 将电芯放入该温箱中恒温 2h, 然后以 0.2C 电流放电至终止电压, 记录放电时间和放电容量, 将电芯取出在常温下搁置 2h, 然后目测电芯外观。</p>	<p>55°C Capacity $\geq 95\% \text{Cini}$</p> <p>No distortion, no smoking</p> <p>55°C 容量 $\geq 95\%$ 初始容量</p> <p>无形变、无冒烟</p>
4	Low Temperature Test 低温试验	<p>At an ambient temperature of $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$, test initial capacity with standard charge and discharge, then it is fully charged with a charge of 0.2C current. Adjusting the temperature humidity chamber to -10°C and mantaning the battery at the temperature</p>	<p>-10°C Capacity $\geq 80\% \text{Cini}$</p> <p>No distortion, no smoking</p>

		<p>for 2h, then the battery is discharged at a constant current of 0.2C down to the final voltage, record the discharge time and discharge capacity; take out the battery cell and leave it at room temperature for 2h, and then visually inspect the appearance of the battery cell.</p> <p>在环境温度 $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$ 的条件下, 以标准充放电测试初始容量, 然后 0.2C 恒流恒压充满电。调节恒温箱至 -10°C, 将电芯放入该温箱中恒温 2h, 然后以 0.2C 电流放电至终止电压, 记录放电时间和放电容量, 将电芯取出在常温下搁置 2h, 然后目测电芯外观。</p>	<p>-10°C容量≥80%初始容量</p> <p>无形变、无冒烟</p>
5	High-temperature storage 高温存储	<p>At ambient temperature of $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$, after the battery is fully charged with a charge of 0.2C current , and is discharged at a constant current of 0.2C down to the end voltage cycle once, this discharge capacity is initial capacity;The cell is fully charged with a charge of 0.2C current , then standby for 10 minutes, measure the cell Voltage V1, impedance R1 and thickness T1;Adjusting the oven to $85^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and keeping battery at the temperature for 4h, then the sample return to room temperature for 2h,measure the cell voltage V2, impedance R2, thickness T2; Then the cell shall be discharged at a constant current of 0.2C down to the end voltage and record the capacity as the retention capacity;After the battery cell is fully charged with a charge of 0.2C current, and is discharged at a constant current of 0.2C down to the end voltage, and record the discharge capacity as recovery capacity;</p> <p>在 $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$ 的环境下, 电芯按照 0.2C 电流充电方式充满电后, 0.2C 放电至终止电压循环 1 次, 记为初始容量; 电芯再次按照 0.2C 电流充电方式充满电, 然后静置 10min, 测量电芯电压、内阻、厚度; 高温箱调至 $85^{\circ}\text{C} \pm 2^{\circ}\text{C}$, 样品放入 高温箱中, 放置 4 小时, 取出在室温下静置 2 小时, 测量电芯电压、内阻、厚度, 然后以 0.2C 电流放电至终止电压, 记录该容量为保持容量; 电芯再以 0.2C 恒流-0.02C 截止充电方式充满电后, 以 0.2C 电流放电至终止电压, 记录该放电容量为恢复容量;</p>	<p>Cap.-Retention $\geq 80\%$Cini</p> <p>Cap.-Recovery $\geq 90\%$Cini</p> <p>Expansion Rate $< 3\%$</p> <p>保持容量$\geq 80\%$Cini;</p> <p>恢复容量$\geq 90\%$Cini,</p> <p>存储膨胀小于 3%;</p>
6	恒定湿热	<p>At ambient temperature of $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$, after the battery is fully charged with a charge of 0.2C current , and is discharged at a constant current of 0.2C down to the end voltage cycle once, this discharge capacity is initial capacity;The cell is fully charged with a charge of 0.2C current , then standby for 10 minutes, measure the cell Voltage V1, impedance R1 and thickness T1;Adjusting the temperature humidity chamber to $65^{\circ}\text{C} \pm 2^{\circ}\text{C}$&90%RH and keep the battery at the temperature and humidity for 7days, take it out and let it stand at room temperature for 2 hours, and test the cell voltage, impedance, and Height;Then the cell shall be discharged at a constant current of 0.2C down to the end voltage and record the capacity as the retention capacity;After the battery cell is fully charged with a charge of 0.2C current, and is discharged at a constant current of 0.2C down to the end voltage, and record the discharge capacity as recovery capacity;</p> <p>在 $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$ 的环境下, 电芯按照 0.2C 电流充电方式充满电后, 0.2C 放电至终止电压循环 1 次, 记为初始容量; 电芯再次按照 0.2C 电流充电方式充满电, 然后静置 10min, 测量电芯电压、内阻、厚度; 将恒温恒湿箱调至 $65^{\circ}\text{C} \pm 2^{\circ}\text{C}$&90%RH, 将电芯放入温箱中搁置 7 天后, 取出在室温下静置 2 小时, 测量电芯电压、内阻、高度, 然后以 0.2C 电流放电至终止电压, 记录该容量为保持容量; 电芯再以 0.2C 恒流-0.02C 截止充电方式充满电后, 以 0.2C 电流放电至终止电压, 记录该放电容量为恢复容量;</p>	<p>Cap.-Retention $\geq 80\%$Cini</p> <p>Cap.-Recovery $\geq 90\%$Cini</p> <p>Expansion Rate $< 3\%$</p> <p>No deformation, No corrosion, No leakage ,No venting, No rupture</p> <p>保持容量$\geq 70\%$Cini;</p> <p>恢复容量$\geq 80\%$Cini,</p> <p>存储膨胀小于 3%;</p> <p>无变形、无锈蚀、不泄漏、不泄气、不破裂</p>

