



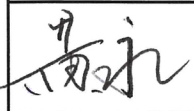
-EVE Power CO., LTD Confidential Proprietary-

Model 型号	IFR40135	Spec. No. 规格书编号	PBRI-C40-V2-D06-01	Version 版本	A
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SPECIFICATIONS OF PRODUCT

产品交付规格书

型号 (Model) : IFR40135

Designed by 设计制作	Designer Checked by 产品设计审核	QC Checked by 品质审核	Sales Checked by 销售审核	Approved by 批准
		杨梦佳		

Customer Signature 客户接收栏
公司名称 (Company Name) :
批 准 (Approved by) :
日 期 (Signature Date) :

2023 年 11 月

EVE Power CO., LTD
湖北亿纬动力有限公司



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客户要求 (Customer Requirements)

No. 序号	Special Requirements 特殊要求	Standards 标准
1		
2		
3		
4		
5		

客户代码 (Customer Code) : _____

签 字 (Signature) : _____

日 期 (Date) : _____



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变更履历 (Revision History)

Version 版本	Date 日期	Contents 更改内容	Checked by 确认人
A	2023.11.13	First Issue 新版发行	黄永

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术语定义 (Definition of Terms)

Terms 术语	Definition 定义
Product 产品	The "Product" in the specifications refers to the 20Ah Cylindrical Lithium-ion Rechargeable Cell (Battery) produced by EVE Power Co., Ltd. 本规格书中“产品”是指湖北亿纬动力有限公司生产的20Ah圆柱锂离子可充放电电芯(电池)。
Customer 客户	Refers to the buyer in the "EVE Power Co., Ltd. Product Sales Contract." 指《湖北亿纬动力有限公司产品销售合同》中的买方。
Environment Temperature 环境温度	The surrounding temperature where the cell is located. 电池所处的周围环境温度。
Cell Temperature 电池温度	The temperature of the cell tested by a temperature sensor at the center of the cell surface.由接入电池表面中心的温度传感器测试的电池温度。
Rate 倍率 (C)	The ratio of charging/discharging current to the rated capacity of the battery. For example, if the battery capacity is 20Ah, and the charging or discharging current is 20A, then the charging or discharging rate is 1C. 充/放电电流与电池的额定容量值的比率。例如，电池容量为20Ah，当充电或放电电流为20A时，则充电或放电倍率为1C。
State of Charge 荷电状态 (SOC)	The ratio of the cell capacity measured in ampere-hours or watt-hours under no load to the rated capacity. For example, if a 20Ah capacity is considered 100% SOC, then at 0Ah, the SOC is 0%. 在无负载的情况下，以安培小时或者以瓦特小时为单位计量的电池容量状态与额定容量的比值。如：若将容量为20Ah的状态视为100%SOC，则容量为0Ah时，SOC为0%。
Standard Charging 标准充电	The charging mode described in Section 3.3 of the specifications. 本规格书第3.3条所述的充电模式。
Standard Discharging 标准放电	The discharging mode described in Section 3.4 of the specifications. 本规格书第3.4条所述的放电模式。
AC Resistance 交流内阻 (ACR)	The internal resistance value obtained by injecting a 1kHz sine wave current into the positive and negative terminals of the cell, abbreviated as ACR. 给电池正负极注入1kHz的正弦波电流测试所得到的内阻值，缩写用ACR表示。
DC Resistance 直流电阻 (DCR)	The ratio of voltage change to the corresponding current change in the working conditions of the cell. 工作条件下电池的电压变化与相应的电流变化之比。
Pulse Current 脉冲电流	Current or voltage pulses that repeat periodically. Pulse currents can appear in the same direction or alternate between positive and negative directions. 以周期重复出现的电流或者电压脉冲称为脉冲电流，脉冲电流或是以同一方向出现，或是以正负交替变换方向出现。



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测量单位 (Unit of Measurement)

No. 序号	Unit 单位	Abbreviation 简写	Type of Units 单位类型
1	毫伏特(Millivolt)	mV	电压单位 Voltage
2	毫安培(Mill Ampere)	mA	电流单位 Current
3	安培-小时(Ampere-Hour)	Ah	容量单位 Capacity
4	瓦特-小时(Watt-Hour)	Wh	能量单位 Energy
5	毫欧姆(Milliohm)	mΩ	电阻单位 Resistance
6	摄氏度(Celsius Degree)	°C	温度单位 Temperature
7	毫米(Millimeter)	mm	长度单位 Length
8	秒(Second)	s	时间单位 Time
9	秒(Minute)	min	时间单位 Time
10	小时(Hour)	h	时间单位 Time
11	赫兹(Hertz)	Hz	频率单位 Frequency

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1 基本信息 (Fundamental Information)

1.1 适用范围 (Scope of Application)

This product specifications are applicable to Cylindrical Lithium-ion Rechargeable Cell produced by EVE Power Co., Ltd.

本产品规格书适用于由湖北亿纬动力有限公司生产的圆柱锂离子可充电电芯。

1.2 产品类型 (Product Type)

Cylindrical Lithium-ion Rechargeable Cell.

圆柱锂离子可充电电芯。

1.3 产品型号 (Product Model)

EVE—IFR40135

(1) "EVE" represents "EVE" defines EVE Power Co., LTD.

"EVE"代表湖北亿纬动力有限公司。

(2) "I" represents lithium-ion cell.

"I"代表锂离子电池。

(3) "F" represents lithium iron phosphate.

"F"代表磷酸铁锂。

(4) "R" represents cylindrical.

"R"代表圆柱形。

(5) "40" represents a diameter of 40 mm for the cell.

"40"代表电池直径为 40 mm。

(6) "135" represents a height of 135 mm for the battery cell.

