

Model	INR 21700-RS40	Version No.	A0
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INR 21700-RS40 产品规格书
INR 21700-RS40 Product Specification

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Revision History

Version No.	Date (M-D-Y)	Description/Note	Author
A0	02/22/2024		

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1.0 范围 Scope

本产品规格书描述了江苏睿恩新能源科技有限公司提供给客户的可充电锂离子电池的产品性能指标。

This product specification has been prepared to specify the specifications of the rechargeable lithium-ion cell to be supplied to customers (buyers) by Jiangsu Reliance Energy Tech. Co., Ltd.

2.0 产品描述和产品型号 Product Description and Model

2.1 产品描述: 可充电锂离子电池 Product Description: Rechargeable Lithium-ion Cell

2.2 产品型号: INR21700-RS40 Product Model: INR21700-RS40

3.0 规格参数 Specifications

项目 Item	规格参数 Specifications
3.1 标准放电容量 3.1 Standard discharge capacity	最小容量 4000mAh。 25±3℃下, 按照标准充电(0.5C(2A)恒流恒压充电到4.20V, 100mA 截止), 搁置 30 分钟, 0.2C (0.8A)放电到 2.5V。1C = 4.0A。 Min. 4000mAh. Charge: 0.5C(2A) CCCV 4.2V, 100mA cut-off, 25 ± 3 °C , rest 30min. Discharge: 0.2C(0.8A), 2.5V cut-off, 25±3°C. 1C = 4.0A.
3.2 交流内阻 3.2 ACIR	交流 1KHz 测量 ≤4.0mΩ By 1kHz AC ≤4.0mΩ
3.3 标称电压 3.3 Nominal voltage	3.60V
3.4 充电截止电压 3.4 End-of-charge voltage	4.20V
3.5 放电终止电压 3.5 Discharge cut-off voltage	2.50V
3.6 标准充电电流 3.6 Standard charge current	2.0A

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3.7 标准放电电流 3.7 Standard discharge current	0.8A	
3.8 倍率充电 3.8 Rate charge	8A	
3.9 最大持续充电电流 3.9 Maximum continuous charge current	14A	
3.10 最大持续放电电流 3.10 Maximum continuous discharge current	70A（有 80°C温度截止） 70A (with 80°C temperature cut-off)	
3.11 重量 3.11 Weight	≤67.0g	
3.12 尺寸 3.12 Dimension	最大直径：21.35mm Max Diameter: 21.35mm 最大高度：70.30mm Max Height: 70.30mm	
3.13 工作温度(电芯表面温度) 3.13 Operating temperature (Cell surface temperature)	充电温度区间：0°C~60°C Charge Temperature: 0°C~60°C 放电温度区间：-20°C~80°C Discharge: -20°C~80°C	
3.14 储存温度 3.14 Storage temperature	1 年 1 year 3 个月 3 months 1 个月 1 month	-20°C ~ 25°C -20°C ~ 45°C -20°C ~ 60°C

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4.0 电芯尺寸 Cell Dimension

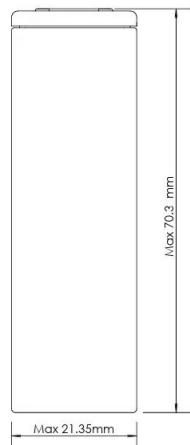


图 1. 电芯尺寸(含套膜) Figure 1. Cell dimension with tube.

电芯总高小于 70.30mm，电芯直径小于 21.35mm。

The cell height should be less than 70.30mm and the cell diameter should be less than 21.35mm.

5.0 电芯外观 Cell Appearance

电池不应该存在划痕、锈蚀、变色、泄漏等缺陷，影响外观。

Cells shall arrive nominally clean on all visible surfaces. There shall be no defects, such as scratch, rust, discoloration, and liquid leakage, which may adversely affect commercial value of the cell.

