

锂离子电芯规格书

Specification for Lithium-ion Rechargeable Cell

电芯型号: 40135FS

Cell Type: 40135FS

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1. Preface 前言

This Product Specification describes the technique requirements, test procedures and precaution notes of cylindrical type Lithium-ion Rechargeable cell to be supplied to customer by DALIAN CBAK POWER BATTERY COMPANY LIMITED.
本标准规定了由大连中比动力电池有限公司生产的锂离子电芯的技术要求、测试方法和注意事项。

2. Description 说明

2.1. Product 产品: Lithium-ion Rechargeable cell 锂离子可充性电芯

2.2. Model (Type) 电芯型号: 40135FS

2.3. Designation 名称:

40	135	F	S
①	②	③	④

①: Indicates the diameter of cell 代表电芯直径

②: Indicates the overall height of cell 代表电芯高度

③: Indicates the property of the cell 代表电池性能

The letter "F" defines LiFePO₄ series cathode

"F"代表以 LiFePO₄ 为正极材料体系

④: Indicates the property of the cell 代表电池性能

The letter "S" defines steel can cell

"S"代表钢壳电池

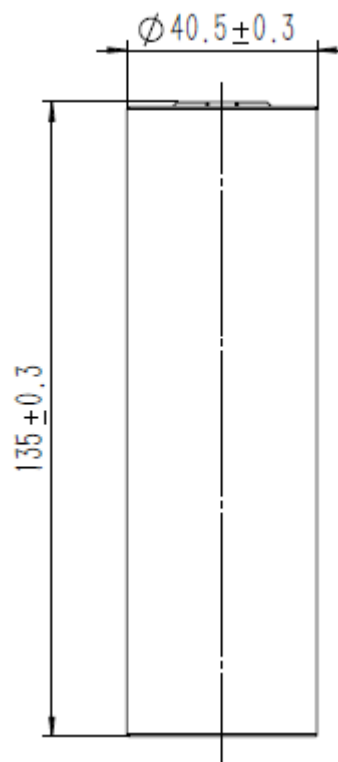


Figure A

3. Cell Size 电芯尺寸

For details, please refer to Figure A. Remark: contain PET cover

对于电池结构的详细资讯, 请参阅图 A。备注: 包含热缩套

4. Construction 电芯结构

A cell is made of cathode, anode, separator, steel can and caps.

电芯由正极、负极、隔膜、钢壳和盖板组成。

5. Specification 标准

Fresh cell, all tests stated in this Specification is Standard Test Conditions.

样品为新电池，无特别要求，此规格书上的产品测试条件均为标准测试条件。

Item 项目		Specification 标准			Remark 备注	
Typical Capacity 典型容量		20000mAh			0.5C discharge capacity	
Minimum Capacity 最小容量		19500mAh				
Internal Impedance 交流内阻		≤2mΩ			By AC 1 kHz	
Nominal Voltage 标称电压		3.20 V				
Cell Weight 电芯重量		403±10g			contain package 包含外包装	
Energy Density 能量密度		159Wh/Kg				
End-of-charge Voltage 充电截止电压		3.65V			At CC mode 恒流制式	
End-of-discharge Voltage 放电截止电压		2.0V			At CC mode 恒流制式	
Standard Charging 标准充电制式		0.5C CC/CV, cut off 0.05C 0.5C 恒流恒压充电至 3.65V, 0.05C 截止			180min	
Standard Discharging 标准放电制式		0.5C CC, cut off 2.0V 0.5C 恒流放电至 2.0V 截止				
Max Continuous Charge 最大持续充电		0~10℃	10~20℃	20~45℃	45~50℃	50~60℃
		0.33C	0.8C	2C	0.8C	0.33C
Max Continuous Discharge 最大持续放电		3C			Only for cell 只限单体电池	
Max Pulse Discharge 最大脉冲放电		4C (30s)				
Cycle Life 循环性能		≥3500 cycles			+0.5C/-0.5C, 25±2℃	
		≥2800 cycles			+1C/-1C, 25±2℃	
Operating Temperature Range 操作温度范围	Charging Temperature 充电温度	0~60℃			The surface temperature of the cell should not exceed 65℃ 电芯表面温度不能超过 65℃	
	Discharging Temperature 放电温度	-30~60℃			The surface temperature of the cell should not exceed 65℃ 电芯表面温度不能超过 65℃	
	Storage Temperature 存储温度	-20~45℃			3month（3 个月）	
		-10~25℃			6month（6 个月）	
Shelf Life 保质期		1year 1 年				
Appearance 外观		Without break, scratch, distortion, contamination, leakage and so on 无破裂、划痕、变形、污迹、电解液泄露等				

