SPECIFICATION OF BATTERY
电池规格书

Product Type (产品类型)	磷酸铁锂电池包
Customer (客户)	
Battery Model (电池型号)	LVB7
Battery No (电池编号)	

Customer Confirmation(客户承认)		
Item（项目）	Approved（批准）	Date（ 日期）
Sign(签名)		

Prepared（制作）	Checked（审核）	Approved（批准）

Revision History List
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1. Scope 适用范围

This Specification describes the requirements of the lithium ion rechargeable battery supplied by Shenzhen EXLIPORC New Energy (Shenzhen) Co.,Ltd.

本规格书描述了由艾力普斯新能源（深圳）有限公司生产的锂离子二次电池的技术要求、测量方法,运输、储存及注意事项。

2. Battery Specification 电池规格参数

Cell 电芯	Model 规格型号	LFP1490960/3.2V/150Ah
	Capacity 容量	150Ah
	Rated Voltage 标称电压	3.2V
	Internal Resistance 内阻标准	≤0.7mΩ
	Combination Standard 配组标准	A. 容差 Capicity≤1% A. 内阻极差 Resistance ≤0.2mΩ B. 电压差 Voltage≤10mV
	Combination Method 组合方式	16 串 1 并 16S1P
Electrical Characteristics 电气性能	Nominal Voltage 额定电压	51.2V
	Nominal Capacity 额定容量	150Ah
	Energy 电量	7.68kWh
	Useable Energy 可用能量	≥95%
	Cycle Life 循环寿命	≥3000 cycles
	Months Self Discharge 月自放电	<3%
	Efficiency of Discharge 放电效率	96~99% @0.5C@25℃
Standard Charge 充电	Charge Voltage 充电电压	57.6V±0.2V
	Charge Mode 充电制式	0.5C constant current,58.4V constant voltage charge to 58.4V,continue charging till current deadline to ≤0.05C
	Charge Current 充电电流	75A
	Max. Charge Current 最大充电电流	100A
Standard Discharge 放电	Continuous Current 持续放电流	75A
	Max. Pulse Current 最大脉冲放电电流	100A
	Discharge Cut-off Voltage 放电截止电压	44.8V
Environmental 环境	Charge Temperature 充电温度	0℃ to 45 ℃ @60±25%R.H.
	Discharge Temperature 放电温度	-20℃ to 55 ℃@60±25%R.H.
	Storage Temperature 储存温度	0℃ to 35℃@60±25%R.H.
	Water Dust Resistance 防水防尘	IP20
Mechanical 机械	Plastic Case 外壳材料	钣金
	Dimensions（mm）外形尺寸	1100*455*135mm
	Weight(kg) 重量	About 80KG

3. Battery cell 电芯尺寸

4. Test Condition and Measuring Equipment 测试环境和仪器

4.1 Test conditions 测试环境

Unless otherwise specified, this specification item test should be performed in the test under the condition of normal atmospheric pressure

除非另有规定，本规范中个项试验应在试验的标准大气压条件下进行：

The temperature 温度： 15℃~35℃；

Relative humidity 相对湿度： 45%~75%；

Atmospheric pressure 大气压强： 86KP~106KP。

4.2 Measuring instrument and equipment requirements 测量仪表与设备要求

4.2.1 Measure the voltage meter accuracy should be not less than 0.5 on the Richter scale, Ω resistance shall be not less than 10 k/V

测量电压的仪表准确度应不低于 0.5 级，内阻应不小于 10KΩ/V。

4.2.2 Measure the current meter accuracy shall be not less than 0.5

测量电流的仪表准确度应不低于 0.5 级。

4.2.3 The instrument accuracy measuring time shall be not less than + / - 0.1%

测量时间的仪表准确度应不低于±0.1%。

4.2.4 Measuring temperature meter accuracy shall be not less than plus or minus 0.5 ℃

测量温度的仪表准确度应不低于±0.5℃。

4.2.5 Adjustable constant current source of constant current, in the process of charging or discharging, the current changes shall be within + / - 1%

