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检测
TESTING
CNAS L0128

210900110152　(2021)沪市监认验第 135 号

W02214600341E

KSWkCevx

检 测 报 告

Test Report

产品名称：	可充电锂电池包
Name of Sample	**Rechargeable Li-ion Battery Module**
型号规格： Type	**LX C9.2-10**
委托单位：	固德威技术股份有限公司
Applicant	**GoodWe Technologies Co., Ltd.**
检测类别：	委托检测
Test Purpose	**Entrusted**

上海市质量监督检验技术研究院
检验检测专用章
DZ

上 海 市 质 量 监 督 检 验 技 术 研 究 院

Shanghai Institute of Quality Inspection and Technical Research

上海市质量监督检验技术研究院
Shanghai Institute of Quality Inspection and Technical Research
检测报告
Testing Report

报告编号 Report No.:W02214600341E

样品名称 Name of Sample	可充电锂电池包 Rechargeable Li-ion Battery Module	检测类别 Test Purpose	委托检测 Entrusted
型号规格 Type	LX C9.2-10	商标 Trade Mark	/
等级 Grade	合格品 / Qualified products		
委托单位 Applicant	固德威技术股份有限公司 GoodWe Technologies Co., Ltd.		
受检单位 Tested Company	/		
标称生产单位 Producer	江苏海基新能源股份有限公司 Jiangsu Higee Energy Co., Ltd.		
委托书编号 Number of Client	6009341	委托/抽样日期 Entrusting/Sampling Date	2022.06.13
到样日期 Reception Date	2022.06.13	抽样地点 Sampling Spot	/
样品数量 Sample Quantity	1 套 / set	受检批数量 Sum of Sample	/
生产日期 Date of Production	/	批号/编号 Original Number	/
样品到样状态 Situation of Sample	完好 邮寄到样 Intact Delivered by mail		
检测地点 Testing Place	上海市闵行区江月路 900 号 No. 900 Jiangyue Road Minhang District Shanghai		
检测依据 Test Standard/ Judgment Rules	ST/SG/AC.10/11/Rev.7 section38.3 试验和标准手册 第 38.3 部分 金属锂电池和锂离子电池组 Manual of Tests and Criteria，Section 38.3, Lithium metal and lithium ion batteries		
检测日期 Date of Testing	2022.06.13 至/to 2022.07.08		
检测结论 Conclusion	该样品本次所检项目检测结果符合上述检测依据相关规定。详见本报告检测结果汇总页。 The test results accord with the requirements of the relevant standards or judgments quoted above. See the details on the page of summary. (检测报告专用章)(Test Report Badge) 签发日期/Issued Date: 2022.09.29		
委托单位通讯资料 Client's Message	地址 Add.	江苏省苏州市高新区紫金路 90 号 No.90 Zijin Rd., New District, Suzhou, 215011, China	
	邮编 Zip Code	/	电话 Tel. +86-15950057889
备注 Remarks	本报告检验检测结论是根据检验检测依据仅对所检项目得出的，不代表未经检验检测的项目或功能符合要求。本报告具有中文和英文，以中文为准。The test report only offers the conclusions for the tested items according to the relevant testing standards which are not included the conclusions of the untested items or performances. The test report has two versions, one in Chinese, the other in English. The Chinese one is in priority.		

批准 Approved by: 谢磊雷 Xieleilei 室主任 Director

审核 Checked by: Chen Susheng

主检 Tested by: Zhouyi

检测报告
Testing Report

检测结果汇总 Collection of The Test Results					
序号 No.	检测项目 Test Items	技术要求 Technical Requirements	检测结果 Test Results	单项判定 Judgements by Single Item	备注 Remarks
1	高度模拟 Altitude Simulation	见第 5 页 Page 5	见第 5 页 Page 5	符合 Complies	/
2	温度试验 Thermal test	见第 6 页 Page 6	见第 6 页 Page 6	符合 Complies	/
3	振动 Vibration	见第 7 页 Page 7	见第 8 页 Page 8	符合 Complies	/
4	冲击 Shock	见第 8-9 页 Page 8-9	见第 9 页 Page 9	符合 Complies	/
5	外部短路 External short circuit	见第 10 页 Page 10	见第 10 页 Page 10	符合 Complies	/
6	挤压 Crush	见第 11 页 Page 11	见第 12 页 Page 12	符合 Complies	/
7	过度充电 Overcharge	见第 13 页 Page 13	/	不适用 Not applicable	/
8	强制放电 Forced discharge	见第 14 页 Page 14	见第 15 页 Page 15	符合 Complies	/
9	照片 / 图纸 Photos / Graphs	/	见第 16-18 页 Page 16-18	/	/