"135"代表电池高度为 135 mm。

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2 电池规格参数 (Specifications & Parameters)

2.1 基本参数 (Basic Parameters)

Item 项目	Specifications 标准		Remarks 备注
0.33C Capacity@3650~2500mV 0.33C容量@3650~2500mV	≥20000	mAh	0.33C Discharge 0.33C放电
1C Capacity@3650~2500mv 1C容量@3650~2500mv	≥19500	mAh	1C Discharge 1C放电
AC-IR 交流内阻	≤1.9	mΩ	AC 1 kHz@25°C 30%SOC
DC-IR 直流内阻	≤6	mΩ	2C放电30s@25°C 30%SOC
End-of-Charge Voltage 充电限制电压	3650	mV	/
End-of-Charge Current 充电截止电流	1000	mA	0.05C
End-Of-Discharge Voltage 放电截止电压	T > 0°C@2500 T ≤ 0°C@1800	mV	/
Nominal Voltage 额定电压	3220	mV	0.33C
	3200	mV	0.5C
	3130	mV	1C
Standard Charging Current 标准充电电流	10000	mA	0.5C
Fast Charging Current 快速充电电流	20000	mA	Max 80%SOC
Standard Discharging Current 标准放电电流	10000	mA	0.5C
Max Discharging Current 最大放电电流	60000	mA	3C Pulse 30s
Range of Operating Temperature 工作温度范围	Charging Temperature 充电温度	0~55°C	Refer to Chapter 4.3.1.1 参考章节 4.3.1.1
	Discharging Temperature 放电温度	-20~60°C	Refer to Chapter 4.3.2.1 参考章节 4.3.2.1
	Storage Humidity 存储湿度	≤70% RH	/

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Item 项目		Specifications 标准		Remarks 备注	
Monthly Self-Discharge Rate 月自放电率		≤3.0	%/month	/	

2.2 产品规格 (Product Specifications)

2.2.1 尺寸、重量指标 (Dimension and Weight)

NO. 序号	Item 项目	Specifications 标准	Test Method 测试方法章节
1	Cell Dimension 电池尺寸	Diameter: $\Phi 40.5 \pm 0.3$ mm (Coated) 直径: $\Phi 40.5 \pm 0.3$ mm (包膜)	3.5.1
		Total Height : 135.0 ± 0.5 mm (Pole Contained) 总高: 135.0 ± 0.5 mm (含极柱)	3.5.1
		Shoulder Height : 130.4 ± 0.3 mm (Pole Not Contained) 肩高: 130.4 ± 0.3 mm (不含极柱)	3.5.1
2	Cell Weight 重量	366±6g	3.5.2

2.2.2 电性能指标 (Electrical Performance)

NO. 序号	Test Item 测试项目	Specifications 标准	Test Method Chapter 测试方法章节
1	Capacity 容量	0.33C Discharge 0.33C 放电	3.5.4.1
2		1C Discharge 1C 放电	3.5.4.1
3	Discharge Capacity under Different Temperature (1.0C Discharge) 不同温度放电性能 (1.0C放电)	-20°C Retention Ratio -20°C容量保持率	3.5.4.2
4		-10°C Retention Ratio -10°C容量保持率	3.5.4.2
5		0°C Retention Ratio 0°C容量保持率	3.5.4.2
6		25°C Retention Ratio 25°C容量保持率	3.5.4.2
7		45°C Retention Ratio 45°C容量保持率	3.5.4.2
8		60°C Retention Ratio 60°C容量保持率	3.5.4.2

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NO. 序号	Test Item 测试项目		Specifications 标准	Test Method Chapter 测试方法章节	
9	Capacity of Retention and Recovery at 100%SOC 100% SOC荷电保持 与恢复能力	28d, 25°C	Retention Ratio≥95% 容量保持率≥95% Recovery Ratio≥97% 容量恢复率≥97%	3.5.4.3	
10		28d, 45°C	Retention Ratio≥90% 容量保持率≥90% Recovery Ratio≥92% 容量恢复率92%	3.5.4.3	
11	Cycle Life 循环寿命	25°C 100%DOD Cycle Life 25°C 100%DOD 循环寿命	After 4000 Cycles, Capacity Retention≥80% Initial Capacity 4000周后容量保持率≥ 80%初始容量	3.5.4.4	
12		45°C 100%DOD Cycle Life 45°C 100% DOD 循环寿命	After 1500 Cycles, Capacity Retention≥70% Initial Capacity 1500周后容量保持率≥ 70%初始容量	3.5.4.5	

2.2.3 安全性能指标 (Safety Performance)

NO. 序号	Test Item 测试项目	Specifications 规格	Test Method Chapter 测试方法章节
1	Over-charge Test 过充电测试	No Explosion, No Fire 不爆炸、不起火	3.5.5.1
2	Over-discharge Test 过放电测试	No Explosion, No Fire 不爆炸、不起火	3.5.5.2
3	Short-circuit Test 短路测试	No Explosion, No Fire 不爆炸、不起火	3.5.5.3
4	Drop Test 跌落测试	No Explosion, No Fire 不爆炸、不起火	3.5.5.4
5	Crush Test 挤压测试	No Explosion, No Fire 不爆炸、不起火	3.5.5.5
6	Heating Test 加热测试	No Explosion, No Fire 不爆炸、不起火	3.5.5.6
7	Low Pressure Test 低气压测试	No Explosion, No Fire, No Leakage 不爆炸、不起火、不漏液	3.5.5.7

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2.3 图纸 (Outline Dimensions)

See Attachment I: IFR40135 Drawing.