7	Simulate altitude 低气压	<p>At an ambient temperature of $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$, the cell is fully charged with a charge of 0.2C current (cut-off current of 0.02C), place it in a vacuum box, and gradually evacuate until the air pressure is less than or Equal to 11.6Kpa (simulated altitude of 15240 meters), and store at this pressure for 6 hours; record the voltage, weight and image of the battery before and after the test;</p> <p>在 $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$ 的环境温度下, 以 0.2C 电流 (截止电流 0.02C) 充电方式将电池充满电后, 放置在真空箱内, 逐渐抽真空至气压小于或等于 11.6Kpa(模拟海拔 15240 米), 并在该气压下保存 6 h; 记录试验前后电芯的电压、重量、图像;</p>	<p>No fire, No explosion, No leakage 不起火、不爆炸、不漏液</p>
8	Temperature Cycle 温度循环	<p>The fully charged battery is placed in a temperature-controllable box with the temperature to $72^{\circ}\text{C} \pm 2^{\circ}\text{C}$ carry out the following steps:1. Raise the temperature of the test chamber to $72^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and keep it for 6 H.2.Increase the temperature of the test chamber to $-40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and keep it for 6 H.3.Repeat steps (1~2) for 10 cycles.4.Repeat steps (a~B) for 10 cycles.</p> <p>将充满电的电池放置在温度为 $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$ 的可控温的箱体中进行如下步骤: 1. 将试验箱温度升高为 $72^{\circ}\text{C} \pm 2^{\circ}\text{C}$, 并保持 6 h; 2. 将试验箱温度降为 $-40^{\circ}\text{C} \pm 2^{\circ}\text{C}$, 并保持 6 h; 3. 重复步骤 (a~b), 共循环 10 次; 4. 在室温 $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$ 下至少保存 6 h。试验过程中每两个温度之间的转换时间不大于 30 min.。试验前后须测量电芯电压、内阻及拍照</p>	<p>No fire, No explosion, No leakage 不起火、不爆炸、不漏液</p>
9	Vibration 振动	<p>At an ambient temperature of $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$, the cell is fully charged with a charge of 0.2C current, and then undergoes simple tuning vibration with an amplitude of 0.8mm (0.03inch) [total maximum deviation 1.6mm (0.06inch)]; the vibration frequency changes at a rate of 1Hz/min within the range of 10~55Hz, and changes back within 90~100min. During the test, the cell vibrates in three mutually perpendicular directions. For batteries with only two axial directions, the cell should be tested in a direction perpendicular to each axis. Record the voltage, impedance and pictures before and after the cell test.</p> <p>在 $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$ 的环境温度下, 电芯以 0.2C 充满电后, 经受简单的调协振动, 振幅为 0.8mm (0.03inch) [总共最大偏移 1.6mm (0.06inch)]; 振动频率在 10~55Hz 范围内以 1Hz/min 的速率变化, 在 90~100min 内变回来。试验时, 电芯沿 3 个互相垂直的方向振动, 对于只有两个轴向的电池, 电芯应沿垂直于每个轴的方向试验。记录电芯试验前后的电压、内阻、图片。</p>	<p>OCV $\geq 90\%$ Initial, weight loss < 0.2% No fire, No explosion, No leakage 开路电压 $\geq 90\%$ 初始电压, 重量损失 < 0.2% 不起火、不爆炸、不漏液</p>
10	Free fall 自由跌落	<p>At the temperature of $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$, the battery shall be fully charged at 0.2 C and dropped freely on the cement floor at the position of 1.5 m. The two end surfaces of the cylindrical and button batteries shall be dropped once respectively, and the cylindrical surface shall be dropped twice. Four drop tests shall be carried out in total. Each surface of the square and flexible packaged batteries shall be dropped once, and six tests shall be carried out in total.</p> <p>在 $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$ 的温度下, 以 0.2C 充电方式充满电, 按 1.5m 的位置自由跌落到水泥地面上, 圆柱型和纽扣型电池两个端面各跌落一次, 圆柱面跌落两次, 共计进行四次跌落试验; 方型和软包装电池每个面各跌落一次, 共进行六次试验。</p>	<p>OCV $\geq 90\%$ Initial No fire, No explosion, No leakage 开路电压 $\geq 90\%$ 初始电压 不泄漏、不起火、不爆炸</p>