6.0 试验条件 Test Conditions

6.1 测试环境 Environmental Conditions

若无特别要求，此规格书上的产品测试时，温度为 $25\pm 3^{\circ}\text{C}$ ，湿度为 $65\%\pm 20\%\text{RH}$ 。

Unless otherwise specified, all tests stated in this Product Specification are conducted at temperature of $25\pm 3^{\circ}\text{C}$ and humidity of $65\pm 20\%\text{RH}$.

6.2 测试设备 Measuring Equipment

6.2.1 充放电设备 Charge and discharge equipment

电压精度： $\pm 0.05\%\text{F.S}$

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Voltage precision: $\pm 0.05\%$ F.S

电流精度: $\pm 0.05\%$ F.S

Current precision: $\pm 0.05\%$ F.S

6.2.2 游标卡尺 Slide caliper

游标卡尺的精度是 0.01mm。

The slide caliper should have 0.01mm scale.

6.2.3 内阻测试仪 Impedance meter

内阻是在 1kHz 交流条件下进行测试。

AC impedance is measured by an impedance meter at 1kHz.

7.0 特性 Characteristics

7.1 标准充电 Standard Charge

25 $\pm$ 3 $^{\circ}$ C下, 0.5C (2A) 恒流恒压充电到 4.2V, 100mA 截止。

Charge: 0.5C(2A) CCCV 4.2V, 100mA cut-off, 25 $\pm$ 3 $^{\circ}$ C.

7.2 倍率充电 Rate Charge

25 $\pm$ 3 $^{\circ}$ C下, 2C (8A)恒流恒压充电到 4.2V, 100mA 截止。

Charge: 2C(8A) CCCV 4.2V, 100mA cut-off, 25 $\pm$ 3 $^{\circ}$ C.

7.3 快速充电 Fast Charge

25 $\pm$ 3 $^{\circ}$ C下, 3.5C(14A)恒流恒压充电到 4.2V, 100mA 截止。

Charge: 3.5C(14A) CCCV 4.2V, 100mA cut-off, 25 $\pm$ 3 $^{\circ}$ C.

7.4 10min 阶梯快速充电 10min Stepwise Fast Charge

25 $\pm$ 3 $^{\circ}$ C下, 8A 充电 1min, 24A 充电 6min, 18A 充电 1.75min, 8A 充电 1.25min, 充电到 3.2Ah(80%SOC), 保护电压为 4.2V, 充电保护温度为 55 $^{\circ}$ C。

Charge: 25 $\pm$ 3 $^{\circ}$ C, Charge at 8A-1min/24A-6min/18A-1.75min/8A-1.25min to 3.2Ah (80%SOC) with 4.20V protection voltage and 55 $^{\circ}$ C protection temperature.

7.5 标准放电容量 Standard Discharge Capacity

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25±3℃下，按照标准充电(0.5C(2A)恒流恒压充电到 4.20V，100mA 截止)，搁置 30 分钟，0.2C (0.8A)放电到 2.5V。 Charge: 0.5C(2A) CCCV 4.2V, 100mA cut-off, 25±3℃, rest 30min, Discharge: 0.2C(0.8A), 2.5V cut-off, 25±3℃.	
放电容量 Discharge Capacity	≥4000mAh

7.6 倍率放电容量 Rate Discharge Capacity

25±3℃下，按照倍率充电 (2C(8A)恒流恒压充电到 4.20V，100mA 截止)，搁置 30 分钟，以 0.8/10/20/30/40/50/60/70A 的电流恒流放电 2.5V 或者 80℃截止，记录放电容量。 Charge: 2C(8A) CCCV 4.2V, 100mA cut-off, 25±3℃, rest 30min. Discharge: 0.8/10/20/30/40/50/60/70A to 2.5V or 80℃ cut-off, 25±3℃.				
放电电流 Discharge Current	0.8A	10A	20A	30A
相对容量 Relative Capacity	100%	≥97%	≥97%	≥95%
放电电流 Discharge Current	40A	50A	60A	70A
相对容量 Relative Capacity	≥95%	≥90%	≥60%	≥50%