见附图一：IFR40135 图纸 (Attachment I: IFR40135 Drawing)。

2.4 外观 (Appearance)

The battery should be free from noticeable scratches, cracks, rust stains, discoloration, or electrolyte leakage—defects that could negatively impact the commercial value of the battery.

电池应无明显擦伤、裂痕、锈渍、变色或电解液泄漏这类对电池商用价值有影响的缺陷。

3 试验条件 (Standard Test Condition)

3.1 环境条件 (Environment Condition)

If not specified otherwise, the product test conditions in this specifications are at a temperature of $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and humidity $\leq 65\% \text{ RH}$.

若无特别要求，此规格书上的产品测试条件均为温度： $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ；湿度： $\leq 65\% \text{ RH}$ 。

3.2 测量设备 (Measuring Equipment)

The accuracy of measuring instruments should meet the following requirements:

测量仪器、仪表准确度应满足以下要求：

- (1) 电压测量装置 (the Voltage Measuring Equipment): $\pm 0.1\%$;
- (2) 电流测量装置 (the Current Measuring Equipment): $\pm 0.1\%$;
- (3) 温度测量装置 (the Temperature Measuring Equipment): $\pm 0.5^{\circ}\text{C}$;
- (4) 尺寸测量装置 (the Dimension Measuring Equipment): $\pm 0.01\text{mm}$;
- (5) 重量测量装置 (the Weight Measuring Equipment): $\pm 0.1\text{g}$.

3.3 标准充电方式 (Standard Charge Method)

"Standard Charge" means, under the condition of ambient temperature at $25 \pm 2^{\circ}\text{C}$, charging with a constant current of 0.5C until reaching 3650mV, followed by constant voltage charging at 3650mV until the current is less than 0.05C. If not specified otherwise, this charging method in the specifications refers to "Standard Charge."

“标准充电”即在环境温度为 $25 \pm 2^{\circ}\text{C}$ 的条件下，先以恒定电流 0.5C 充电至 3650mV，再以 3650mV 的恒压充电至电流小于 0.05C。若无特别说明，此规格书充电方式表示“标准充电”。

3.4 标准放电方式 (Standard Discharge Method)

"Standard Discharge" means, under the condition of ambient temperature at $25 \pm 2^{\circ}\text{C}$, discharging with a constant current of 0.5C until reaching 2500mV. If not specified otherwise, this discharging method in the specifications refers to "Standard Discharge."

“标准放电”即在环境温度为 $25 \pm 2^{\circ}\text{C}$ 的条件下，以恒定电流 0.5C 放电到 2500mV。若无特别说明，此规格

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书充电方式表示“标准放电”。

3.5 测试方法 (Test Method)

3.5.1 尺寸 (Dimension)

Use calipers to measure the diameter and height of the battery.

使用卡尺测量电池直径和高度。

3.5.2 重量 (Weight)

Use an electronic scale to measure the weight of the battery.

使用电子秤测量电池的重量。

3.5.3 内阻 (Internal Resistance)

ACR: Under the condition of ambient temperature at $25 \pm 2^\circ\text{C}$, test the battery at 30% SOC with a frequency of 1kHz.

DCR: Under the condition of ambient temperature at $25 \pm 2^\circ\text{C}$, discharge the battery at 0.5C to 2000mV, let it sit for 30min, then charge it at 0.5C for 36min (adjust SOC to 30%), let it sit for another 30min. Record the end-of-resting voltage as V_1 , discharge it at 2C for 30s, record the end-of-discharge voltage as V_2 , and calculate $\text{DCR} = (V_1 - V_2) / 40$ (m Ω).

ACR: 在环境温度 $25 \pm 2^\circ\text{C}$ 的条件下, 30%SOC 的电池采用 1kHz 的频率进行测试。

DCR: 在环境温度 $25 \pm 2^\circ\text{C}$ 的条件下, 电池以 0.5C 放电至 2000mV, 搁置 30min 后使用 0.5C 的电流充电 36min (调整 SOC 至 30%), 搁置 30min, 记录搁置末期电压 V_1 , 用 2C 的电流放电 30s, 记录放电末端电压 V_2 , 计算 $\text{DCR} = (V_1 - V_2) / 40$ (m Ω)。

3.5.4 电性能 (Electrical Characteristics)

3.5.4.1 放电容量 (Discharge Capacity)

0.33C Discharge Capacity: At ambient temperature of $25 \pm 2^\circ\text{C}$, charge at 0.5C constant current and constant voltage to 3650mV, stop at 0.05C, let it sit for 30min; discharge at 0.33C constant current to 2500mV, stop, and record the discharge capacity.

1C Discharge Capacity: At ambient temperature of $25 \pm 2^\circ\text{C}$, charge at 0.5C constant current and constant voltage to 3650mV, stop at 0.05C, let it sit for 30min; discharge at 1C constant current to 2500mV, stop, let it sit for another 30min; cycle for 5 times, record the average of the last three discharge capacities.

0.33C 放电容量: 在环境温度 $25 \pm 2^\circ\text{C}$, 0.5 C 恒流恒压充电至 3650mV, 0.05 C 截止, 搁置 30 min; 0.33 C 恒流放电至 2500mV 截止, 记录放电容量。

1C 放电容量: 在环境温度 $25 \pm 2^\circ\text{C}$, 0.5 C 恒流恒压充电至 3650mV, 0.05 C 截止, 搁置 30 min; 1 C 恒流放电至 2500mV 截止, 搁置 30 min; 循环 5 次, 记录后三次放电容量均值。

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3.5.4.2 不同温度放电性能 (Discharge Capacity at Different Temperatures)

Capacity Calibration: At ambient temperature of $25 \pm 2^\circ\text{C}$, perform a 1C discharge to 2500mV for capacity calibration, and record the calibrated capacity. Then, use the standard charging method at $25 \pm 2^\circ\text{C}$ to fully charge the battery.