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6. Test Conditions 测试条件

6.1. Standard Test Conditions 标准测试条件

Unless otherwise specified, all tests stated in this Specification are conducted at temp. $25 \pm 2^\circ\text{C}$ and humidity 15-90% RH. 若无特别要求，此规格书上的产品测试条件均为温度： $25 \pm 2^\circ\text{C}$ ，湿度：15-90% RH。

6.2. Standard Charge and Discharge Method 标准充放电制式

The "Standard Charge" means charging the Cell at a constant current of 0.5C until the voltage is 3.65V, then charged at a constant voltage of 3.65V until its current is less than 0.05C.

“标准充电制式”即以恒定电流 0.5C 充电至 3.65V，再以 3.65V 的恒压充电至电流小于 0.05C。

The "Standard Discharge" means discharging the Cell at a constant current of 0.5C until the voltage is 2.0V.

“标准放电制式”即以恒定电流 0.5C 放电至 2.0V。

7. Electrical Characteristics 电性能

Test Item 测试项目	Test Method 测试方法	Criteria 检验标准
1) High Temperature Performance 高温性能	A cell is charged in accordance with Standard Charge, and stored in an ambient temp. of $55 \pm 2^\circ\text{C}$ for 4hrs, then discharged in accordance with Standard Discharging. After that, fetch out the cell and place it in Standard Test Conditions for 4hrs, then check its appearance. 电芯按标准充电制式充电结束后，放入 $55 \pm 2^\circ\text{C}$ 的高温箱中恒温 4h，然后以标准放电制式放电，将电芯取出在标准测试条件下搁置 4hrs，然后目测电芯外观。	1. Capacity $\geq 95\%$; 2. No distortion, no rupture. 1. 放电容量 $\geq 95\%$; 2. 电芯外观无变形，无爆裂。
2) Low Temperature Performance 低温性能	A cell is charged in accordance with Standard Charge, and stored in an ambient temp. of $-10 \pm 2^\circ\text{C}$ for 4h, then discharged in accordance with Standard Discharging. After that, fetch out the cell and place it in Standard Test Conditions for 4h, then check its appearance. 电芯按标准充电制式充电结束后，将电芯放入 $-10^\circ\text{C} \pm 2^\circ\text{C}$ 的低温箱中恒温 4h，然后以标准放电制式放电，将电芯取出在标准测试条件下搁置 4h，然后目测电芯外观。	1. Capacity $\geq 70\%$ 2. No distortion, no rupture 1. 放电容量 $\geq 70\%$; 2. 电芯外观无变形，无爆裂。
3) C-Rate Performance 倍率性能	A cell is charged in accordance with Standard Charge, after that stored for 10min, then discharged to cut-off voltage at a constant current of 0.5C, after that, stored 30min; then the cell is charged and discharge as above except that at a discharged constant current of 1C; then the cell is charged and discharge as above except that at a discharged constant current of 2C; then the cell is charged and discharge as above except that at a discharged constant current of 3C. 电芯按标准充电制式充电结束后搁置 10min，然后以 0.5C 恒流放电，放电结束后搁置 30min；这颗电芯继续进行下一次充放电循环，需以 1C 进行恒流放电；继续进行下一次充放电循环，需以 2C 进行恒流放电，继续进行下一次充放电循环，需以 3C 进行恒流放电。	1C Capacity/0.5C Capacity $\geq 98\%$; 2C Capacity/0.5C Capacity $\geq 95\%$; 3C Capacity/0.5C Capacity $\geq 93\%$. 1C /0.5C 放电容量 $\geq 98\%$; 2C /0.5C 放电容量 $\geq 95\%$; 3C /0.5C 放电容量 $\geq 93\%$ 。

