

 东莞市银天新能源有限公司 DONGGUAN SILVER SKY TECHNOLOGIES CO., LTD.	东莞市银天新能源有限公司 Dongguan Silver Sky Technologies Co.,Ltd.	编号: YTA-RDD-046 版本: A1
	产品规格书—INR21700E5000 Product Specification For INR21700E5000	

圆柱锂离子电芯规格书

Specification For Cylindrical Lithium-ion Rechargeable Cell

电芯型号 : INR21700E5000(双极耳)

Cell Type: INR21700E5000(Bipolar ears)

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---	---	---------------------------

Contents 目录

- 1 Preface 前言**
- 2 Definition 定义**
 - 2.1 Rated capacity and minimum capacity 标称容量与最小容量
 - 2.2 Standard charge method 标准充电方式
 - 2.3 Standard discharge method 标准放电方式
- 3 Cell type, bar code , Colour 电芯型号, 颜色**
 - 3.1 Description and model 电芯说明及型号
 - 3.2 Cell colour explanation 电芯套膜颜色说明
- 4 Characteristics 电芯性能**
 - 4.1 Cell specification 电芯特性
 - 4.2 Cell dimensions 电芯尺寸
- 5 Technical requirements 技术要求**
 - 5.1 Cell storage conditions 电芯储存环境
 - 5.2 Cell testing conditions 电芯测试条件
 - 5.3 Requirement of the testing equipment 测量仪表要求
 - 5.4 Electronic performance 电性能
 - 5.5 Safety characteristics 安全性能
- 6 Warning and cautions in handling the lithium-ion cell 电芯使用时警告事项及注意事项**
- 7 The restriction of the use of hazardous substances 有害物质控制要求**
- 8 Contact information 联系方式**

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1 Preface 前言

This specification describes the type and size, performance, technical characteristics, warning and caution of the lithium ion rechargeable cell. The specification only applies to INR21700E5000 cell supplied by Dongguan Silver Sky Technologies Co., Ltd.

本标准描述了圆柱型锂离子电芯的外型尺寸、特性、技术要求及注意事项。本标准适用于东莞市银天新能源有限公司生产的圆柱型INR21700E5000锂离子电芯。

2 Definition 定义

2.1 Rated capacity and minimum capacity: 标称容量与最小容量:

Rated capacity: Cap=5000mAh, minimum capacity: Cap=4900mAh。Under 25±2°C, It means the capacity value of being discharged by 5-hours rate to end voltage 2.5 V, which is signed Cap, the unit is mAh

标称容量 Cap=5000mAh, 最小容量Cap=4900mAh, 指在25±2°C环境下, 以5小时率放电至终止电压2.5V时的容量, 以Cap表示, 单位为毫安培时 (mAh)。

2.2 Standard charge method: 标准充电方式:

Under 25±2°C, it can be charged to 4.2V with constant current of 0.5C, and then, charged continuously with constant voltage of 4.2V until the charged current is 0.01C.

指在25±2°C环境下, 以0.5C的电流恒流充电至单体电芯电压4.2V后, 转为恒压4.2V充电, 至充电电流小于0.01C时, 停止充电。

2.3 Standard discharge method: 标准放电方式:

Under 25±2°C, it can be discharged to the voltage of 2.5V with constant current of 0.5C.

指在25±2°C环境下, 以0.5C的电流恒流放电至单体电芯电压2.5V。

3 Cell type and Colour 电芯型号及套膜颜色

3.1 Description and model 电芯说明及型号

Description: Cylindrical Li-ion rechargeable cell

Model: INR21700E5000-5000mAh

说明: 圆柱锂离子二次电芯

型号: INR21700E5000-5000mAh

3.2 Cell colour explanation 电芯套膜颜色说明

gray; 灰色

Colour is for reference only, the colour can be adjusted according to customer requirements.