Low-Temperature Discharge: Let the battery rest for 24h at $-20/-10/0 \pm 2^\circ\text{C}$, then discharge at 1C to 1800mV at this temperature, record the discharge capacity, and calculate the capacity retention rate = discharge capacity / calibrated capacity.

High-Temperature Discharge: Let the battery rest for 6h at $45/60 \pm 2^\circ\text{C}$, then discharge at 1C to 2500mV at this temperature, record the discharge capacity, and calculate the capacity retention rate = discharge capacity / calibrated capacity.

容量标定: 在环境温度 $25 \pm 2^\circ\text{C}$ 下对电池进行 1C 放电至 2500mV 进行容量标定, 记录标定容量。然后在 $25 \pm 2^\circ\text{C}$ 使用标准充电方式对电池充满电。

低温放电: 在 $-20/-10/0 \pm 2^\circ\text{C}$ 下搁置 24h, 再在此温度下 1C 放电至 1800mV, 记录放电容量, 容量保持率=放电容量/标定容量。

高温放电: 在 $45/60 \pm 2^\circ\text{C}$ 下搁置 6h, 再在此温度下 1C 放电至 2500mV, 记录放电容量, 容量保持率=放电容量/标定容量。

3.5.4.3 100% SOC 荷电保持与恢复能力 (Capacity of Retention and Recovery at 100%SOC)

The battery undergoes capacity calibration testing according to the standard charging and discharging method. Subsequently, the battery is charged and discharged to full capacity using standard charging and discharging procedures. It is then stored for 28 days at ambient temperatures of $25 \pm 2^\circ\text{C}$ / $45^\circ\text{C} \pm 2^\circ\text{C}$. Afterward, under the condition of $25 \pm 2^\circ\text{C}$, it undergoes standard discharging to 2500mV (record the discharge holding capacity), followed by a 30-minute rest. Next, it undergoes three cycles of standard charging and discharging (record the third as the discharge recovery capacity). The capacity retention rate is calculated as the discharge holding capacity / calibrated capacity $\times 100\%$, and the capacity recovery rate is calculated as the discharge recovery capacity / calibrated capacity $\times 100\%$.

电池先按照标准充放电方式进行标定容量测试, 而后电池按照标准充放电充满电, 在环境温度 $25 \pm 2^\circ\text{C}$ / $45^\circ\text{C} \pm 2^\circ\text{C}$ 的条件下搁置 28 天, 然后在环境温度 $25 \pm 2^\circ\text{C}$ 的条件下按照标准放电制度放电至 2500mV (记录放电保持容量), 搁置 30 min, 然后按照标准充放电制度循环三次 (记录第三次为放电恢复容量)。容量保持率=放电保持容量/标定容量 $\times 100\%$, 容量恢复率=放电恢复容量/标定容量 $\times 100\%$ 。

3.5.4.4 25°C 100% DOD 循环寿命 (25°C 100%DOD Cycle Life)

Under ambient temperature conditions of $25 \pm 2^\circ\text{C}$, the battery undergoes the following cycling procedure repeatedly until completing 4000 cycles:

1. Charge at a constant current of 0.5C until reaching 3650mV.

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2. Then, charge at a constant voltage until the current is 0.05C.
3. Allow a 30-minute rest.
4. Discharge at a constant current of 0.5C until reaching 2500mV.
5. After the discharge, let it rest for 30 minutes before proceeding to the next cycle.

This cycle is repeated for a total of 4000 times under the specified conditions.

在环境温度 $25 \pm 2^\circ\text{C}$ 的条件下, 以 0.5 C 恒流充电至 3650mV, 再恒压充电至电流 0.05 C 截止; 搁置 30 min, 然后以 0.5 C 放电至 2500mV, 放电结束后搁置 30 min 后进行下一个循环, 直至循环 4000 次。

3.5.4.5 45°C 100% DOD 循环寿命 (45°C 100%DOD Cycle Life)

Under ambient temperature conditions of $45^\circ\text{C} \pm 2^\circ\text{C}$, the battery undergoes the following cycling procedure repeatedly until completing 1500 cycles:

1. Charge at a constant current of 0.5C until reaching 3650mV.
2. Then, charge at a constant voltage until the current is 0.05C.
3. Allow a 30-minute rest.
4. Discharge at a constant current of 0.5C until reaching 2500mV.
5. After the discharge, let it rest for 30 minutes before proceeding to the next cycle.

This cycle is repeated for a total of 1500 times under the specified conditions.

在环境温度 $45^\circ\text{C} \pm 2^\circ\text{C}$ 的条件下, 以 0.5 C 恒流充电至 3650mV, 再恒压充电至电流 0.05 C 截止; 搁置 30 min, 然后以 0.5 C 放电至 2500mV, 放电结束后搁置 30 min 后进行下一个循环, 直至循环 1500 次。

3.5.5 安全性能 (Safety Characteristics)

The following tests should be conducted in a device with forced ventilation conditions and explosion-proof measures, and before the tests, all batteries are charged according to the standard charging method as specified in 3.3.

下述试验应在有强制排风条件及防爆措施的装置内进行, 在试验前所有的电池都按 3.3 规定标准充电方式充电后再进行以下试验。

3.5.5.1 过充电测试 (Over-charge Test)

At a test environment temperature of $25 \pm 2^\circ\text{C}$, charge the battery at a constant current of 1C until the battery voltage reaches 1.5 times the charging termination voltage or 1h after charging. After completing the above test steps, observe for 1h at the test environment temperature.