测 试 描 述 / Test Description

样品描述/ Item Description：

样品类型……..:	■ 可充电 □ 不可充电
Test item type……..:	■ rechargeable □ non-rechargeable
受试样品为.....:	□ 电池 ■ 元件电池 ■ 电池组 □ 单电池电池组 □ 电池组件
Test item……..…..:	□ cell ■ component cell ■ battery □ single cell battery □ battery assembly
电池外观.....:	□ 圆柱型（直径≥18mm） □ 圆柱型（直径<18mm） ■ 方型 □ 软包 □ 纽扣 □ 其他 _____
Cell shape……..…..:	□ cylindrical (diameter ≥ 18mm) □ cylindrical (diameter < 18mm) ■ prismatic □ pouch □ coin/button □ other _____
电池重量.....:	■ >500g □ ≤500g
Mass of cell.....:	■ >500g □ ≤500g
电池组重量.....:	■ >12kg □ ≤12kg
Mass of battery.....:	■ >12kg □ ≤12kg
电池组过充电.....:	□ 带有过充电保护装置 ■ 未带过充电保护装置
Overcharge protection:	□ equipped ■ not equipped

本次试验：

电池组样品名称：可充电锂电池包；

Test item particulars: Rechargeable Li-ion Battery Module；

型号/ Model：LX C9.2-10；

额定容量：240Ah；标称电压：38.4V；额定能量：9.216kWh；

Ratings: 9.216kWh / 240Ah / 38.4V；充电限制电压/ Limited Charging Voltage：43.2V；

样品尺寸/ Dimensions：(468×641×204) mm；

电池组内部电池排列：2 并 12 串/ Structure: 2P12S；

样品数量/ Sample size: 4； 编号/ Numbered as: b1-b4。

测 试 描 述 / Test Description

内部元件电池型号/Model: LFP48173170E-120Ah；

额定容量：120Ah；标称电压：3.2V；额定能量：384Wh；

Ratings: 384Wh/ 120Ah/ 3.2V：

样品数量/ Sample size: 30；编号：/ Numbered as: c1-c30

本次试验依据试验和标准手册第38.3部分 金属锂电池和锂离子电池组38.3.4.1~38.3.4.6、38.3.4.8 条款进行了 T.1~ T.6、T.8 试验，结果符合。

The tests T.1 ~ T.6, T.8 are conducted according to Recommendations on the TRANSPORT OF DANGEROUS GOODS, Manual of Tests and Criteria, Section 38.3, Lithium metal and lithium ion batteries. The samples comply with the requirement of ST/SG/AC.10/11/Rev.7 section38.3.

测试结果详见检测结果页。

Results are as following pages.

注 1：本报告检测结果中“temp”指代“temperature”，“/”表示未做或不需填写。
Note 1: In this report, ‘temp’ refers to temperature and ‘/’means no need to fill in.
注 2：本报告中以“.” 表示小数点。
Note 2: Point is used as the decimal separator.

判定： Possible test case verdicts：	
要求不适用于该产品， 或不进行该项试验 -test case does not apply to the test object	N/A 或不适用
试验结果符合要求 -test object does meet the requirement	P 或合格 P (Pass)
试验结果不符合要求 - test object does not meet the requirement	F 或不合格 F (Fail)

条款 Clause	试验内容 Requirement & Tests	结果-评述 Results-remarks	判定 Verdict
38.3.4.1	T.1: 高度模拟 Altitude simulation	/	P
	目的：本试验模拟在低压条件下的空运。 要求：无渗漏，无排气，无解体，无破裂，无起火以及电压保存比例不少于 90%。 步骤: 测试电池和电池组置于 11.6kPa 的压力及 20℃±5℃环境下至少 6 小时。 Purpose: Simulates air transport under low-pressure conditions. Requirements: no leakage, no venting, no disassembly, no rupture, no fire, and the voltage after testing not less than 90% of which immediately before testing. Procedure: Test cells or batteries shall be stored at a pressure of 11.6kPa or less for at least six hour at ambient temperature (20±5)℃.	见表 T.1-2 See tableT.1-2 放置温度/ Ambient temp：22.8 ℃ 样品未泄漏、未排气、未解体、未破裂、未起火，电压保存比例高于 90% Test results comply with the requirements	P