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4) Capacity Retention and recovery 荷电保持和恢复性能	A cell is charged in accordance with Standard Charge, and stored in $55 \pm 2^{\circ}\text{C}$ for 7d, after that stored for 5hrs at room temperature, then discharged in accordance with Standard Discharging. After that, stored 10min the cell is charged in accordance with Standard Charge, after that stored for 10min, then discharged in accordance with Standard Discharging. 电芯按标准充电制式充电结束后, 将电芯在 $55 \pm 2^{\circ}\text{C}$ 搁置 7 天, 然后在室温下搁置 5 小时, 再以标准放电制式放电。放电结束后搁置 10min, 此电芯标准充电制式充电结束后, 搁置 10min, 然后以标准放电制式放电。	Capacity retention: $\geq 90\%$ Capacity recovery: $\geq 95\%$ 容量保持率: $\geq 90\%$ 容量恢复率: $\geq 95\%$
	A cell is charged in accordance with Standard Charge, and stored in Standard Test Conditions for 28d, then discharged in accordance with Standard Discharging. After that, stored 10min the cell is charged in accordance with Standard Charge, after that stored for 10min, then discharged in accordance with Standard Discharging. 电芯按标准充电制式充电结束后, 在标准测试条件下, 将电芯搁置 28 天, 再以标准放电制式放电。放电结束后搁置 10min, 此电芯标准充电制式充电结束后, 搁置 10min, 然后以标准放电制式放电。	Capacity retention: $\geq 90\%$ Capacity recovery: $\geq 95\%$ 容量保持率: $\geq 90\%$ 容量恢复率: $\geq 95\%$
5) Cycle Life 循环寿命	At Temp.: $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$, a cell is charged at a constant current of 0.5C until the voltage is 3.65V, then charged at a constant voltage of 3.65V until its current is less than 0.05C, after that stored for 30min; then discharged at a constant current of 0.5C until the voltage is 2.5V, after that, stored 30min prior to next charge-discharge cycle. The cell shall be continuously charged and discharged for 3500 times. 温度 $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$, 电芯以 0.5C 恒流充电至 3.65V, 以 3.65V 恒压充电至电流小于 0.05C, 结束后搁置 30min, 然后以 0.5C 恒流放电至 2.5V, 放电结束后搁置 30min, 再进行下一次充放电循环, 连续进行充放电循环 3500 次。	capacity retention: $\geq 80\%$ 容量保持率: $\geq 80\%$
	At Temp.: $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$, a cell is charged at a constant current of 1C until the voltage is 3.65V, then charged at a constant voltage of 3.65V until its current is less than 0.05C, after that stored for 60min; then discharged at a constant current of 1C until the voltage is 2.5V, after that, stored 60min prior to next charge-discharge cycle. The cell shall be continuously charged and discharged for 2800 times. 温度 $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$, 电芯以 1C 恒流充电至 3.65V, 以 3.65V 恒压充电至电流小于 0.05C, 结束后搁置 60min, 然后以 1C 恒流放电至 2.5V, 放电结束后搁置 60min, 再进行下一次充放电循环, 连续进行充放电循环 2800 次。	capacity retention: $\geq 80\%$ 容量保持率: $\geq 80\%$

8. Safety Characteristics 安全性能

All below tests are carried out on the equipment with forced ventilation and explosion-proof device. Before test, all cells are charged in accordance with Standard Charge, and stored 1hrs prior to testing.