恒流源的电流恒定可调，在充电或放电过程中， 其电流变化应在±1% 范围内。

4.2.6 Constant voltage source voltage is adjustable, and its voltage range is + / - 0.5%

恒压源的电压可调，其电压变化范围为±0.5%。

4.2.7 Measuring instrument accuracy is not lower than 0.02 mm size, range of 200 mm

尺寸测量仪的准确度不低于 0.02mm，量程为 200mm。

4.2.8 Weighing the quality of the instruments are not less than 0.1 g, weighing 1.5 Kg
称量质量的仪器感量不低于 0.1g，秤量为 1.5Kg。

5. Electrical Characteristic 充放电性能

NO. 序号	Item 检测项目	Test Method 检测方法	Criteria 检验标准
1	Charge Method 充电制式	Standard Charge Method: The charging the Battery at a constant current of 0.5C until the limit voltage , then charged at a constant voltage until its current is less than cut-off current 0.05C， the charging time less than 5h. 标准充电方法:先将蓄电池以恒流0.5C充电至极限电压，再以恒压充电至其电流小于截止电流0.05C，充电时间小于5h。	The battery shall not smoke, catch fire, vent or leak. 电池应无冒烟、着火、泄漏或漏液。
2	0.2C Discharge Capacity 0.2C放电容量	A battery is charged in accordance with 5.1a, and then stored in an ambient temperature of 20℃±5 ℃ for 0.5h～1h, finally discharged to cut-off voltage at a constant current of 0.2C. 电池按5.1规定充电后在环境温度为20℃±5 ℃的条件下搁置0.5h～1h,而后以0.2C电流放电到终止电压	Release capacity ≥100% initial capacity. 放出容量≥ 100% 初始容量。
3	1C Discharge Capacity 1C放电容量	The battery is charged in accordance with 5.1, and then stored in an ambient temperature of 20 ℃±5 ℃ for 0.5h～1h,finally discharged to cut-off voltage at a constant current of 1C . 电池按5.1规定充电后在环境温度20℃±5 ℃的条件下搁置0.5h～1h,而后以1C电流放电到终止电压 。	Release capacity ≥90% initial capacity. 放出容量≥ 90% 初始容量。
`4	Cycle Life 循环寿命	With 0.5C constant-current charging to Limit voltage, then charged at a constant voltage until its current is less than cut-off current 0.05C, let stand for 30 min, use electricity to the cut-off Voltage,0.2C constant exile let stand for 30 min. Repeat the above steps, record the battery charge and discharge capacity. 用0.5C恒流充电至限制电压，恒压充电至截止电流≤0.05C，静置30min后，用0.2C恒流放电至终止电压，静置30min。重复上述步骤，记录电池充放电容量。	≥3000 cycles .Retention capacity≥80% of the initial. 循环寿命不少于3000次,剩余容量≥80% 初始容量。
5	Storage Characteristics 储存性能	Capacity after 30days storage at 25℃±5℃ from standard charge. 标准充电方式充电后， 25℃±5℃下储存30天后的容量	Retention Capacity ≥90% 剩余容量≥90%

6. Environmental Characteristic 环境性能

NO. 序号	Item 检测项目	Test Method 检测方法	Criteria 检验标准
`1	High temperature performance 高温性能	After standard charge, and stored in an ambient temperature of 55℃±2 ℃ for 2h, then discharged to cut-off voltage at a constant current of 0.5C. After that, fetch out the battery and place it in the ambient temperature of 25℃±5 ℃ for 2h, then check its appearance . 电池按标准充电方式充满电,将电池放入55℃±2 ℃的高温箱中恒温2h,然后以0.5C电流放电至终止电压,实验结束后,将电池取出在环境温度为25±5 ℃的条件下搁置2h,然后目测电池外观.	The discharge time must ≥108min, and the battery must have no distortion, no explosion. 放电时间应≥108分钟， 外观应无变形、无爆裂。
2	Low temperature performance 低温性能	After standard charge, and stored in an ambient temperature of -10℃±2 ℃ for 4h,then discharged to cut-off voltage at a constant current of 20A. After that,fetch out the battery and place it in the ambient temperature of 20℃± 5 ℃ for 2h,then check its appearance. 电池按标准充电方式充满电,将电池放入-10℃±2 ℃的低温箱中恒温4h,然后以0.5C电流放电至终止电压,实验结束后,将电池取出在环境温度为20 ℃±5 ℃的条件下搁置2h,然后目测电池外观.	Release capacity ≥55% initial capacity. 放出容量≥ 55% 初始容量 。
3	constant humidy performance 恒定湿热性能	After standard charge, and put the battery in the temperature is 45±2 degrees Celsius and the humidity is 90% of the constant temperature and humidity box shelved after 48 hours, remove the battery at room temperature for 2h,then discharge at 0.5C to the cut-off voltage . 电池按标准充电方式充满电,将电池放入温度为45±2摄氏度和湿度为90%的恒温恒湿箱中搁置48小时后，将电池取出在常温下搁置2h,然后以0.5C放电至截止电压。	Recovery capacity≥85% 恢复容量≥85%