表 T.1-2 电池组
Table T.1-2 Batteries

样品状态 State of samples	编号 No.	质量 Mass (kg)		质量损失 Mass loss (%)	电压 Voltage (V)		电压保存比例(%) Ratio of remaining voltage	结果 Results
		测试前 Pre-test	测试后 Post test		测试前 Pre-test	测试后 Post test		
第一个循环后完全充电状态 Fully charged after one cycle	b1	85.30	85.30	0.000	40.37	40.36	99.98	NL, NV, ND, NR, NF
	b2	85.35	85.35	0.000	40.45	40.45	100.00	NL, NV, ND, NR, NF
25 个循环后完全充电状态 Fully charged after 25 cycles	b3	85.30	85.30	0.000	40.28	40.28	100.00	NL, NV, ND, NR, NF
	b4	85.30	85.30	0.000	40.33	40.31	99.95	NL, NV, ND, NR, NF

注 Note：L=leakage 泄漏，V=venting 排气，D=disassembly 解体，R=rupture 破裂，F=fire 起火
NL=no leakage 未泄漏，NV=no venting 未排气，ND=no disassembly 未解体，NR=no rupture 未破裂，NF=no fire 未起火

条款 Clause	试验内容 Requirement & Tests	结果-评述 Results-remarks	判定 Verdict
38.3.4.2	T.2: 温度试验 Thermal test	/	P
	目的：评估电池和电池组的密封完整性和内部电气连接。试验利用迅速和极端的温度变化进行 要求：无渗漏，无排气，无解体，无破裂，无起火以及电压保存比例不少于 90%。 步骤：样品应该放置于 72℃±2℃的环境中至少 6 小时，随后置于-40℃±2℃的环境中至少 6 小时。两个极端试验温度之间的最大时间间隔为 30 分钟，整个过程重复 10 次，接着将样品置于 20℃±5℃的环境条件下 24 小时。对于大电池和电池组，暴露于极端试验温度的时间至少应为 12 小时。 Purpose: Assesses seal integrity and internal electrical connections. Requirements: no leakage, no venting, no disassembly, no rupture, no fire, and the voltage after testing not less than 90% of which immediately before testing. Procedure: Samples are to be stored for at least six hours at a test temperature equal to 72 ℃ ± 2 ℃, followed by storage for at least six hours at a test temperature equal to -40 ℃ ± 2 ℃. The maximum time interval between test temperature extremes in 30 minutes, This procedure is to be repeated until 10 total cycles are complete, after which all test cells and batteries are to be stored for 24 hours, at ambient temperature(20 ℃ ± 5 ℃). For large cells and batteries the duration of exposure to the test temperature extremes should be at least 12 hours.e test temperature extremes should be at least 12 hours.	见表 T.2-2 See tableT.2-2 上限温度/ Upper limit temp：72.0 ℃ 下限温度/ Lower limit temp：-40.0 ℃ 极限温度持续时间/ Temp extremes duration：12 h 样品未泄漏、未排气、未解体、未破裂、未起火，电压保存比例高于 90% Test results comply with the requirements.	P

表 T.2-2 电池组

Table T.2-2 Batteries

样品状态 State of samples	编号 No.	质量 Mass (kg)		质量损失 Mass loss (%)	电压 Voltage (V)		电压保存比例(%) Ratio of remaining voltage	结果 Results
		测试前 Pre-test	测试后 Post test		测试前 Pre-test	测试后 Post test		
第一个循环后完全充电状态 Fully charged after one cycle	b1	85.30	85.29	0.012	40.36	40.09	99.33	NL, NV, ND, NR, NF
	b2	85.35	85.34	0.012	40.45	40.13	99.21	NL, NV, ND, NR, NF
25 个循环后完全充电状态 Fully charged after 25 cycles	b3	85.30	85.29	0.012	40.28	40.02	99.35	NL, NV, ND, NR, NF
	b4	85.30	85.29	0.012	40.31	40.03	99.31	NL, NV, ND, NR, NF

注 Note：L=leakage 泄漏，V=venting 排气，D=disassembly 解体，R=rupture 破裂，F=fire 起火
NL=no leakage 未泄漏，NV=no venting 未排气，ND=no disassembly 未解体，NR=no rupture 未破裂，NF=no fire 未起火