4. Safety Test 安全测试

Coincell battery can meet several international safety standards. Below is part of safety tests which are referred to international standard.

深圳市科恩瑟尔电池有限公司的电池能达到多个国际电池安全标准。以下是部分安全测试项目。

No.	Test item 测试项目	Test Method 测试方法	Criteria 标准
1	Overcharge Test 过充电测试	Battery cell is fully charged by standard charge process. Then, the battery is charged by 3.0C rate constant current and voltage to 4.6V for 7hrs. 电芯按标准充电流程满充电。之后电芯用 3C4.6V 恒流恒压充电 7 小时。	No fire, No explosion 不起火、不爆炸
2	Over discharge Test 过放电测试	At 25±3°C, battery cell is discharged by 0.2C until 3.0V. And then battery cell is connected the load with 30Ω to discharge for 7hours. 电芯在 23±3°C 用 0.2C 放电到 3.0V。之后电芯连接 30Ω 负载放电 7 小时。	No fire, No explosion 不起火、不爆炸
3	Forced discharge 强制放电	At the ambient temperature of 20 °C ± 5 °C, discharge the test sample to the end voltage at a constant current of 0.2 C, and charge it reversely to the negative upper limit voltage at a current of 1 C for a total of 90 min. Record the temperature, voltage and current of the test sample during the test; record the test process; and take photos of the test sample after the test. 在 23°C±3°C 的环境温度下，将测试样本以 0.2C 恒流放电至终止电压，以 1C 的电流进行反向充电至负的充电上限电压，反向充电时间共计 90 min，记录试验过程中测试样本的温度、电压、电流；对试验过程进行录像；对试验后测试样本进行拍照。	No fire, No explosion 不起火、不爆炸
4	Short test 短路测试	Battery cell is fully charged by standard charge process. Then, battery cell anode and cathode connected to 80±20mΩ load for 1hour. 电芯按标准充电流程满充电。电芯的正负极连接到 80±20 mΩ 负载 1 小时。	No fire, No explosion The Temperature of the Battery surface not exceeded than 150°C 无起火，无爆炸，表面温度≤150°C
5	Projectile Test 焚烧测试	Battery cell is fully charged by standard charge process. Battery cell is placed on the screen which is to be constructed by steel wire mesh. The screen is mounted above the burner. And eight-sided covered wire cage is to be placed over the battery cell. Battery cell is to be heated and remain on the screen until it explodes or has been ignited or burned out. 电芯按标准充电流程满充电。将电芯放在钢丝网上，钢丝网下有燃烧器和钢丝网被八面铝网盖住。电芯在钢丝网上被加热直到电芯爆炸或被点燃或完全烧毁。	No part of an exploding cell shall penetrate the wire screen. 电芯的任何部分不得穿出此八面铝网。