7. Mechanical Characteristic 机械性能

NO. 序号	Item 检测项目	Test Method 检测方法	Criteria 检验标准

`1	Vibration 振动	After standard charge, fixed the cell to vibration table and subjected to vibration cycling that the frequency is to be varied at the rate of 1Hz per minute between 10Hz～55 Hz，the excursion of the vibration is 1.6mm. The cellshall be vibrated for 30 minutes per axis of XYZ axes. 标准充电后，将电池固定在振动台上，进行振动循环，频率在10Hz~55 Hz之间以每分钟1Hz的速度变化，振动的偏移为1.6mm。每XYZ轴振动30分钟。	The battery shall not rupture, smoke, catch fire, vent or leak and the voltage not be lower than 20V . 电池应无破裂、冒烟、着火、泄漏或漏液， 并且电压不低于20V 。
2	Impacting Testing 撞击	After vibration, the battery will be impacted 1000±10 times(60±20 times per minute)with the acceleration of 100m/s2 and pulse lasting time 16ms. 将振动后的电池以峰值加速度为100m/s2的脉冲撞击1000±10次（平均每分钟60±20次），脉冲持续时间为16ms。	The battery shall not rupture, smoke, catch fire, vent or leak and the voltage not be lower than 20V . 电池应无破裂、冒烟、着火、泄漏或漏液， 并且电压不低于20V 。
3	Free fall 自由跌落	After Impacting, the battery will be dropped free five times in three mutually perpendicular directions from the height of 1.0m onto a hard board with the thickness of 20mm. 撞击实验结束后， 将电池由高度为1m的位置自由跌落到水泥地面上的20mm厚的硬木板上，比X、Y 、Z正负方向（六个方向）每个方向自由跌落1次。	The battery shall not rupture, smoke, catch fire, vent or leak and the voltage not be lower than 20V . 电池应无破裂、冒烟、着火、泄漏或漏液， 并且电压不低于20V。

8. Safe Characteristic 安全性能

NO. 序号	Item 检测项目	Test Method 检测方法	Criteria 检验标准

`1	Short Circuit 短路	After standard charge the battery located in 3 fume hood is to be short-circuited by connecting the positive and negative terminals with an external load less than 50m Ω till the battery case temperature has returned to near ambient temperature. 将标准充电后的电池置于通风橱中，短路其正负极（线路总电阻不大于50 mΩ），实验过程中监视电池温度变化，当电池温度下降到接初始室温时，结束实验。	The battery shall not rupture, smoke, catch fire, vent or leak. 电池应无破裂、冒烟、着火、泄漏或漏液。
2	Abnormal Charging Test 过充	After discharging the battery 0.5C to 2.5V, adjust the current 3C for charging, and the charging time is calculated by the following formula: tc = 2.5 * battery rated capacity / (3 * manufacturer given 1 c current). 将电池0.5C放电至2.5V后，调节电流3C充电，充电时间按以下公式计算： tc = 2 . 5*电池额定容量 / （3 *制造商给定1 c 电流)。	The battery shall not rupture, smoke, catch fire, vent or leak. 电池应无破裂、冒烟、着火、泄漏或漏液。
3	Over discharge testing 过放	After standard charge, the battery will be connected with external with a maximum resistance load of 0.1 Ω for 24hrs until it is completely discharged and the battery case temperature has returned to near ambient temperature. 以标准方式充电后,将电池正负端以内阻小于0.1 Ω的铜导线连接24小时,直至电池完全放电,温度下降到环境温度。	The battery shall not rupture, smoke, catch fire, vent or leak. 电池应无破裂、冒烟、着火、泄漏或漏液。

9. Battery Required Protection Functions 电池组保护功能要求

9. 1 PCM Electrical Characteristics（ at 25℃）

Item 项目	Symbol 符号	Content 详细内容	Criterion 标准
Over charge Protection 过充保护	V_{DET1}	Over charge detection voltage 过充电检测电压	3.650±0.050V
	tV_{DET1}	Over charge detection delay time 过充电检测延迟时间	1000±1500mS
	V_{REL1}	Over charge release voltage 过充电解除电压	3.55±0.050V
Over discharge protection 过放保护	V_{DET2}	Over discharge detection voltage 过放电检测电压	2.5±0.1V
	tV_{DET2}	Over discharge detection delay time 过放电检测延迟时间	1000±1500mS