条款 Clause	试验内容 Requirement & Tests	结果-评述 Results-remarks	判定 Verdict
38.3.4.3	T.3: 振动 Vibration	/	P
	目的：本试验模拟运输过程中的振动 要求：无渗漏，无排气，无解体，无破裂，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试验后的开路电压不小于进行这一试验前电压的 90%。 步骤：电池和电池组紧固在振动机器试验平台上，但紧固程度不能造成电池变形以致不能准确传递振动。振动以正弦波形式从 7Hz 扫描至 200Hz，再回到 7Hz，跨度为 15 分钟。该振动过程应在三个互相垂直的安装方向上，每一个方向重复 12 次，各 3 个小时。其中一个振动方向必须与端子面垂直。 对于总重量不超过 12 公斤的电池和电池 (电池和小电池)，以及总重量大于 12 公斤的电池 (大电池)，对数频率扫描应有所不同。 作对数扫频，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。 对大型电池组：从 7Hz 起以峰值加速度 1gn 持续到 18Hz，振幅维持在 0.8mm(总偏移 1.6mm) 增加频率直到峰值加速度达到 2gn（约 25Hz）。将最大加速度为 2gn，直到频率增加到 200Hz。 Purpose: Simulates vibration during transport. Requirements: no leakage, no venting, no disassembly, no rupture, no fire, and the voltage after testing not less than 90% of which immediately before testing. Procedure: 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 12kg (cells and small batteries), and for batteries with a gross mass of more than 12kg (large batteries). For large batteries: from 7 Hz to a peak acceleration of 1 gn is maintained unti18 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.	见表 T.3-2 See tableT.3-2 样品未泄漏、未排气、未解体、未破裂、未起火，电压保存比例高于 90% Test results comply with the requirements	P

表 T.3-2 电池组

Table T.3-2 Batteries

样品状态 State of samples	编号 No.	质量 Mass (kg)		质量损失 Mass loss (%)	电压 Voltage (V)		电压保存比例(%) Ratio of remaining voltage	结果 Results
		测试前 Pre-test	测试后 Post test		测试前 Pre-test	测试后 Post test		
第一个循环后完全充电状态 Fully charged after one cycle	b1	85.29	85.29	0.000	40.09	40.08	99.98	NL, NV, ND, NR, NF
	b2	85.34	85.34	0.000	40.13	40.12	99.98	NL, NV, ND, NR, NF
25 个循环后完全充电状态 Fully charged after 25 cycles	b3	85.29	85.29	0.000	40.02	40.02	100.00	NL, NV, ND, NR, NF
	b4	85.29	85.29	0.000	40.03	40.03	100.00	NL, NV, ND, NR, NF

注 Note：L=leakage 泄漏，V=venting 排气，D=disassembly 解体，R=rupture 破裂，F=fire 起火
NL=no leakage 未泄漏，NV=no venting 未排气，ND=no disassembly 未解体，NR=no rupture 未破裂，NF=no fire 未起火

条款 Clause	试验内容 Requirement & Tests	结果-评述 Results-remarks	判定 Verdict
38.3.4.4	T.4: 冲击 Shock	/	P
	目的：模拟运输中可能造成的震动 要求：无泄漏，无排气，无解体，无破裂，无起火，以及电压保存量不少于 90%。 步骤：测试电池和电池组应该通过在支撑所有测试电池表面的严格安装方式固定在测试机器上 。每个电池应该承受 150g_n 加速度的半正弦波冲击，脉冲持续时间为 6ms。大电池可改为 50g_n 加速度、脉冲持续时间为 11ms。电池组的半正弦波冲击加速度由其质量大小决定，小电池组脉冲持续时间为 6ms，大电池组脉冲持续时间为 11ms。下表中的公式用来计算最小峰值加速度的近似值。 每个电池或电池组必须承受三次正方向冲击，及三次反方向冲击，对三个不同垂直安装位置均需施加试验，共试验 18 次冲击。 Purpose: Simulates possible impacts during transport. Requirements: no leakage, no venting, no disassembly, no rupture, no fire, and the voltage after testing not less than 90% of which immediately before testing. Procedure: Test cells and batteries shall be secured to the testing machine by means of a rigid mount which will support all mounting surfaces of each test battery. Each cell	见表 T.4-2 See tableT.4-2 冲击加速度/Peak acceleration: 18.7 g_n 样品未泄漏、未排气、未解体、未破裂、未起火，电压保存比例高于 90% Test results comply with the requirements.	P