6	Crush test 挤压测试	<p>Battery cell is fully charged by standard charge process.</p> <p>The battery cell is to be crushed with its longitudinal axis parallel to the surfaces of crushing apparatus.</p> <p>The surfaces are to be brought in contact with cell and the crushing is to be continued until an applied force of $13 \pm 1\text{kN}$ is reached. Once the maximum force has been obtained, it is to be released.</p> <p>电芯按标准充电流程满充电。</p> <p>电芯的纵向跟平面金属板间平行，持续施加 $13 \pm 1\text{kN}$ 的压力挤压，直到压力达到 $13 \pm 1\text{KN}$ 时停止并释放压力。</p>	No fire, No explosion, 不起火，不爆炸
7	Impact 重物冲击	<p>At an ambient temperature of $20^\circ\text{C} \pm 5^\circ\text{C}$, the cell is fully charged with a charge of 0.2C current (cut-off current of 0.02C). A test sample battery is to be placed on a flat surface. A $15.8 \pm 0.1\text{-mm}$ ($5/8 \pm 0.004\text{-in}$) diameter metal bar is to be placed across the center of the sample. A $9.1 \pm 0.46\text{-kg}$ ($20 \pm 1\text{-lb}$) weight is to be dropped from a height of $610 \pm 25\text{ mm}$ ($24 \pm 1\text{ in}$) onto the sample, and observe for 6 hours. Record the initial voltage and internal resistance of the cell.</p> <p>电芯按标准充电流程满充电。将电池放置于平台表面，将直径为$\Phi 15.8\text{mm} \pm 0.2\text{ mm}$ 的金属棒放在电池几何中心表面上，采用质量 $9.1 \pm 0.1\text{Kg}$ 的重物从 $610 \pm 25\text{mm}$ 的高处,以自由落体状态撞击放有金属棒的电池表面上，并观察 6 h，记录电芯初始电压、内阻</p>	No fire, No explosion, 不起火，不爆炸
8	Heat abuse 热滥用	<p>At an ambient temperature of $23^\circ\text{C} \pm 3^\circ\text{C}$, the cell is fully charged with a charge of 0.2C current, and heat the cells in a natural convection or flowing air oven. The temperature of the oven is $5 \pm 2^\circ\text{C}$ ($9 \pm 3.6^\circ\text{F}$)/min speed up to $130 \pm 2^\circ\text{C}$ ($266 \pm 3.6^\circ\text{F}$), after reaching $130 \pm 2^\circ\text{C}$, The cell remains at this temperature for 30 min before the test is discontinued.</p> <p>在环境温度 $23^\circ\text{C} \pm 3^\circ\text{C}$ 的条件下，以 0.2C 充电方式充满电，将电芯在自然对流或流动空气烘箱中加热，烘箱温度以 $5 \pm 2^\circ\text{C}/\text{min}$ 速度升温到 $130 \pm 2^\circ\text{C}$，保持 30 分钟后停止。</p>	No fire, No explosion, 不起火，不爆炸

5. Performance and Test Criteria 电池性能和测试标准

5.1 Standard Test Criteria 标准测试标准

If test criteria is not defined, test should be done under the below standard test criteria.

如果测试标准没有定义，测试标准会按以下测试完成。

Test Criteria 测试标准	Parameters 参数
Ambient Temperature 环境温度	23±3°C
Relative Humidity 相对湿度	65±20%
Atmospheric pressure 大气压力	86 ~ 106 KPa
Charge 充电	Standard charge process 标准充电流程
Discharge 放电	Standard discharge process 标准放电流程
Delivery Time from Coincell 从科恩瑟尔发出时间	Within 1month 一个月内

5.2 Visual Inspection 外观检查

No crack, no leakage

没有破裂，没有漏液

5.3 Measuring Instrument Standard 测量仪器标准

Instrument 仪器	Standard 标准
Instrument to measure dimension 测试尺寸仪器	Precision scale : 0.01mm 精度: 0.01mm
Voltmeter 伏特计	Internal impedance < 10kΩ/V 内阻 < 10kΩ/V
Ammeter 安培计	Impedance of ammeter and wires < 0.01Ω 安培计和电线内阻 < 0.01Ω
Impedance meter 阻抗计	Impedance is measured by sinusoidal 1kHz AC current 内阻测试用1kHz正弦交流电流

5.4 Standard charge process 标准充电流程

Battery pack is charged by 0.2C constant current at $23\pm3^{\circ}\text{C}$ until 4.35V. Then, battery cell is charged by constant voltage until current drop to 0.02C.