	V_{REL2}	Over discharge release voltage 过放电解除电压	2.7±0.1V
Over current protection 过流保护		Continuous Current 持续放电流	75A
	IDP	Discharge protection overcurrent 放电保护过电流	100±10A
	tIDP	过电流检测延迟时间	12000±1500mS
	RIDP	Release condition 保护解除条件	Load off or charge off 断开负载或充电解除
Short protection 短路保护		Short circuit protection current 短路保护电流	1200±150A
		Short circuit protection delay 短路保护延时	500±300μs
		Release condition 保护解除条件	Load off 断开负载
Temperature protection 温度保护	Tdch	Discharging Temperature 放电保护温度(外置）	50±8℃
	RTdch	Discharging Temperature Protection Release 放电保护恢复温度(外置）	45±12℃
	Tch	Discharging Temperature 放电保护温度(内置）	55±5℃
	RTch	Discharging Temperature Protection Release 放电保护恢复温度(内置）	50±5℃
Balance 均衡		Balance Start Voltage 均衡开启电压	3.4±0.05V
		Balance Current	50±30mA

		均衡电流	
		Balance Mode均衡方式	脉冲方式
Power consumption of protection board 保护板功耗	I_{DD}	Static current consumption 静态消耗电流	≤150μA
Low temperature charging protection 低温充电保护		无	/

10. Warranty Period & Product Liability 保质期限及产品责任

Product shelf life from the factory ,quality assurance 12 months.
保质期是从出厂开始起,产品质保 12 个月。

EXLIPORC New Energy (Shenzhen) Co.,Ltd. is not responsible for the troubles caused by mishandling of the battery which is clearly against the instructions in this specification.

艾力普斯新能源（深圳）有限公司对因没有按本规格书规定操作而导致的意外不负责任

When EXLIPORC New Energy (Shenzhen) Co.,Ltd. finds any new facts YJC require modification of this document, we will inform you again.

艾力普斯新能源（深圳）有限公司发现本规格书有新的修改细节，我们将再告知。

11. Safety warning 安全警示

Dangerous 危险

In order to prevent battery leakage, heat, explosion, please observe the following precautions:
为了防止电池泄漏、发热、爆炸，请遵守以下防范事项：

Don't put battery into water or seawater, note moist;
不要将电池浸入水或海水中，注意防潮；

Don't the battery near heat sources, such as fire or heater;
不要将电池接近热源，如火或发热器；

When charging, please use the specific charger;
在充电时，请用特定的充电器；

Don't reverse battery is negative;
不要颠倒电池的正负极；

Do not connect the battery in the power of export;
不要将电池连接在电源的出口；

Do not place the battery in fire or hot items;
不要将电池放置于火里或热的物品上；

Don't across the electrodes of the battery short circuit conductors;
不要将电池的正负极用导体短路；

Don't put the battery and the metal conductor, such as necklace, hairpin, etc connected or stored together;

不要把电池和金属导体，如项链、发夹等一起连接或存储；

Do not knock or throw the battery;

不要敲打或丢抛电池；

Don't Pierce the battery with pin or other sharp;

不要用针或其他锋利物刺穿电池；

Don't use hammer strike or step on the top;

不要用锤击打或者踩在上面；

Don't direct welding power source;

不要直接焊接电源；

Battery with safety device, in order to guarantee its inherent security features, please don't split the battery or change any part;

电池内有安全装置，为了保证其固有的安全功能，请不要将电池分解或改变任何的部分；

Don't charge near the fire or in a hot environment.

不要在接近火源或在酷热的环境中充电。

Warning 警告

Don't put the battery in a microwave oven or pressure in the closet;

不要将电池放入微波炉或压力柜子里；

Do not put batteries and other chemical battery (such as dry cell) or pooling of different capacity, brand of battery, if the battery scent, fever, discoloration, deformation, or in the use of charge, storage process, any abnormal please immediately from the device or charger, stop using;

不要将电池与其他化学电池（像干电池）或不同容量、牌子的电池合用，若电池发出气味、发热、变色、变形或者在使用充电、存储过程中，出现任何的不正常请立即从装置或充电器取出，停止使用；

Specify the charging time if can't charge please do not continue to charge;

指定充电时间内若不能再充电请不要继续充电；

Batteries in the children can't touch place, if children ingest batteries, please immediately go to a doctor;

电池放于小孩子不能触摸的地方，若小孩咽下电池，请立即就医；

If the battery leaks or electrolytic gas emit odor, please away from the fire, otherwise leaked solution catches fire, the battery will be on fire;

若电池泄露或电解放出怪味之气体，请速离火源，否则泄露解质会着火，电池将会着火；

If the battery leaks or electrolytic into eyes, do not rub eyes, after the application of clean water to rinse the eye doctor, otherwise will cause eye diseases.