<table>
<tr><th>条款
Clause</th><th>试验内容
Requirement & Tests</th><th>结果-评述
Results-remarks</th><th>判定
Verdict</th></tr>
<tr><td>38.3.4.4</td><td>T.4: 冲击 Shock</td><td>/</td><td>P</td></tr>
<tr><td></td><td>shall be subjected to a half-sine shock of peak acceleration of 150 g_n and pulse duration of 6 milliseconds. Large cells may be subjected to a half-sine shock of peak acceleration of 50 g_n 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.
<table>
<tr><th>Battery</th><th>Minimum peak acceleration</th><th>Pulse duration</th></tr>
<tr><td>Small batteries</td><td>150 g_n or result of formula
$Acceleration(g_n) = \sqrt{\left(\frac{100850}{mass^a}\right)}$
whichever is smaller</td><td>6 ms</td></tr>
<tr><td>Large batteries</td><td>50 g_n or result of formula
$Acceleration(g_n) = \sqrt{\left(\frac{30000}{mass^a}\right)}$
whichever is smaller</td><td>11 ms</td></tr>
</table>
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.</td><td></td><td></td></tr>
</table>

表 T.4-2 电池组

Table T.4-2 Batteries

样品状态 State of samples	编号 No.	质量 Mass (kg)		质量损失 Mass loss (%)	电压 Voltage (V)		电压保存比例(%) Ratio of remaining voltage	结果 Results
		测试前 Pre-test	测试后 Post test		测试前 Pre-test	测试后 Post test		
第一个循环后完全充电状态 Fully charged after one cycle	b1	85.29	85.29	0.000	40.08	40.08	100.00	NL, NV, ND, NR, NF
	b2	85.34	85.34	0.000	40.12	40.11	99.98	NL, NV, ND, NR, NF
25 个循环后完全充电状态 Fully charged after 25 cycles	b3	85.29	85.29	0.000	40.02	40.02	100.00	NL, NV, ND, NR, NF
	b4	85.29	85.29	0.000	40.03	40.02	99.98	NL, NV, ND, NR, NF

注 Note：L=leakage 泄漏，V=venting 排气，D=disassembly 解体，R=rupture 破裂，F=fire 起火
NL=no leakage 未泄漏，NV=no venting 未排气，ND=no disassembly 未解体，NR=no rupture 未破裂，NF=no fire 未起火

条款 Clause	试验内容 Requirement & Tests	结果-评述 Results-remarks	判定 Verdict
38.3.4.5	T.5: 外部短路 External short circuit	/	P
	目的：模拟外部短路情况 要求：外部温度不超过 170℃，并且在试验中和试验后 6 小时内无解体，无破裂，无起火。 步骤：电池或电池组应加热至外壳温度到 57℃±4℃，若外壳温度不可测，则小型电池和小型电池组至少放置 6h。然后电池或电池组在 57℃±4℃的温度下承受外部电阻小于 0.1Ω的短路试验。短路试验在样品外壳温度回归到57℃±4℃温度后持续至少 1 小时。 Purpose: Simulates an external short circuit. Requirements: External temperature not exceeding 170℃ and no disassembly, no rupture, no fire during the test and within six hours after the test. Procedure: The cells and batteries shall be heated for a period of time necessary to reach a homogeneous stabilized temperature of (57±4)℃ 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. Then the cell or battery at (57±4)℃ 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)℃, or in 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.	见表 T.5-2 See table T.5-2 设置温度/ Temp set： 57 ℃ 短路电阻/ Resistance： 80 mΩ 样品外部温度小于 170 ℃ 试验中及试验后 6 小时内样品未解体、未破裂、未起火 Test results comply with the requirements	P

表 T.5-2 电池组

Table T.5-2 Batteries

样品状态 State of samples	编号 No.	测试前电压 Pre-test Voltage (V)	测试前温度 Pre-test Temperature (℃)	样品表面最高温度 Highest external temperature (℃)	结果 Results
第一个循环后，完全充电状态 Fully charged after one cycle	b1	40.08	59.5	66.3	ND, NR, NF
	b2	40.11	59.9	66.7	ND, NR, NF
25 个循环后，完全充电状态 Fully charged after 25 cycles	b3	40.02	59.2	65.6	ND, NR, NF
	b4	40.02	59.2	65.9	ND, NR, NF
注 Note： D=disassembly 解体，R=rupture 破裂，F=fire 起火 ND=no disassembly 未解体，NR=no rupture 未破裂，NF=no fire 未起火					