在 $23\pm3^{\circ}\text{C}$ ，电池成品以0.2C恒流电流充电直到4.35V，电池用恒压充电直到电池电流降到0.02C。

5.5 Standard discharge process 标准放电流程

Battery pack is discharged by 0.2C continuous current at $23\pm3^{\circ}\text{C}$ until the voltage drop to 3.0V.

在 $23\pm3^{\circ}\text{C}$ ，电池成品以0.2C连续放电电流放电直到3.0V。

5.6 Maximum charge current 最大充电电流

Battery pack is charged by 1C constant current at $23\pm3^{\circ}\text{C}$ until 4.35V. Then, battery pack is charged by constant voltage at 4.35V until current drop to 0.02C.

在 $23\pm3^{\circ}\text{C}$ ，电池成品以 1C恒流电流充电直到4.35V，电池用恒压充电直到电池电流降到0.02C。

5.7 Maximum discharge current 最大放电电流

Battery pack is discharged by 1C continuous current at $23\pm3^{\circ}\text{C}$ until the voltage drop to 3.0V.

在 $23\pm3^{\circ}\text{C}$ ，电池成品以1C连续放电电流放电直到3.0V。

5.8 Initial impedance 初始内阻值

Battery pack is fully charged by standard charge process.

The impedance of fully charged battery cell is tested by AC impedance tester at 1kHz. The initial impedance should be $\leq 1100\text{m}\Omega$.

电池成品用标准充电流程充满电。再使用交流阻抗测试仪 (at 1KHz) 测量初始内阻。电芯初始内阻应 $\leq 1100\text{m}\Omega$ 。

5.9 Initial capacity 初始容量值

Battery pack is fully charged by standard charge process and then battery cell is fully discharged by standard discharge process.

The initial capacity is $\geq 30\text{mAh}$.

电池成品用标准充电流程充满电。电芯再用标准放电流程放完电。电芯初始容量 $\geq 30\text{mAh}$ 。

5.10 Life Cycles 循环寿命

Test procedure 测试步骤 (RT: $23\pm3^{\circ}\text{C}$)

Step 1: Battery pack is charged by 0.5C constant current at $23\pm3^{\circ}\text{C}$ until 4.35V. Then, battery cell is charged by constant voltage at 4.35V until current drop to 0.02C.

Step 2: Wait for 10mins

Step 3: Battery pack is discharged by 0.5C continuous current at $23\pm3^{\circ}\text{C}$ until the voltage drop to 3.0V.

Step 4: Wait for 10mins

Step 5: Repeat step1 to step 4 until discharge capacity is less than 80% of initial battery capacity. Cycle life should be more than or equal to 1200cycles.

- 1) 电池成品在 $23\pm3^{\circ}\text{C}$ 按 0.5C 恒流充电直到 4.35V。再用 4.35V 恒压充电直到充电电流小于 0.02C。
- 2) 等待 10 分钟
- 3) 电池成品在 $23\pm3^{\circ}\text{C}$ 按 0.5C 恒流放电直到 3.0V
- 4) 等待 10 分钟
- 5) 重复 1) 到 4) , 直到放电容量小于初始容量 80%。

循环寿命需要大于等于 1200 周。

6. Usage of battery 使用电池

Shenzhen Coincell Battery Co., Ltd. Ltd **DO NOT** take responsibility if customer **DO NOT** follow the specification and below instruction using the battery.

如果客户**没有**按规格书和以下说明使用电池，深圳科恩瑟尔将**不负任何责任**。

To have good performance of battery, battery should follow this battery specification to use and storage. Recommend to charge battery every 6months using standard charge process.

To use the battery safe, battery is prohibited to disassemble, drop, heat, burn, soak, crush, shock, short circuit.

Enough insulation inside the customer's end product is required to avoid the short circuit of the battery. Battery should have enough space to install inside the customer's end product. Please use the maximum dimension of battery pack after cycle life to reserve the space.