下述试验应在有强制排风条件及防爆措施的装置内进行，在试验前所有的电芯都按标准充电制式充电，并搁置 1hrs 后，再进行以下试验。

Test Item 测试项目	Test Method 测试方法	Criteria 检验标准
1) Temperature Cycling Test 温度循环测试	The cell is to be placed in a test chamber, Raising the chamber-temperature to $70 \pm 3^{\circ}\text{C}$ within 30min and maintaining this temperature for 4h, Reducing the chamber-temperature to $20 \pm 3^{\circ}\text{C}$ within 30min and maintaining this temperature for 2h, Reducing the chamber-temperature to minus $40 \pm 3^{\circ}\text{C}$ within 30min and maintaining this temperature for 4h, Raising the chamber-temperature to $20 \pm 3^{\circ}\text{C}$ within 30min, Repeat the sequence for a further 9 cycles. After the 10th cycles, storing the cell for a minimum of 24h, at a temperature of $20 \pm 5^{\circ}\text{C}$ prior to examination. 将电芯放入温控箱内， 在 30 分钟内，温控箱温度升至 70°C，并在 $70 \pm 3^{\circ}\text{C}$ 温度下保持 4 小时， 在 30 分钟内，温控箱温度降至 20°C，并在 $20 \pm 3^{\circ}\text{C}$ 温度下保持 2 小时， 在 30 分钟内，温控箱温度降至 -40°C，并在 $-40 \pm 3^{\circ}\text{C}$ 温度下保持 4 小时， 在 30 分钟内，温控箱温度升至 20°C， 重复以上步骤 9 次，第 10 次循环后将电池放置在 $20 \pm 5^{\circ}\text{C}$ 环境下 24 小时，检查电芯。	No leak, no fire, no explosion, no vent. 不漏液、不起火、不爆炸、不裂开。
2) Low-pressure Test 低气压测试	The cell is to be stored for 6 hours at an absolute pressure of 11.6kPa and a temperature of $20 \pm 3^{\circ}\text{C}$. 将电芯放入在绝对压力为 11.6KPa，温度 $20 \pm 3^{\circ}\text{C}$ 的环境中搁置 6h。	No leak, no fire, no explosion, no vent. 不漏液、不起火、不爆炸、不裂开。
3) Vibration Test 振动测试	The cell is to be subjected to simple harmonic motion with an amplitude of 0.8mm (1.6mm total maximum excursion). The frequency is to be varied at the rate of 1Hz/min between 10 and 55 Hz, and return in not less than 90 nor more than 100min. The cell is to be tested perpendicular to each axis. 将电芯安装在振动台的台面上，按下面的振动频率和对应的振幅调整好实验设备，垂直的两个轴向每个方向上从 10~55Hz 循环振动 90-100min，变化速率为 1Hz/min，位移幅值：0.8mm（最大行程 1.6mm）。	No leak, no fire, no explosion, no vent. 不漏液、不起火、不爆炸、不裂开。

4) Shock Test 冲击测试	At $20 \pm 5^\circ\text{C}$, the cell is to be secured to the testing machine. Each cell shall be subjected to a total of three shocks of equal magnitude. The shocks are to be applied in each of two mutually perpendicular directions. Each shock is to be applied in a direction normal to the face of the cell. For each shock the cell is to be accelerated in such a manner that during the initial 3ms the minimum average acceleration is 75 g (where g is the local acceleration due to gravity). The peak acceleration shall be between 125 and 175 g. $20 \pm 5^\circ\text{C}$, 将电芯固定在设备上。电芯在两个相互垂直的方向上承受三次等值的冲击, 每次冲击都沿着电芯表面的法线方向施加。每次冲击在最初的 3ms 内, 最小平均加速度为 75g (g 为当地的重力加速度), 峰值加速度在 125g 和 175g 之间。	No leak, no fire, no explosion, no vent. 不漏液、不起火、不爆炸、不裂开。
5) Drop Test 自由跌落测试	At $20 \pm 5^\circ\text{C}$, the cell is placed at a height of 1000mm and dropped freely onto the cement panel with positive and negative terminals downward and twice on the cylinder. $20 \pm 5^\circ\text{C}$, 电芯放置在高度 1000mm 的位置, 自由跌落到水泥面板上, 两个端面各一次, 圆柱面跌落两次。	No fire, no explosion. 不起火、不爆炸。
6) Short-circuit Test 短路测试 ($55 \pm 5^\circ\text{C}$)	The cell is to reach equilibrium at $55 \pm 5^\circ\text{C}$. Then the cell is to be short-circuited by connecting the positive and negative terminals of the cell with a circuit load having a resistance load of $80 \pm 20\text{m}\Omega$. The temperature of the cell is to be recorded during the test. The cell is to discharge until it has reached a completely discharged state of less than 0.2V and the cell case temperature has returned to $\pm 10^\circ\text{C}$ of ambient temperature. 电芯达到 $55 \pm 5^\circ\text{C}$, 短路其正负极 (线路总电阻 80 ± 20 毫欧)。试验过程中监视电芯温度变化, 当电芯达到完全放电状态电压降到 0.2V 以下或温度下降到环境温度 $\pm 10^\circ\text{C}$ 时, 结束试验。	No fire, no explosion. 不起火, 不爆炸。
7) Short-circuit Test 短路测试 ($22 \pm 5^\circ\text{C}$)	The cell is to reach equilibrium at $22 \pm 5^\circ\text{C}$. Then the cell is to be short-circuited by connecting the positive and negative terminals of the cell with a circuit load having a resistance load of less than $5\text{m}\Omega$. The test time is 10min, then observed the cell for 1h at ambient temperature. 电芯达到 $22 \pm 5^\circ\text{C}$, 短路其正负极 (线路总电阻 ≤ 5 毫欧)。试验过程中监视电芯温度变化, 测试时间 10 分钟, 结束实验。试验环境温度下观察 1 小时。	No fire, no explosion. 不起火, 不爆炸。
8) Overcharge Test 过充电测试	At $22 \pm 5^\circ\text{C}$, the cell is to be charged to 1.5 times the cut-off voltage at a constant current of 1C or until that last 1h, then observed the cell for 1h at ambient temperature. $22 \pm 5^\circ\text{C}$, 电芯以 1C 恒流充电至截止电压的 1.5 倍或充电时间达到 1h 后停止充电, 试验环境温度下观察 1 小时。	No fire, no explosion. 不起火, 不爆炸。
9) Forced-Discharge Test 过放电测试	At $22 \pm 5^\circ\text{C}$, the cell is to be discharged at a constant current of 1C until the discharge time reaches 90min, then observed the cell for 1h at ambient temperature. $22 \pm 5^\circ\text{C}$, 电芯以 1C 恒流放电, 直至放电时间到达 90min, 试验环境温度下观察 1 小时。	No fire, no explosion. 不起火, 不爆炸。