颜色仅供参考, 可依据客户要求进行调整。

3.3 Cell bar code and explanation 电芯喷码及说明



说明: SS INR21700E5000 3.7V 18.5Wh, SS: 公司名称, INR21700: 产品型号, E: 能量型电池, 5000: 标称容量5000mAh, 3.7V: 标称电压3.7V, 18.5Wh: 标称能量18.5Wh;

“22A01 F0100101” 22: 产品年份, A: 产品月份 (A-L共12个月份), 01: 产品投料日期
F: 具备快充性, 0100101: 产品流水号

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4 Characteristics 电池性能

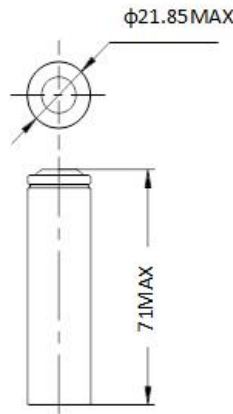
4.1 Cell specification 电芯基本特性

ITEM 项目	SPECIFICATION 特性	
Normal capacity 标称容量	5000 mAh	mAh@0.2C (4.2-2.5)
Minimum capacity 最小容量	4900 mAh	mAh @0.2C (4.2-2.5)
Nominal voltage 标称电压	3.7	V
Energy density 能量密度	695	Wh/L
	256.3	Wh/Kg
Charging voltage 充电电压	4.20	±0.05V
Discharge ending voltage 放电终止电压	2.5	±0.05V
Standard charging current 标准充电电流	2500	mA
Standard discharge current 标准放电电流	2500	mA
Max charge current 最大充电电流	1C (可支持循环)	45°C≥T≥20°C
	0.5C	20°C≥T≥10°C
	0.1C	0°C≥T≥10°C
Max discharge current 最大放电电流	2C	T≥0°C
	1C	0°C>T≥-10°C
	0.5C	-10°C>T≥-20°C
Max recommended charge and discharge cell body temperature 充放电过程中电芯表面的温度	Charge: 0~45°C Discharge: -20~60°C 充电时: 0-45°C 放电时: -20-60°C	
Maximum allowable charge and Discharge ambient temperature. Charging and discharging at these Conditions will shorten cell cycle life. 充放电过程中电芯表面的短时间,最大温度 (在这些情况下充放电将会导致电池 循环寿命迅速衰减)	Charge: 45°C Discharge: 60°C 充电时: 45°C 放电时: 60°C	

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Internal resistance 内阻	$\leq 22 \text{ m}\Omega$ (AC Impedance, 1000 Hz)
Cell dimension 电芯尺寸	Height : 71 mm Max 最大高度: 71 mm Diameter: 21.85mm Max 最大直径: 21.85 mm
Weight 重量	$\leq 72\text{g}$

4.2 Cell dimensions 电芯尺寸



5 Technical characteristics 技术要求

5.1 Cell storage conditions 电芯存储环境

Temperature 温度: 3 个月 3 month -20~45℃ 3个月以上 more than 3 months -20℃~35℃

Relative humidity 相对湿度: 0~45%RH

If the cell needs to be stored for a long time, the cell's storage voltage should be 3.8 ~ 3.9 V. Also, it is recommended to charge the cell every three months.

若电池需长期存储, 电池的存储电压应该为 3.8 ~ 3.9V。同时, 建议每 3 个月对电池进行充电。

5.2 Cell testing conditions 电芯测试条件

Unless otherwise specified, all tests stated according to following:

除非有特殊说明, 所有测试的条件要求如下:

Temperature 温度: $25 \pm 2^\circ\text{C}$

Use standard charge and standard discharge method 使用标准充电与标准放电方式

5.3 Requirement of the testing equipment 测量仪表要求

Voltage meter: The precision is ≥ 0.5

电压仪表要求: 测量电压的仪表精度不小于 0.5 级

Temperature meter: The precision is $\pm 0.5^\circ\text{C}$

温度仪表要求: 测量温度的仪表精度 $\pm 0.5^\circ\text{C}$

5.4 Electrochemical Characteristics 电池性能

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	产品规格书—INR21700E5000 Product Specification For INR21700E5000	