测试环境温度 $25 \pm 2^\circ\text{C}$, 以 1 C 电流恒流充电至电池电压达到 1.5 倍充电终止电压或充电 1h 后停止充电。完成以上试验步骤后, 在试验环境温度下观察 1 h。

3.5.5.2 过放电测试 (Over-discharge Test)

At a test environment temperature of $25 \pm 2^\circ\text{C}$, discharge the battery at a constant current of 1C for 90 minutes.

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After completing the above test steps, observe for 1h at the test environment temperature.

测试环境温度 $25 \pm 2^{\circ}\text{C}$ ，以 1 C 电流恒流放电 90 min；完成以上试验步骤后，在试验环境温度下观察 1 h。

3.5.5.3 短路测试 (Short-circuit Test)

At a test environment temperature of $25 \pm 2^{\circ}\text{C}$, short-circuit the positive and negative terminals of the battery externally for 10 minutes, with an external line resistance of less than $5\text{ m}\Omega$. After completing the above test steps, observe for 1h at the test environment temperature.

测试环境温度 $25 \pm 2^{\circ}\text{C}$ ，将电池正负极经外部短路 10 min，外部线路电阻应小于 $5\text{ m}\Omega$ 。完成以上试验步骤后，在试验环境温度下观察 1 h。

3.5.5.4 跌落测试 (Drop Test)

At a test environment temperature of $25 \pm 2^{\circ}\text{C}$, drop the battery from a height of 1.5m with the positive or negative terminal facing down onto a concrete surface. After completing the above test steps, observe for 1h at the test environment temperature.

测试环境温度 $25 \pm 2^{\circ}\text{C}$ ，将电池的正极或者负极端子朝下从 1.5m 高度处自由跌落到水泥地面上 1 次。完成以上试验步骤后，在试验环境温度下观察 1 h。

3.5.5.5 挤压测试 (Crush Test)

At a test environment temperature of $25 \pm 2^{\circ}\text{C}$, place the battery between two pressing surfaces of a squeezing device, and conduct the test under the following conditions:

- Pressing plate: Radius 75mm semi-cylinder, length exceeding the size of the battery;
- Pressing direction: Pressing perpendicular to the direction of the battery plate;
- Pressing speed: Not exceeding 2 mm/s ;
- Pressing depth: Stop pressing when the voltage reaches 0V, or the deformation reaches 15%, or the pressing force reaches 100kN, or 1000 times the weight of the test object;
- Hold for 10min, observe for 1h.

测试环境温度 $25 \pm 2^{\circ}\text{C}$ ，将电池置于挤压设备的两个挤压平面之间，用液压油缸或类似的力挤压按照下列条件进行试验：

- 挤压板：半径 75 mm 半圆柱体，长度超过电池尺寸；
- 挤压方向：垂直于蓄电池极板方向施压；
- 挤压速度：不大于 2 mm/s ；
- 挤压程度：电压达到 0 V 或变形量达到 15%或挤压力达到 100 kN 或 1000 倍试验对象重量后停止挤压；
- 保持 10min，观察 1h。

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3.5.5.6 加热测试 (Heating Test)

At a test environment temperature of $25 \pm 2^{\circ}\text{C}$, heat the battery in an electrically heated air drying oven, raising the temperature from room temperature to $130^{\circ}\text{C} \pm 2^{\circ}\text{C}$ at a rate of $5^{\circ}\text{C} \pm 2^{\circ}\text{C}/\text{min}$ and maintain for 30min. After completing the above test steps, observe for 1h at the test environment temperature.

测试环境温度 $25 \pm 2^{\circ}\text{C}$ ，将电池放在电热鼓风干燥箱中加热，温度以 $5^{\circ}\text{C} \pm 2^{\circ}\text{C}/\text{min}$ 的速率由室温升至 $130^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 并保持 30min。完成以上试验步骤后，在试验环境温度下观察 1 h。

3.5.5.7 低气压测试 (Low Pressure Test)

At a test environment temperature of $25 \pm 2^{\circ}\text{C}$, place the battery in a vacuum box with a pressure of 11.6kPa for 6h. After completing the above test steps, observe for 1h at the test environment temperature.

测试环境温度 $25 \pm 2^{\circ}\text{C}$ ，将电池放入 11.6kPa 的真空箱中搁置 6h，完成以上试验步骤后，在试验环境温度下观察 1 h。

4 电池操作说明及注意事项 (Cell Operation Instruction and Precautions)

4.1 运输 (Transportation)

The shipped batteries are in a 30% state of charge (SOC). Due to self-discharge, it cannot be guaranteed that the batteries delivered to the customer will maintain a full 30% charge. During transportation, precautions should be taken to prevent severe vibrations, impacts, and exposure to sunlight or rain.

出货电池为 30%SOC 状态，由于电池存在自耗，运送到客户端的电池无法完全保证 30%荷电量。运输过程应防止剧烈振动、冲击、日晒雨淋。

4.2 储存建议 (Storage Recommendations)

4.2.1 短期存放 (Short-term Storage)

* For short-term storage (up to 3 months), the batteries should be stored in a temperature range of 0°C to 45°C , in a low humidity environment, and in an atmosphere free from corrosive gases.

电池短期存放（不超过 3 个月）应储存在 0°C ~ 45°C 温度范围，低湿度和不含腐蚀性气体的环境中。

* Do not subject the batteries to any pressure.

不要让电池承受任何压力。

4.2.2 长期存放 (Long-term Storage)

* For long-term storage (beyond 3 months), the recommended storage conditions include a temperature range of 0°C to 25°C , low humidity, and an environment free from corrosive gases.