10) Crush Test 挤压测试	The cell is to be crushed between two flat surfaces. The flat surfaces are to be brought in contact with the 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. The cell is to be crushed with its longitudinal axis parallel to the flat surfaces of the crushing apparatus. 电芯放置在两个挤压表面之间，将平面与电芯接触并持续挤压，直至压力达到 $13 \pm 1\text{kN}$，立即释放，电芯纵轴平行于挤压平面。	No fire, no explosion. 不起火，不爆炸。
11) Impact Test 重物冲击测试	The cell is to be placed on a flat surface. A $15.8 \pm 0.1\text{mm}$ diameter bar is to be placed across the center of the cell. A $9.1 \pm 0.46\text{kg}$ weight is to be dropped from a height of $610 \pm 25\text{mm}$ onto the cell. The cell is to be impacted with its longitudinal axis parallel to the flat surfaces and perpendicular to the longitudinal axis of the 15.8mm diameter curved surface lying across the center of the cell. 电芯放置在平台上，将一个直径 $15.8 \pm 0.1\text{mm}$ 的棒材放置在电芯中心，将一个 $9.1 \pm 0.46\text{kg}$ 的重物从 $610 \pm 25\text{mm}$ 的高度掉落到电芯上。电芯的纵轴平行于平台，垂直于棒材的纵轴。	No fire, no explosion. 不起火，不爆炸。
12) Heating Test 加热测试	At $22 \pm 5^\circ\text{C}$, the cell is to be heated in a circulating air oven. The temperature of the oven is to be raised at a rate of $5^\circ\text{C} \pm 2^\circ\text{C}$ per minute to a temperature of $130^\circ\text{C} \pm 2^\circ\text{C}$ and remain for 30min at that temperature before the test is discontinued. Then observed the cell for 1h at $22 \pm 5^\circ\text{C}$. $22 \pm 5^\circ\text{C}$，将电芯放在电热鼓风干燥箱中，温度以 $5^\circ\text{C} \pm 2^\circ\text{C}/\text{min}$ 的速率升至 $130^\circ\text{C} \pm 2^\circ\text{C}$ 并保持 30min 后停止加热。$22 \pm 5^\circ\text{C}$ 下观察 1 小时。	No fire, no explosion. 不起火，不爆炸。
13) Fire Exposure Test 焚烧测试	The cell is to be placed on a screen that covers a 102mm diameter hole in the center of a platform table. The screen is to be constructed of steel wire mesh having 25 openings per inch and a wire diameter of 0.017 in. An eight-sided covered wire cage, 610mm across and 305mm high, made from metal screening is to be placed over the test sample. The metal screening is to be constructed from 0.25mm diameter aluminum wire with 16-18 wires per inch in each direction. The screen is to be mounted 38mm above a burner. The fuel and air flow rates are to be set to provide a bright blue flame that causes the supporting screen to glow a bright red. The cell is to be heated and shall remain on the screen until it explodes or the cell has ignited and burned out. 将电芯放置于测试网上，测试台中间有一个直径为 102mm 被测试网覆盖的洞，测试网由每英寸 25 孔，直径为 0.43mm 的钢丝构成。罩上由铝做成的每面 610mm 宽，305mm 高共八面的铝网，铝网由直径 0.25mm 的铝丝编成，在每个方向上，每英寸有 16~18 根铝丝组成。点燃燃烧器喷射电芯，测试网在燃烧器上 38mm，燃料和空气流速设定到可以提供明亮红色火焰，直到电芯爆炸或烧尽。	If the cell explodes, the explosives don't penetrate the aluminum screening. 如果电芯发生爆炸，爆炸物不穿透到铝网之外。