NO. 序号	ITEM 项目	CRITERION 性能标准	TESTING METHOD 测试条件与方法
1	Discharge Characteristics (Room Temperature) 室温倍率放电性能	Discharge capacity /discharge capacity at 0.5C*100% A) 0.5C ≥100% B) 1C ≥90% C) 2C ≥85%	Under the room temperature after 0.5C standard charged rest for 15min and then discharge at 0.5C,1C and 2C to the discharge cut-off voltage 2.5V respectively Discharge capacity of different rate accord with testing standard.在室温下, 电池以标准充电方式充电后, 搁置 15 分钟, 分别以 0.5C, 1C, 2C 电流放电至 2.5V, 不同倍率放电容量符合测试标准。
2	Cycle Life 循环寿命	循环方式 The300th discharge capacity≥Nominal capacity *80% 300次放电容量 ≥ 初始容量*80%	Measured the initial condition and initial capacity of battery. Then conduct +1C/-1C 300th cycle measured the final condition of battery.测量电池的初始状态和初始容量, 进行+1C/-1C 循环, 300 次后测量电池的最终状态 (电压范围 4. 20V-2. 75V) 。
		循环方式 The300th discharge capacity≥Nominal capacity *70% 300次放电容量 ≥ 初始容量*70%	Measured the initial condition and initial capacity of battery. Then conduct +1C/-2C 300th cycle measured the final condition of battery.测量电池的初始状态和初始容量, 进行+1C/-2C 循环, 300 次后测量电池的最终状态 (电压范围 4. 20V-2. 75V) 。
3	High temperature Storage 高温荷电保持能力 (55℃)	Residual capacity≥Initial capacity*85% Recovery capacity≥Initial capacity*90% 剩余容量 ≥ 初始容量 *85% 恢复容量 ≥ 初始容量 *90%	Standard charge tested the initial condition of battery Put the battery into a 55℃±2℃ for 7d,Then discharge at 0.5C to the discharge cut-off voltage 2.5V,tested the residual capacity of battery Then conduct +0.5C/-0.5C cycle for 3 times to tested the recovery capacity of battery.测量电池的初始状态, 电池标准充电后, 在 55±2℃条件下存储 7 天, 再在室温下以 0.5C 电流放至 2.5V, 测试电池的剩余容量, 以+0.5C/-0.5C 循环 3 次测量电池的恢复容量。

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4	High And Low temperature discharge Characteristics 高低温放电	Discharge capacity/ Initial capacity *100% A)55°C≥100% B)-10°C≥70% 放电容量/初始容量*100% A)55°C≥100% B)-10°C≥70%	Tested the initial condition and initial capacity of battery Standard charge Put the battery into a 55°C±2 for 2h, discharge at 1C to the cut-off voltage 2.5V, then standard charge at room temperature. In turn put the battery into -10°C±2°C for 4h, discharge at 0.2C to the cut-off voltage 2.5V, then test the final capacity of the battery. 测量电池的初始容量和初始状态, 电池标准充电后, 在 55±2°C 条件下恒温搁置 2h、以 1C 放电至 2.5V, 然后在室温条件下标准充电, 在 -10±2°C 的恒温条件下搁 4h, 以 0.2C 放电至 2.5V. 分别记录不同温度下容量。
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5.5 Safety Performance 安全性能