7.7 放电容量随温度变化特性 Temperature Dependence of Discharge Capacity

25±3℃下，按照倍率充电(2C(8A)恒流恒压充电到 4.20V，100mA 截止)，在-20℃/-10℃/0℃/25℃/45℃的条件下恒温 4h，然后以 40A 电流恒流放电至 2.5V 或者 75℃截止，以 25±3℃下 40A 放电容量作为 100%基准。 Charge: 2C(8A) CCCV 4.2V, 100mA cut-off, 25±3℃, rest 4h at -20℃/ -10℃/ 0℃/ 25℃/ 45℃. Discharge: 40A to 2.5V or 75℃ cut-off. Percentage index of the discharge at 25±3℃ at 40A is 100%.					
放电温度 Discharge Temperature	-20℃	-10℃	0℃	25℃	45℃
相对容量 Relative Capacity	90%	92%	95%	100%	90%

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7.8 0°C +8/-10A 循环寿命 0°C +8/-10A Cycle Performance

0±3°C下，按照倍率充电(2C(8A)充电到 4.20V，100mA 截止)，搁置 30 分钟，10A 恒流放电至 2.5V，循环 200 圈。 Charge: 2C(8A) CCCV 4.2V, 100mA cut-off, 0±3°C, rest 30min. Discharge: 10A to 2.5V cut-off, 0±3°C. Cycle 200 times.	
循环 200 圈后剩余容量保留率 200 Cycles Capacity Retention	≥80%

7.9 -10°C +3/-10A 循环寿命 -10°C +3/-10A Cycle Performance

-10±3°C下，3A 充电到 4.20V，100mA 截止，搁置 30 分钟，10A 恒流放电至 2.5V，循环 50 圈。(备注：温度低于 0°C时，我们不建议进行电芯充电。) Charge: 3A CCCV 4.2V, 100mA cut-off, -10±3°C, rest 30min. Discharge: 10A to 2.5V cut-off, -10±3°C. Cycle 50 times. (Remark: we don't recommend charge the cell below 0°C.)	
循环 50 圈后剩余容量保留率 50 Cycles Capacity Retention	≥80%

7.10 常温+8/-40A 循环寿命 RT +8/-40A Cycle Performance

25±3°C下，按照倍率充电(2C(8A)充电到 4.20V，100mA 截止)，搁置 30 分钟，40A 恒流放电至 2.5V，循环 400 圈。 Charge: 2C(8A) CCCV 4.2V, 100mA cut-off, 25±3°C, rest 30min. Discharge: 40A to 2.5V cut-off, 25±3°C. Cycle 400 times.	
循环 400 圈后剩余容量保留率 400 Cycles Capacity Retention	≥60%

7.11 常温+14/-30A 循环寿命 RT +14/-30A Cycle Performance

25±3°C下，按照快速充电(3.5C(14A)充电到 4.20V，100mA 截止)，搁置 30 分钟，30A 恒流放电至 2.5V，循环 400 圈。 Charge: 3.5C(14A) CCCV 4.2V, 100mA cut-off, 25±3°C, rest 30min. Discharge: 30A to 2.5V cut-off, 25±3°C. Cycle 400 times.	
循环 400 圈后剩余容量保留率 400 Cycles Capacity Retention	≥60%

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8.0 机械特性 Mechanical Characteristics

8.1 振动测试 Vibration Test

根据UN38.3标准, 电池在$25\pm3^{\circ}\text{C}$下按照倍率充电(8A充电到4.20V, 100mA截止), 将电芯用夹具安装在振动台的台面上, 沿着电池的径向和轴向进行15min扫频振动(7Hz→200Hz→7Hz), 重复12次, 共3小时。(扫频振动: 以1G的加速度使频率从7Hz上升到18Hz, 保持0.8mm的振幅增加频率使加速度达到8G, 保持8G的加速度使频率提高到200Hz)。 According to the UN38.3 standard, the test sample cell is charged at a rate of 8A (8A CCCV at 8A to 4.20V, with a cutoff of 100mA) at $25\pm3^{\circ}\text{C}$. The cell is then installed on the table of the vibration table with fixtures, and radial and axial vibrations are performed along the cell for 15 minutes (7Hz→200Hz→7Hz) for 12 repetitions, totaling 3 hours. (Sweep vibration: accelerate from 7Hz to 18Hz with an acceleration of 1G, maintain a vibration amplitude of 0.8mm and increase the frequency to achieve an acceleration of 8G, maintain an acceleration of 8G to increase the frequency to 200Hz).	
通过标准: Criteria:	不漏液, 电压降小于 10%。 No leakage, with less than 10% of OCV drop.