电池长期存放（超过 3 个月）应存储在 0°C ~ 25°C 温度范围，低湿度和不含腐蚀性气体的环境中。

* Do not subject the batteries to any pressure.

不要让电池承受任何压力。

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4.3 操作说明 (Operation Instruction)

4.3.1 充电 (Charging)

* The charging temperature range for the batteries is 0°C to 55°C.

电池充电温度范围为 0°C~55°C。

* It is recommended to charge the batteries at a constant current of 10000mA until reaching 3650mV. It is not advised to use currents exceeding 20000mA.

建议以 10000mA 的电流恒流充电至 3650mV，超过 20000mA 的电流建议不要使用。

4.3.1.1 温度梯度充电方案 (Temperature gradient charging scheme)

	SOC	Temperature Gradient						
		温度梯度						
		0~5°C	5~10°C	10~15°C	15~25°C	25~45°C	45~50°C	50~55°C
Charge Current 充电 电流	100%	0.05C	0.05C	0.05C	0.05C	0.05C	0.05C	0.05C
	98%	0.1C	0.1C	0.1C	0.1C	0.1C	0.1C	0.1C
	90%	0.1C	0.1C	0.4C	0.5C	0.5C	0.5C	0.2C
	80%	0.2C	0.2C	0.4C	0.5C	0.8C	0.5C	0.2C
	70%	0.2C	0.2C	0.6C	0.8C	1.0C	0.5C	0.2C
	60%	0.2C	0.4C	0.6C	0.8C	1.0C	0.5C	0.2C
	50%	0.2C	0.4C	0.8C	0.8C	1.0C	0.5C	0.2C
	40%	0.2C	0.5C	0.8C	0.8C	1.0C	0.5C	0.2C
	30%	0.2C	0.5C	0.8C	0.8C	1.0C	0.5C	0.2C
	20%	0.2C	0.5C	0.8C	0.8C	1.0C	0.5C	0.2C
	10%	0.2C	0.5C	0.8C	0.8C	1.0C	0.5C	0.2C
	0%	0.2C	0.5C	0.8C	0.8C	1.0C	0.5C	0.2C

4.3.2 放电 (Discharging)

* For discharging, it is recommended to terminate above 0°C with a termination voltage of 2500mV and below 0°C with a termination voltage of 1800mV. It is not recommended to use currents exceeding 60000mA.

建议温度在 0°C 以上的放电终止电压为 2500mV，0°C 及以下的放电终止电压为 1800mV，超过 60000mA 的电流建议不要使用。

* To achieve optimal performance, the battery's discharging temperature range is -20°C to 60°C.

为了达到较好的性能，电池的放电温度范围为 -20°C~60°C。

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4.3.2.1 温度梯度放电方案 (Temperature gradient discharging scheme)

Discharge Current 放电电流	SOC	Temperature Gradient 温度梯度							
		-20~(-10)°C	-10~0°C	0~10°C	10~20°C	20~45°C	45~50°C	50~55°C	55~60°C
	100%	0.5C	0.8C	1.5C	1.5C	1.5C	0.8C	0.5C	0.2C
	98%	0.5C	0.8C	1.5C	1.5C	1.5C	0.8C	0.5C	0.2C
	90%	0.5C	0.8C	1.5C	1.5C	1.5C	0.8C	0.5C	0.2C
	80%	0.5C	0.8C	1.5C	1.5C	1.5C	0.8C	0.5C	0.2C
	70%	0.5C	0.8C	1.5C	1.5C	1.5C	0.8C	0.5C	0.2C
	60%	0.5C	0.8C	1.5C	1.5C	1.5C	0.8C	0.5C	0.2C
	50%	0.5C	0.8C	1.2C	1.2C	1.5C	0.8C	0.5C	0.2C
	40%	0.5C	0.6C	1C	1C	1.5C	0.8C	0.5C	0.2C
	30%	0.4C	0.6C	0.8C	1C	1.5C	0.8C	0.5C	0.2C
	20%	0.25C	0.5C	0.8C	0.8C	1.2C	0.8C	0.5C	0.2C
	10%	0.25C	0.5C	0.5C	0.5C	1.0C	0.5C	0.5C	0.1C
	5%	0.1C	0.5C	0.5C	0.5C	0.5C	0.5C	0.5C	0.1C

4.3.3 温度限制 (Temperature Limits)

Item 项目	Value 数值	Remarks 备注
Recommended Operating Temperature Range 推荐操作温度范围	10°C ~ 35°C	Recommended Operating Temperature Range 推荐使用电池的温度范围。
Maximum Operating Temperature 最高操作温度	60°C	If the battery is used at temperatures exceeding the maximum operating temperature, the power should be reduced to 0. 如果电池使用温度超过最高操作温度, 功率需要降为0。
Minimum Operating Temperature 最低操作温度	-20°C	If the battery is used at temperatures below the minimum operating temperature, the power should be reduced to 0. 如果电池使用温度超过最低操作温度, 功率需要降为0。
Maximum Safe Temperature 最高安全温度	60°C	Exceeding the maximum safe temperature during battery use can result in irreversible and permanent damage to the battery. Users should not operate the battery at temperatures higher than the maximum safe temperature. 如果电池使用温度超过最高安全温度, 将会造成电池不可逆

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Item 项目	Value 数值	Remarks 备注			
		的永久性损坏，用户使用时不得高于最高安全温度。			
Minimum Safe Temperature 最低安全温度	-20°C	Exceeding the minimum safe temperature during battery use can result in irreversible and permanent damage to the battery. Users should not operate the battery at temperatures lower than the minimum safe temperature. 如果电池使用温度超过最低安全温度，将会造成电池不可逆的永久性损坏，用户使用时不得低于最低安全温度。			