9. Shipment 出货

The Cell shall be shipped in 20-30% state of charge (SOC) or in accordance with customers' requirement. The remaining capacity before charging shall be changed depending on the storage time and conditions.

单体电芯按 20-30%的充电容量或客户要求出货，电芯出货后充电前的剩余容量取决于储存时间和条件。

10. Warranty 质量保证

The Warranty period of cell is made according to business contract, However, even though the problem occurs within this period, DALIAN CBAK POWER BATTERY COMPANY LIMITED won't replace a new cell for free as long as the problem is not due to the failure of DALIAN CBAK POWER BATTERY COMPANY LIMITED manufacturing process or is due to customer's abuse or misuse.

自出货之日起，电芯的保质期限依合同而定。但是，在此期限内，如果不是大连中比动力电池有限公司的制程原因而是客户的误用造成的电芯质量问题，大连中比动力电池有限公司不承诺免费更换。

DALIAN CBAK POWER BATTERY COMPANY LIMITED will not be responsible for trouble occurred by handling outside of the precautions in instructions.

大连中比动力电池有限公司对违反安全守则操作所产生的问题不承担任何责任。

DALIAN CBAK POWER BATTERY COMPANY LIMITED will not be responsible for trouble occurred by matching electric circuit, cell pack and charger.

大连中比动力电池有限公司对与电路、电池组、充电器搭配使用所产生的问题不承担任何责任。

DALIAN CBAK POWER BATTERY COMPANY LIMITED will be exempt from warrantee any defect cells during assembling after acceptance.

出货后客户在电芯组装过程中产生的不良电芯不在大连中比动力电池有限公司质量保证的范围之列。

11. Precautions and Safety Instructions 安全守则

Lithium-Ion rechargeable batteries subject to abusive conditions can cause damage to the cell and/or personal injury. Please read and observe the standard cell precautions below before using utilization.

滥用锂离子充电电芯可能会造成电芯损害或人身伤害，在使用以前，请仔细阅读以下的安全守则：

Note 1. The customer is required to contact DALIAN CBAK POWER BATTERY COMPANY LIMITED in advance, if and when the customer needs other applications or operating conditions than those described in this document.

注释 1、如果客户需要将电芯在该文件之外的条件下操作或应用，请先咨询大连中比动力电池有限公司相关事宜。

Note 2. DALIAN CBAK POWER BATTERY COMPANY LIMITED will take no responsibility for any accident when the cell is used under other conditions than those described in this Document.

注释 2、在该文件说明的条件之外使用该电芯而产生的事故，大连中比动力电池有限公司不承担任何责任。

11.1 Standard cell Precautions 电芯防范措施

- a) Do not throw the Battery cell into fire or heat it.
不要将电芯投入火中或加热。
- b) Do not short circuit, over-charge or over-discharge the cell.
不要将电芯短路，过充或过放。
- c) Do not subject the cell to strong mechanical shocks.
不要使电芯承受过重的机械冲击。