8.2 自由跌落 Drop Test

根据 IEC62133 标准, 电池在 $25\pm3^{\circ}\text{C}$下按照倍率充电(8A 充电到 4.20V, 100mA 截止), 由高度为 1m 的位置从 X、Y、Z 每个方向自由跌落至水泥地面各 1 次。 According to the IEC62133 standard, the test sample cell is charged at a rate of 8A (CCCV at 8A to 4.20V, with a cutoff of 100mA) at $25\pm3^{\circ}\text{C}$, and dropped freely from a height of 1m in each direction (X, Y, Z) to the concrete ground once.	
通过标准: Criteria:	不起火, 不爆炸。 No fire, no explosion.

8.3 挤压测试 Crush Test

根据 UL1642 标准, 电池在 $25\pm3^{\circ}\text{C}$下按照倍率充电(8A 充电到 4.20V, 100mA 截止), 电池被两个平面内被挤压, 用它的圆面平行于挤压装置的平面做挤压测试, 直到压力达到 $13\pm1\text{KN}$, 力一旦达到最大值就释放。	
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According to the UL1642 standard, the test sample cell is charged at a rate of 8A (CCCV at 8A to 4.20V, with a cutoff of 100mA) at 25±3°C. The cell is then subjected to compression between two flat planes, with its circular face parallel to the plane of the compression device, until the pressure reaches 13±1kN (3000 ±224lbs). Once the force reaches its maximum, it is released.	
通过标准:	不起火, 不爆炸。
Criteria:	No fire, no explosion.

9.0 安全测试 Safety Test

9.1 2C 6V 过充测试 2C 6V Overcharge Test

根据 IEC62133 标准, 电池以 0.8A 电流恒流放电至 2.5V 后, 以 8A 的电流过充至 6V, 观察 1h。 According to the IEC62133 standard, the test sample cell is discharged to 2.5V at a constant current of 0.8A. The cell is then overcharged at 8A to 6V. The cell is monitored for 1h.	
通过标准:	不起火, 不爆炸。
Criteria:	No fire, no explosion.

9.2 过放电测试 Forced-Discharge Test

根据 IEC62133 标准, 电池在 25±3°C 下按照倍率充电 (8A 充电到 4.20V, 100mA 截止), 以 4.0A 电流恒流放电 90min, 观察 1h。 According to the IEC62133 standard, the test sample cell is charged at a rate of 8A (CCCV at 8A to 4.20V, with a cutoff of 100mA) at 25±3°C. The cell is then discharged at 4.0A for 90min. The cell is monitored for 1h.	
通过标准:	不起火, 不爆炸。
Criteria:	No fire, no explosion.

9.3 短路测试 Short-circuit Test

根据 UL1642 标准, 电池在 25±3°C 下按照倍率充电 (8A 充电到 4.20V, 100mA 截止), 用导线 (导线电阻 80±20mΩ) 将电池正负极外部短路 10min, 观察 1h。 According to the UL1642 standard, the test sample cell is charged at a rate of 8A (CCCV at 8A to 4.20V, with a cutoff of 100mA) at 25±3°C, then short-circuit the positive and negative for 10min with the copper wire (resistance: 80±20mΩ). The cell is monitored for 1h.	
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通过标准:	不起火, 不爆炸。
Criteria:	No fire, no explosion.