To protect the battery, battery should be installed in the customer's end product with strong mechanical strength.

Any movement of the battery in the end product should be avoided.

If battery has any abnormal feature such as battery cannot be charged and discharge, abnormal heat generate, deformation, smelling of electrolyte or leakage, battery should be stopped to use immediately. Battery with smelling of electrolyte or leakage should be placed away from fire. Electrolyte is harmful. If electrolyte is contacted the skin or eyes, please flush electrolyte by purified water and consult doctor.

为了电池保持良好的性能，电池需要按本规格书使用和储存。

建议电池每6个月按标准充电流程充电一次。

为了安全使用电池，电池禁止拆解，掉落，加热，焚烧，浸泡，挤压，撞击，短路。

客户终端产品需要有足够的绝缘，避免电池被短路。

客户终端产品需要有足够的空间组装电池。空间需求请按规格书中循环后的电池成品最大尺寸进行设计。

客户终端产品需要有强力的结构保护电池。

请避免电池在客户终端产品中能移动。

如果电池有异常特征，比方说电池不能充放电，发热异常，变形，有电解液气味或漏夜，电池应马上停止使用。

电池有电解液气味或漏夜须要远离火种。电解液是有害的。如果电解液接触到皮肤或眼睛，请马上用纯净水冲洗和就医。

7. Warranty 保证期

Shenzhen Coincell Battery Co., Ltd. guarantees the battery at good condition within **12months** when battery is delivered from Coincell factory. Cell should charge with storage more than 6 months.

深圳科恩瑟尔保证电池从出厂日起**12个月内**功能良好，电池存储时间大于6个月及时充电。

8. Others 其他

8.1 Prohibition disassemble 禁止拆卸

- 1) Never disassemble the cells. The disassembling may generate internal short circuit in the cell, which may cause gassing, firing, explosion, or other problems.
- 2) Electrolyte is harmful. LIP battery should not have liquid from electrolyte flowing, but in case the electrolyte come into contact with the skin, or eyes, physicians shall flush the electrolyte immediately with fresh water and medical advice is to be sought.
 - 1) 不要拆卸电池。拆卸电池会发生电池内部短路，会引起起火、爆炸、有害气体或者其它问题。
 - 2) 电解液是有害的。万一电解液沾到皮肤、进入眼睛，应立即用清水冲洗以及求助医生。

8.2 Prohibition of dumping of battery into fire 不要把电池倾倒入火中

Never incinerate nor dispose the cells in fire. These may cause explosion of the cells, which is very Dangerous and is prohibited.
不要焚烧电池，否则会致电池爆炸，这很危险，必须禁止。

8.3 Prohibition of use of damaged battery 禁止使用损坏的电池

The cells might be damaged during shipping by shock. If any abnormal features of the cells are found such as damages in a plastic envelop of the cell, deformation of the cell package, smelling of an electrolyte, an electrolyte leakage and others, the cells shall never be used any more. The Cells with a smell of the electrolyte or a leakage shall be placed away from fire to avoid firing or explosion.

电池可能在出货途中碰撞而受损。如果发现电池有异常，例如包装损坏、电池包裹变形，有电解液的味道、发现漏液等等，不要再使用这些电池。电池如果有电解液的味道或者出现漏液，电池放置应该远离火源避免起火及爆炸。

8.4 The following warning language is to be provided with the information packaged with the small cells and batteries or equipment using them

以下警告语言将提供与小型电池、电池或设备一起使用的信息：

- Keep batteries out of reach of children to avoid being swallowed. Swallowing may lead to burns, perforation of soft tissue, and death. Severe burns can occur within 2 h of ingestion. In case of ingestion of a cell or battery, seek medical assistance promptly.
把电池放到小孩够不到的地方以免吞服，吞下可能导致烧伤、软组织穿孔和死亡。如摄入电池，应立即寻求医疗救助，2小时内未进行处理可能会导致严重灼伤。
- If children use the battery, their guardians should explain the proper handling.
小孩使用电池时，监护人应详细解释操作方法。

8.5 Any other items are not covered in the specification shall be agreed by both parties.

任何本规格书没有包括的事项，需要双方协议确定。