条款 Clause	试验内容 Requirement & Tests	结果-评述 Results-remarks	判定 Verdict
38.3.4.6	T.6: 挤压 Crush	/	P
	目的：模拟撞击或挤压等可能造成电池内部短路的机械性破坏 要求：外部温度不超过 170℃，并且在试验中和试验后 6 小时内无解体，无破裂，无起火。 步骤 2（挤压）：将样品置于两个平面之间，两个平面均接触样品后，以约 1.5cm/s 的速度进行挤压。持续施压直到出现以下三种情况之一： (a) 施加的力值达到 13 kN ± 0.78 kN； (b) 电池电压下降至少 100mV；或 (c) 电池形变量达到原始厚度的 50%或以上。 方型或软包电池应对宽面施压，纽扣电池应对上下平面施压，圆柱型电池应按垂直于长轴方向施压。 每个试验只做一次挤压试验，试验应继续观察 6 小时。 Purpose: Simulates mechanical abuse from an impact or crush that may result in an internal short circuit. Requirements: no disassembly, no fire during the test and within six hours after the test. Procedure 2 (crush): Sample 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. 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; (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.	见表 T.6 See tableT.6 样品外部温度小于 170 ℃ 试验中及试验后 6 小时内样品未解体、未破裂、未起火 Test results comply with the requirements	P

表 T.6 元件电池

Table T.6 Component cells

样品状态 State of samples	编号 No.	测试前电压 Pre-test Voltage (V)	样品表面最高温度 Highest external temperature (℃)	结果 Results
第一个循环后半充电状态 50% of the rated capacity after one cycle	c1	3.278	23.8	ND, NF
	c2	3.296	24.4	ND, NF
	c3	3.288	23.8	ND, NF
	c4	3.288	23.8	ND, NF
	c5	3.295	24.2	ND, NF
25 个循环后半充电状态 50% of the rated capacity after 25 cycles	c6	3.279	24.5	ND, NF
	c7	3.280	24.3	ND, NF
	c8	3.291	24.0	ND, NF
	c9	3.282	24.4	ND, NF
	c10	3.290	24.6	ND, NF

注 Note： D=disassembly 解体，R=rupture 破裂，F=fire 起火
ND=no disassembly 未解体，NR=no rupture 未破裂，NF=no fire 未起火

条款 Clause	试验内容 Requirement & Tests	结果-评述 Results-remarks	判定 Verdict
38.3.4.7	T.7: 过度充电 Overcharge	/	N/A
	目的：评估可充电电池组承受过充电的能力 要求：试验过程及试验后七天内不解体、不起火。 步骤：过充电流应为制造商推荐的最大持续充电电流的两倍，试验最小电压如下： （a）制造商建议的充电电压不大于 18V 时，试验的最小电压应为电池组最大充电电压的两倍或 22V 中的较小值； （b）制造商建议的充电电压大于 18V 时，试验的最小电压应该为电池组最大充电电压的 1.2 倍。 试验在室温下持续进行 24 小时。 Purpose: Evaluates the ability of a rechargeable battery or a single cell rechargeable battery to withstand an overcharge condition. Requirements: no disassembly and no fire during the test and within seven days after the test. Procedure: 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 18V, the minimum voltage of the test shall be the lesser of two times the maximum charge voltage of the battery or 22V. (b) When the manufacturer's recommended charge voltage is more than 18V, 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.	样品自身未带有过度充电保护电路，本条款不适用 The samples are not subject to the requirements for the absence of overcharge protection	N/A

条款 Clause	试验内容 Requirement & Tests	结果-评述 Results-remarks	判定 Verdict
38.3.4.8	T.8: 强制放电 Forced discharge	/	P
	目的：评估不可充电原电池和可充电电池承受强制放电条件的能力。 要求：试验过程及试验后七天内不解体、不起火。 步骤：每个电池在环境温度下与 12V 直流电源串联，在起始电流等于制造商规定的最大放电电流的条件下进行强制放电试验。将适当大小和额定值的电子负载与试验电池串联，以达到规定的放电电流。强制放电（/小时）等于其额定容量除以初始试验电流（安培）。 Purpose: Evaluates the ability to withstand a forced discharge condition. Requirements: no disassembly and no fire during the test and within seven days after the test. Procedure: 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).	见表 T.8 See tableT.8 试验中及试验后 7 天内未解体、未起火 Test results comply with the requirements	P