NO. 序号	ITEM 项目	CRITERION 性能标准	TESTING METHOD 测试条件与方法
1	Overcharge 过充	No fire、No explode 不起火、不爆炸	Standard charge. Charge at 1 C 5A to 6.3V, then change to charge with constant voltage till the current less than or equal to 0.01 C. Observe the variation of the battery's appearance and temperature. 电池标准放电后, 测量电池的初始状态, 保证电池状态正常 (下同), 以 1 C 电流充电至 6.3V, 然后转恒压充电至截至电流 0.01C 时终止, 观察电池的温度及外观变化。
2	Forced Discharge 强制放电	No fire、No explode 不起火、不爆炸	The battery was discharged from 0.5c to 2.50v in a ventilated, explosion-proof and at room temperature, and the battery was recharged in reverse for 90min with a current of 1C. 在通风、防爆, 室温环境下, 将电池 0.5C 放电至 2.50V, 以 1C 的电流对电池进行反向充电 90min。

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NO. 序号	ITEM 项目	CRITERION 性能标准	TESTING METHOD 测试条件与方法
3	Short Test At Normal temperature 常温外部短路测试	No fire、No explode 不起火、不爆炸	Standard fully charged batteries, placed in the environment of the 25°C±5°C aside 30 min, puts the battery with the thermocouple in the fume hood, with wire short circuit it is negative, short circuit conductor resistance is 80 mΩ±20 mΩ. When one of the following two circumstances, the termination: a) the battery temperature down to about 20% lower than the peak, b) short circuit time reach 24 h battery should be no fire, no explosion, the highest temperature does not exceed 150 °C.标准充满电电池，放置在25°C±5°C的环境中搁置30min，将接有热电偶的电池置于通风橱中，用导线短路其正负极，短路导线电阻为80mΩ±20mΩ。当出现以下两种情形之一时，试验终止：a)电池温度下降到比峰值低约20%，b)短路时间达到24h.电池应不起火、不爆炸，最高温度不超过150°C。
4	Vibration 振动性能	Diminishing rate of voltage≤10% No remarkable damage/smoking/ explosion/ leakage 电压衰减≤10% 电池外观无明显损伤、不冒烟、不爆炸、不漏液	Standard charge. Equip it to the vibration platform, adjust and prepare the test equipment according to following vibration frequency and relevant swing, doing frequency sweeping from X, Y, Z three directions, each from 7Hz to 200Hz for 3 hours of recycling.电池标准充电后，测量电池初始状态，安装在振动台面上，按下面的振动频率和对应的振幅调整好试验设备,X、Y、Z三个方向每个方向上从 7Hz~200Hz 循环扫频振动 3h。

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NO. 序号	ITEM 项目	CRITERION 性能标准	TESTING METHOD 测试条件与方法
5	Drop 跌落	No fire、No explode 不起火、不爆炸	Standard fully charged batteries, battery according to the 1 m drop height of free fall on the concrete slab, a two face each fall, the cylinder is falling twice, a total of 4 times drop test. The battery open circuit voltage should be not less than 90% of the initial voltage, should be no fire and explosion, 电池标准充满电, 电池按1m的跌落高度自由跌落于混凝土板上, 两个端面各跌落一次, 圆柱面跌落两次, 共计进行4次跌落试验. 电池开路电压应不低于90%的初始电压, 应不起火和不爆炸
6	Crush 挤压	No fire、No explode 不起火、不爆炸	In ventilation, explosion-proof (20±5)°C, environment temperature, under the condition of standard after fully charged, the battery is placed within the two surfaces, perpendicular to the direction of tablet by extruding, applied between the two plate extrusion of 13 kN ±0.78 kN test. 在通风、防爆、环境温度 (20±5°C) 的情况下, 标准充满电后, 将电池放在两个平面内, 垂直于平板方向进行挤压, 两平板间施加13kN±0.78kN的挤压力。一旦挤压力达到最大值即停止挤压试验, 试验过程中电池不能发生外部短路
7	Hot Oven 热冲击	No fire、No explode 不起火、不爆炸	Standard charge Keep the battery connected with a thermocouple and put it into a gravity convection or circulating air oven. Temperature is raised at a rate of 5°C ±2 °C per minute to a temperature of 130°C±2 °C and remained for 30min at this temperature Observe the variation of the battery's appearance. 测量电池的初始状态, 电池标准充电后, 放置于热箱中, 并与热电偶相连, 温度以 (5 °C±2 °C) /min 的速率升至 130 °C±2 °C并保温 30Min。测试完成后测量电池的最终状态。