9.4 热箱测试 Heating Test

根据 UL1642 标准, 电池在 25±3°C 下按照倍率充电 (8A 充电到 4.20V, 100mA 截止), 放至恒温箱中, 以 5°C/min 的速率升温至 130°C±2°C, 保温 10min。 According to the UL1642 standard, the test sample cell is charged at a rate of 8A (CCCV at 8A to 4.20V, with a cutoff of 100mA) at 25±3°C, and then transferred into a circulating air oven. The temperature of the oven is raised at a rate of 5°C per minute to a temperature of 130°C±2°C and remain for 10min at that temperature.	
通过标准:	不起火, 不爆炸。
Criteria:	No fire, no explosion.

10.0 存贮 Storage

电芯必须在本产品规格书规定的存贮环境下进行存贮。在存贮过程中, 电压会随着时间下降; 容量会随时间慢慢减少; 长时间 (超出 3 个月) 存贮应该保持电芯电压在 3.50~3.80V 间。

The cell shall be stored at the storage condition specified in this specification.

During storage, the voltage will drop and the recoverable capacity will decrease with the time. The cell voltage should be kept in the range of 3.50V to 3.80V if the cell is stored for more than 3 months.

11.0 危险提示 Warning, Caution, and Prohibition

11.1 不要直接用电源插座给电池充电。

Please don't directly charge the cell by an electric outlet .

11.2 不要反向给电池充电。

Please don't charge the cell reversely.

11.3 不要把电池放在火或热源附近。

Please don't leave the cell near the fire or a heated source.

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11.4 不要把电池扔进火里。

Please don't throw the cell into the fire.

11.5 不要将电池放在车内或内部温度可能过高的类似地方，充电或使用电池。

Please don't leave, charge or use the battery in a vehicle or in similar locations where of the internal temperature may be excessively high (e.g., over 60 °C).

11.6 不要将电池浸入水中/海水中、扔下或弄湿。

Please don't immerse, throw, wet the cell in water or sea water.

11.7 不要使电芯承受过重的机械冲击。

Please don't subject the cell to strong mechanical shocks.

11.8 请勿使电池短路，也不要让金属或其它导体接触电池接电端子。

Please don't short circuit the cell or allow metallic or conductive objects to contact the cell terminals.

11.9 不要使电芯受到明显的损害或变形。

Please do not cause any noticeable damage or deformation of the cell.

11.10 将电芯放置在远离儿童的地方。

Please keep cell away from children.

11.11 不要针刺，锤打电芯。

Please do not drive a nail into the cell, or strike it by hammer.

11.12 不要撞击或投掷电芯。

Please do not impact or throw the cell.

12.0 其他事项 Others

12.1 在任何情况下不得拆卸电芯，拆卸电芯可能会导致内部短路，进而引起着火及其它问题。

Under no circumstances should the battery cells be disassembled. Disassembling the cell may

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lead to internal short circuits, which can result in fire and other hazards.

- 12.2 电解液有害，锂电池理论上不存在流动的电解液，但万一有电解液泄漏而接触到皮肤、眼睛或身体其它部位，应立即用清水冲洗电解液并就医。

Electrolyte is harmful. In principle, the cell do not have flowing electrolyte. In case of electrolyte leakage contacting the skin, eyes, or other part of the body, please immediately rinse with water and seek medical attention.

- 12.3 更换电芯应由电芯供应商或设备供应商完成，用户不得自行更换。

The cell replacement shall be performed only by either the cell supplier or the device supplier.

Users are not allowed to replace cell on their own.

- 12.4 禁止使用已损坏的电芯。

Any damaged cells are prohibited to use.

- 12.5 电芯在运输过程中可能因撞击等原因而损坏，若发现电芯有任何异常特征，如电芯塑料封边损坏，外壳破损，闻到电解液气味，电解液泄漏等，该电芯不得使用。有电解液泄漏或闻到异常味道的电池应远离火源以避免着火。

The cell might be damaged during shipping by shock or other reasons during transportation. If any abnormal features of the cell are found such as damages in a plastic envelope of the cell, deformation of the cell package, the smell of electrolyte, electrolyte leakage and others, the cell shall never be used any more. The cell with electrolyte leakage or abnormal odors should be kept away from the ignition source to prevent fire.