表 T.8 元件电池

Table T.8 Component cells

样品状态 State of samples	编号 No.	初始电流 Initial current(A)	额定容量 Rated capacity (Ah)	测试时间 Time interval (hour)	测试前电压 Pre-test Voltage (V)	结果 Results
第一个循环后完全放电状态 Fully discharged after one cycle	c11	120.0	120	1.0	2.966	ND, NF
	c12				2.960	ND, NF
	c13				2.965	ND, NF
	c14				2.969	ND, NF
	c15				2.969	ND, NF
	c16				2.971	ND, NF
	c17				2.964	ND, NF
	c18				2.951	ND, NF
	c19				2.977	ND, NF
	c20				2.955	ND, NF
第 25 个循环后完全放电状态 Fully discharged after 25 cycles	c21	120.0	120	1.0	2.958	ND, NF
	c22				2.964	ND, NF
	c23				2.964	ND, NF
	c24				2.959	ND, NF
	c25				2.971	ND, NF
	c26				2.960	ND, NF
	c27				2.967	ND, NF
	c28				2.956	ND, NF
	c29				2.972	ND, NF
	c30				2.956	ND, NF

注 Note： D=disassembly 解体， F=fire 起火
ND=no disassembly 未解体， NF=no fire 未起火

照片 / 图纸
Photos / Graphs

图 1. 可充电锂电池包 LX C9.2-10
Fig.1 Picture of Rechargeable Li-ion Battery Module LX C9.2-10

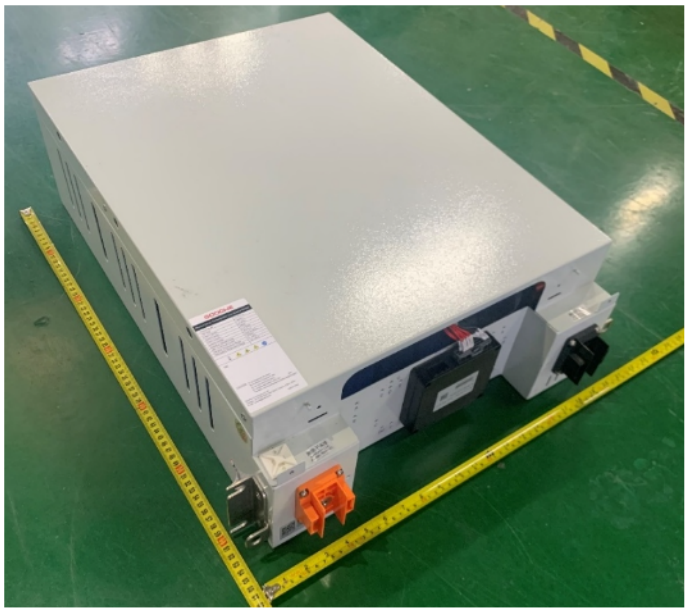

图 2. 可充电锂电池包 LX C9.2-10 侧视图
Fig.2 Side view of Rechargeable Li-ion Battery Module LX C9.2-109

照片 / 图纸
Photos / Graphs

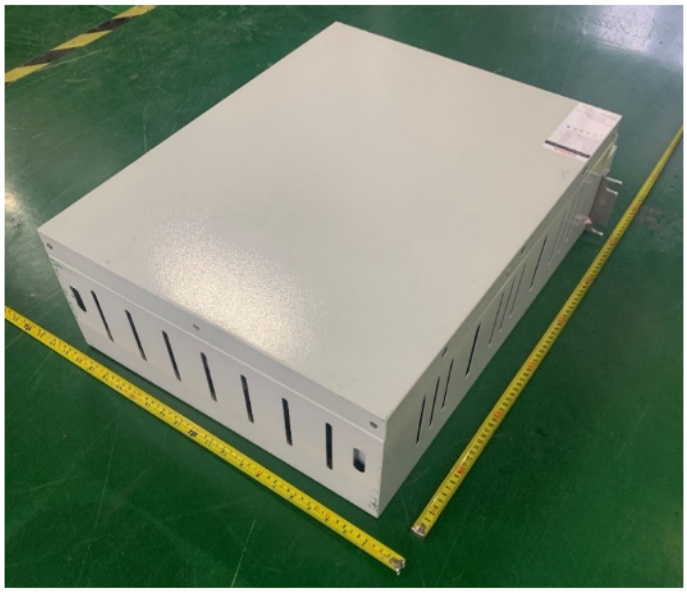

图 3. 可充电锂电池包 LX C9.2-10 背视图
Fig.3 Back view of Rechargeable Li-ion Battery Module LX C9.2-10