若电池泄露或电解后进入眼睛，切勿揉眼睛，应用清水冲洗眼睛后就医，否则将致眼疾。

Matters needing attention 注意事项

Don't put the battery in high temperature place (such as direct sunlight or heat the world in the car), otherwise, will overheat and fire performance degradation or shorten the life.

不要将电池放于高温处（如阳光直射或热天下汽车里），否则，会过热着火，性能降低或寿命缩短。

Safety device, in order to ensure safety, the battery should be installed in the electrostatic manufacturing when required by the electrostatic when do not use, otherwise, the safety device failure, lead to the battery's cells from overheating, rupture, explosion and fire.

为确保安全，电池应安装安全装置，在静电强于制造时所要求的静电时请勿使用，否则，安全装置会失效，导致电池过热、破裂、爆炸及着火。

Please in normal use under the following conditions, otherwise it will overheat and catch fire, performance degradation or shorten the life span.

请在下列条件下正常使用，否则会过热，着火，性能降低或缩短寿命。

Environmental conditions 环境条件：

（T 温度） charge 充电：0 ~ + 55℃

discharge 放电： -20 ~ +55℃

Within 30 days of preservation 30 天内保存： -20 ~ +45℃

Within 90 days of preservation 90 天内保存： 0 ~ +30℃

If a child USES batteries, shall designate them according to the instruction manual for use and ensure the normal order of the battery at any time must be used.

如果小孩使用电池，应指定他们按使用说明书进行使用且保证电池在任何时候都必须是正常使用。

If the battery leaks, electrolytic touch on the skin or clothing, application of water to rinse or use running water to wash clothes, otherwise the skin will be corrosion.

若电池泄露，电解沾于皮肤或衣服上，应用水冲洗掉或用流水洗衣服，否则将会腐蚀皮肤。

In order not to put the wrong battery or spoilage battery, please carefully read the instructions for installation and remove from the device.

为了不装错电池或损耗电池，请认真阅读使用说明书进行安装与拆卸（从装置上）。

If the battery is not long time use, please take the battery out and put in dry place, otherwise will be corrosion ,performance and life.

若是电池不长时间使用，请把电池拿出并放于干燥的地方，否则将会被腐蚀、降低性能和减少寿命。

If the battery terminal, dirty, please clean with dry cloth before use, otherwise will lead to poor contact with equipment, power failure or inadequate charge, must realize the discarded battery can lead to fire, and with a belt tied down to isolate its positive and negative extremely.

若弄脏了电池终端，请在使用之前用干布擦干净，否则将导致与装置接触不良，功率不足或充电失败，必须意识到丢弃电池会导致着火，用带子绑住以隔离其正负极端。

12. Transport and Store 运输和存储

12.1 Transport 运输

Batteries should be in half charged states (60%) for charging status into boxes for shipping, should avoid violent vibration and impact during the transit or extrusion, prevent from, adapt to sea air transport.

电池应在半荷电状态（60%充电状态）下包装成箱进行运输，在运输过程中应防止剧烈振动、冲击或挤压，防止

日晒雨淋，适应于海陆空的交通运输。

12.2 Store 储存

Batteries should be stored at ambient temperature of 5 ℃ to 35 ℃ in clean, dry and ventilated indoor, should avoid contact with corrosive substances, stay away from fire and heat source.

电池应储存在环境温度为-5℃至 35℃的清洁、干燥通风的室内，应避免与腐蚀性物质接触，应远离火源及热源。

13. Logo and packaging 标志和包装

13.1 The packing 包装

a. Packing: packing box inside must also be attached product inspection certificate, specification, and certificate of three guarantees.

包装方式：包装盒内还必须附有产品检验合格证、使用说明书、产品三包凭证；

b. Equipped with battery products packing box should be placed in dry, dust-proof, moisture-proof packaging box;

装有电池产品的包装盒应放在干燥、防尘、防潮的包装箱内；

c. Outside should indicate the product name, model, quantity, gross weight, manufacturers and contact address, date of production, should be "handle with care", "keep dry", "up" necessary signs, such as the packing storage icon marking shall comply with the terms of GB191-1990.

包装箱外应标明产品名称、型号、数量、毛重、制造厂商及联络地址、出厂日期， 应有“小心轻放”、“怕湿”、“ 向上”等必要标志，其包装储运图标标志应符合 GB191-1990 的规定。

13.2 mark 标志

Each battery shall have the Chinese sign of the following: product name, type and nominal voltage, nominal capacity, the positive and negative polarity, marks and warning specifications, manufacturing date, batch number, manufacturing factory name.

每个电池上应有下列中文标志：产品名称、型号、标称电压、额定容量、正负极性、商标和警示说明、制造日期、批号、 制造厂名。

13. Appearance产品外观