- d) Do not immerse the cell in water or sea water, or get it wet.
不要将电芯浸入海水或水中，或者使其吸湿。
- e) Do not reverse the polarity of the cell for any reason.
不要颠倒电芯的正负极。
- f) Do not disassemble or modify the cell.
不要拆卸或修整电芯。
- g) Do not handle or store with metallic like necklaces, coins or hairpins, etc.
不要和项链，硬币或发夹等金属物品放置在一起。
- h) Do not use the cell with conspicuous damage or deformation.
不要使电芯受到明显的损害或变形。
- i) Do not connect cell to the plug socket or car-cigarette-plug.
不要将电芯与插座连接。
- j) Do not touch a leaked cell directly.
不要直接接触泄漏的电芯。
- k) Do not use Lithium-ion cell in mixture.
不要将锂离子电芯混合使用。
- l) Do not use or leave the cell under the blazing sun (or in heated car by sunshine).
不要将电芯放置在太阳光直射的地方。
- m) Keep cell away from children.
将电芯放置在远离儿童的地方。
- n) Do not drive a nail into the cell, strike it by hammer or tread it.
不要针刺，锤打或践踏电芯。
- o) Do not give cell impact or fling it.
不要撞击或投掷电芯。
- p) Do not put Battery Cell into microwave oven or high pressure container.
不要将电芯放入微波炉或高压容器中。

11.2 Cell Operation Instructions 电芯使用说明

11.2.1 Charging 充电

- a) When the Battery Cell is charged, the specified charge method and current described in this PS-Documents should apply.
If charge current exceeds the upper limit of the specified range, characteristics and safety of the Battery Cell could be deteriorated, or it may cause heat, explosion and fire.
应遵守本规格书的充电方式。如果超过电流上限，电池的安全性将不能被保证，会引起发热，爆炸，起火。
- b) Charge voltage should not exceed 3.7V.
充电电压不能超过 3.7V。
- c) Charge the cell in a temperature range of 0°C to 60°C.
电芯充电温度范围为 0°C~60°C。
- d) Use a constant current, constant voltage (CC/CV) lithium-ion (Li+) cell charge controller.
使用恒流恒压锂离子电芯充电器。

11.2.2 Discharging 放电

- a) The discharge current should not exceed the designated current described in this PS-Documents. If the discharge current exceeds the specified value, discharge capacity could be extremely deteriorated or the Cell could be heated
放电电流不能超过本规格书的规定值，如果电流超过了规定值，电池容量将被破坏或者电池会出现发热情况。
- b) For maximum performance, discharge the cell in a temperature range of -30°C to 60°C.

为了达到较好的性能，电芯的放电温度范围为-30℃~60℃。

11.2.3 Storage Recommendations 储存建议

- a) Do not store the Battery Cell together with combustibles.

不要将电池和易燃物一起存放。

- b) If it needs to be stored for a long time (more than 3 months), the cells should be stored in an environment with a temperature range of -10~25℃, a humidity of 0~60%RH, and no corrosive gases. It should be ensured that under the controlled conditions of this environment, condensation water droplets cannot appear on the surface of the cells, and the ground where the cells is stored should not experience moisture regain. It is recommended to charge and discharge the cells every 3 months, and maintain the SOC between 25-75%.

如果要长时间存放（超过 3 个月），电芯应储存在温度范围为 -10~25℃，湿度为 0~60%RH 并且不含腐蚀性气体的环境中，应确保在该环境控制的条件下不能使电芯表面出现冷凝水珠，同时储存电芯的地面不能出现返潮现象。建议每隔 3 个月充放电一次，SOC 保持在 25-75%之间。

- c) No press on the cell

不要让电芯承受任何压力。

12. Consultation 技术咨询

As to the obscurity, contact the following.

Address: No.11 East Meigui Road, Huayuankou Economic District, Dalian

Tel No.: +86—411—39185929

Fax No.: +86—411—39185980

如有疑问，请按以下方式咨询

厂址：大连花园口经济开发区玫瑰街东段 11 号

电话号码：+86—411—39185929

传真号码：+86—411—39185980

<http://www.cbak.com.cn>

13. Requirement for Safety Assurance 安全保证要求

For the sake of safety assurance, please discuss the equipment design, its system and protection circuit of Lithium-ion cell with DALIAN CBAK POWER BATTERY COMPANY LIMITED in advance. And consult about the high rate current, rapid charge and special application in the same way.

为了安全起见，如有设备设计，锂离子电芯系统保护电路或高电流，快速充电和其它方面的特殊应用，请先咨询大连中比动力电池有限公司相关事宜。