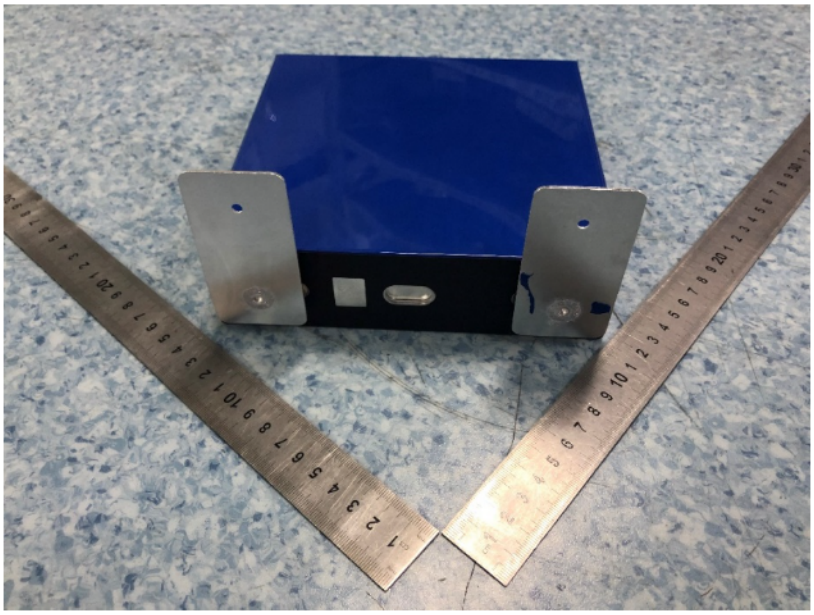

图 4 元件电池 LFP48173170E-120Ah 外观
Fig.4 View of component cell LFP48173170E-120Ah

照片 / 图纸
Photos / Graphs

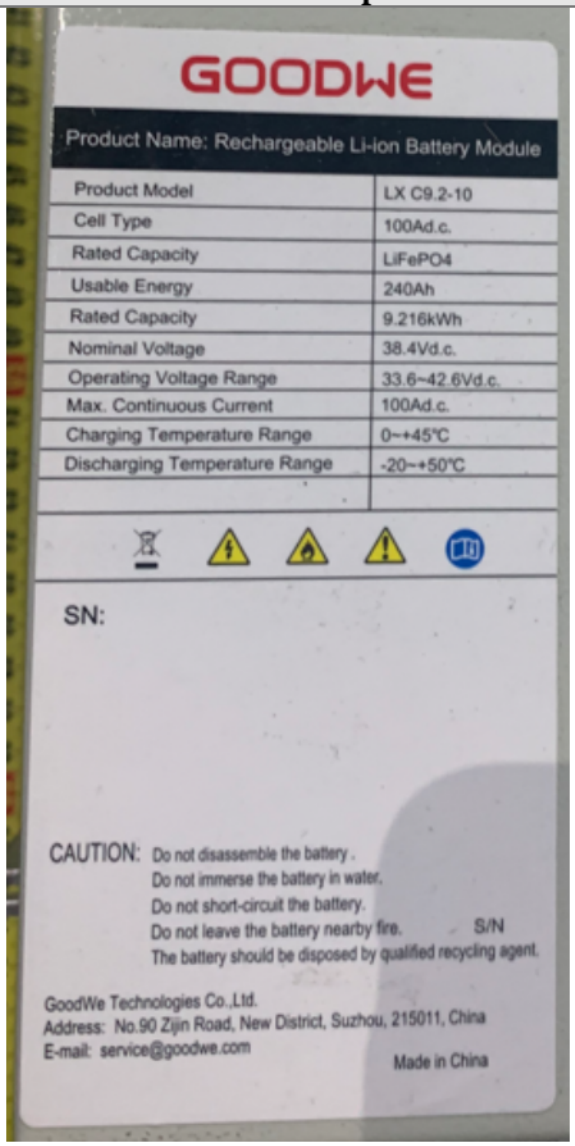

图 5 可充电锂电池包 LX C9.2-10 标签图
Fig.5 Label of Rechargeable Li-ion Battery Module LX C9.2-10

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