Cautions:**注意事项:**

a) The battery should avoid charging under low-temperature conditions prohibited by this technical agreement, including but not limited to standard charging, fast charging, emergency charging, and regenerative charging, as it may result in unexpected capacity reduction. The battery management system should control charging and regenerative charging based on the minimum specified temperature. Charging below the temperature specified in this technical agreement is prohibited. Otherwise, Party B does not assume quality assurance responsibility and any related liability for losses or damages caused.

a) 电池避免在本技术协议禁止的低温条件下充电（包括但不限于标准充电，快充，紧急情况充电和再生充电等），否则可能出现意外的容量降低现象。电池管理系统应依照最小的充电和再生充电温度进行控制。禁止在低于本技术协议规定的温度条件下充电，否则，乙方不承担质量保证责任及由此引起的损失赔偿等一切相关责任。

b) The design of the battery pack should thoroughly consider heat dissipation. Party B does not assume quality assurance responsibility for any damage caused by overheating of the battery or battery pack due to design issues related to heat dissipation.

b) 电池包设计中应充分考虑电池的散热问题，由于电池包散热设计问题导致的电池或电池过热损坏，乙方不承担质量保证责任。

4.3.4 电池防范措施 (Standard Cell Precautions)

* Use a dedicated lithium-ion battery charger when charging.

充电时需选用锂离子电池专用充电器

* Do not expose the battery to extreme heat or environments with sparks.

不要将电池暴露在极热或有火星的环境中。

* Avoid short-circuiting, overcharging, or over-discharging the battery.

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不要将电池短路，过充或过放。

- * Do not subject the battery to excessive mechanical shock.

不要使电池承受过重的机械冲击。

- * Avoid immersing the battery in seawater or other liquids, and keep it dry.

不要将电池浸入海水或水中，或者使其吸湿。

- * Do not reverse the polarity of the battery.

不要颠倒电池的正负极。

- * Do not disassemble or modify the battery.

不要拆卸或修整电池。

- * Avoid placing the battery with metal items such as necklaces, coins, or hairpins.

不要和项链、硬币或发夹等金属物品放置在一起。

- * Prevent obvious damage or deformation to the battery.

不要使电池受到明显的损害或变形。

- * Do not connect the battery to a socket.

不要将电池与插座连接。

- * Avoid direct welding on the battery.

不要直接焊接电池。

- * Do not touch a leaking battery directly.

不要直接接触泄漏的电池。

- * Do not use the battery for purposes other than intended.

不要将电池用于其它设备。

- * Do not mix different models of lithium-ion batteries.

不要将锂离子电池混合使用。

- * Keep the battery away from direct sunlight.

不要将电池放置在太阳光直射的地方。

- * Store the battery in a place inaccessible to children.

将电池放置在远离儿童的地方。

- * Do not puncture, hammer, or step on the battery.

不要针刺、锤打或践踏电池。

- * Avoid impacting or throwing the battery.

不要撞击或投掷电池。

- * Prohibit the use or placement of batteries in high temperatures, as it may lead to battery overheating, functional

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failure, and lifespan degradation.

禁止在高温下使用或放置电池，否则可能会引起电池过热或功能失效、寿命衰减

4.4 其他 (Others)

For safety considerations, such as device design, lithium-ion battery system protection circuits, high current, fast charging, and other specific applications, please consult EVE for relevant matters. Any issues not mentioned in the specifications must be determined through mutual consultation.

为了安全起见，如有设备设计，锂离子电池系统保护电路或高电流，快速充电和其它方面的特殊应用，请先咨询亿纬公司相关事宜。任何本规格书中未提及的事项，须经过双方协商确定。

The specifications are written in both Chinese and English. In case of conflicts between the English and Chinese versions, the Chinese version shall prevail.

本规格书由中英两种语言书写，当英文版本和中文版本发生冲突时，以中文版本为主。

5 免责声明 (Disclaimer)

If the product is not used in accordance with the specifications in this manual due to the requirements of the unit and the user, EVE will no longer assume responsibility for product quality assurance and any related liabilities or compensation for losses incurred. In case such actions negatively impact EVE's reputation, EVE reserves the right to pursue legal responsibilities against the product-demanding unit.

如果由于产品需求单位和使用者的不按本说明书中的规定进行使用，EVE 不再承担产品质量保证责任及由此引发的损失赔偿等一切相关责任。因前述行为，对 EVE 的声誉造成负面影响的，EVE 将保留追究产品需求单位法律责任权利。

6 联系方式 (Consultation)

For inquiries, please contact us using the following information:

Address: No.68 Jingnan Avenue, Duodao District, High-tech Zone, Jingmen, Hubei Province, China

Email: sales@evebattery.com

Website: <http://www.evepower.com>

如有疑问，请按以下方式咨询：

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Model 型号	IFR40135	Spec. No. 规格书编号	PBRI-C40-V2-D06-01	Version 版本	A
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附图一： IFR40135 图纸 (Attachment I: IFR40135 Drawing)

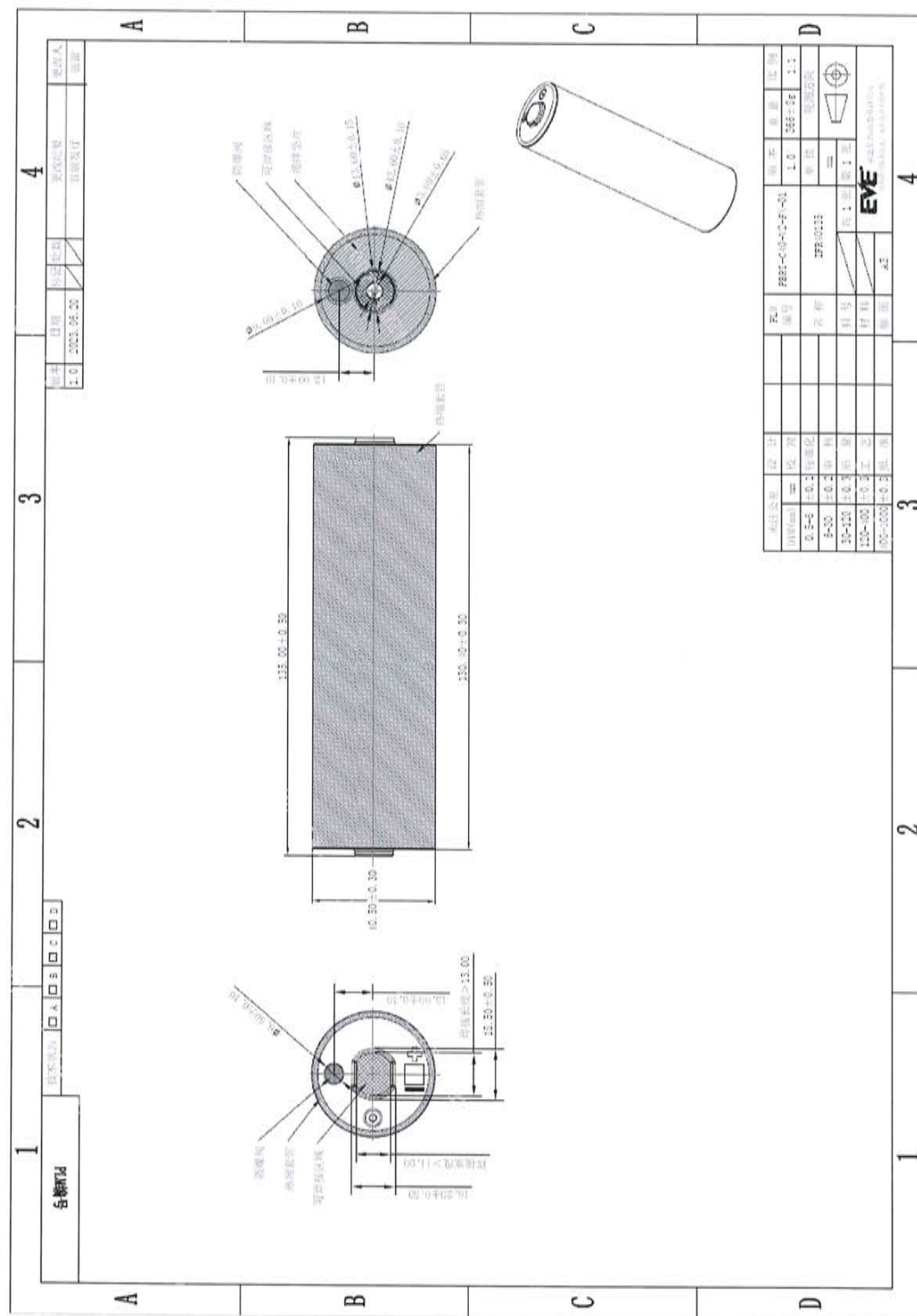


Figure A (图 A)

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附图二：IFR40135 包装 (Attachment II: IFR40135 Packing)

Each box contains 45pcs batteries, as shown in Figure B.

每箱 45pcs 电池，如图 B 所示。

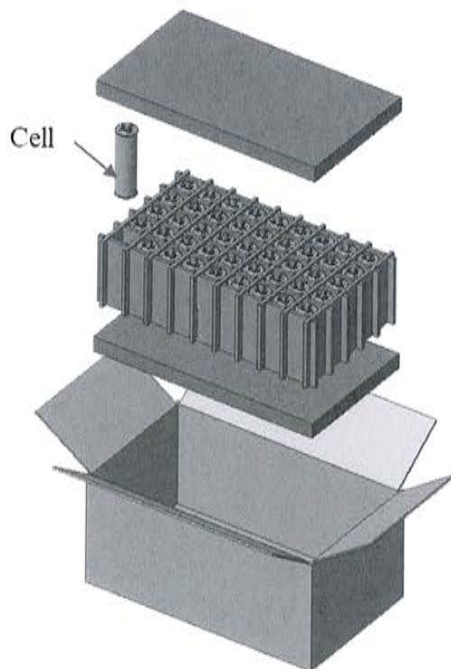


Figure B (图 B)

Each pallet carries 40 boxes, arranged in 5 layers, as illustrated in Figure C.

每卡板 40 个箱子，分 5 层，如图 C 所示。

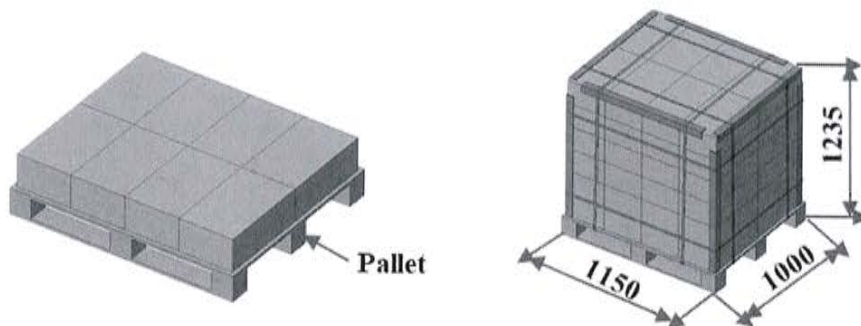


Figure C (图 C)