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---	---	---------------------------

Comments: the definitions of some nomenclatures of this specification

备注：以上标准中的一些术语的定义：

- (1) Initial State: The initial appearance, open-circuit voltage and internal resistance of battery.
初始状态：电池的初始外观、开路电压、交流内阻。
- (2) Final State: The final appearance, open-circuit voltage and internal resistance of battery.
最终状态：电池的最终外观、开路电压、交流内阻。
- (3) Residual Capacity: After a specific testing program, the first discharge capacity of battery.
剩余容量：电池经过特定的检测程序后的首次放电容量。
- (4) Recovery capacity: After a specific testing program, and through the repeatedly charging and discharging to the recovery state, then the discharge capacity of battery.
恢复容量：电池经过特定的检测程序后，通过反复充放电使状态恢复后的放电容量。
- (5) I1:1 小时率放电电流；C1:1 小时率放电容量；
- (6) Initial Capacity :Standard charge method and standard discharge method at the room temperature ,the discharge capacity is initial capacity.
初始容量：在室温下，电池按照标准充电和标准放电方式进行充放电测试的放电容量。

6 Warning and cautions in handling the lithium-ion cell 电芯使用时警告事项及注意事项

To prevent the possibility of the cell from leaking, heating, explosion, please observe the following precautions:
为防止电芯可能发生泄露，发热，爆炸，请注意以下预防措施：

Don't immerse the cell in water.

严禁将电芯浸入水中，保存不用时，应放置在阴凉干燥的环境中。

Don't use and leave the cell near a heat source such as fire or heater.

禁止将电芯在热高温源旁，如火，加热器等旁边使用和留置。

When charging, use a cell charger specifically for that purpose.

充电时请选用锂离子电芯专用充电器。

Don't reverse the positive and negative terminals.

严禁颠倒正负极后使用电芯。

Don't connect the cell to an electrical outlet directly.

严禁将电芯直接插入电源插座。

Don't discard the cell in fire or heater.

禁止将电芯丢入火或加热器中。

Don't connect the positive and negative terminal directly with metal objects.

禁止用金属直接连接电芯正负极，造成短路。

Don't transport and store the cell together with metal objects such as necklaces, hairpins.

禁止将电芯与金属，如发卡、项链等一起运输或存储。

Don't strike, throw or trample the cell.

禁止敲击，抛掷或踩踏电芯等。

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---	---	---------------------------

Don't directly solder the cell.

禁止直接焊接电芯。

Don't pierce the cell with a nail or other sharp object.

禁止用钉子或其它利器刺穿电芯。

When disposing of secondary cells, keep cells of different electrochemical systems separate from each other.

二次电池处理时，请将电池和其他电化学体系的产品分开。

Caution 小心

Don't use or leave the cell at very high temperature conditions (for example, strong direct sunlight or a vehicle in extremely hot conditions).

禁止在高温下（直热的阳光下或很热的汽车中）使用或放置电芯，否则可能会引起电芯过热，起火或功能失效，寿命减短。

If the cell leaks and the electrolyte get into your eyes, don't wipe eyes, instead, thoroughly rinse the eyes with clean running water for at least 15 minutes, and immediately seek medical attention. Otherwise, eyes injury can result.

如果电芯发生泄露，电解液进入眼睛，请不要搓揉，应用清水冲洗眼睛，必要时请立即前往医院接受治疗，否则会伤害眼睛。

If the cell gives off an odor, generates heat, becomes discolored or deformed, or in any way appear abnormal during usage, recharging or storage, immediately remove it from the device or cell charger and stop using it.

如果电芯发出异味，发热，变色，变形或使用、存储、充电过程中出现任何异常现象，立即将电芯从装置或充电器中移开并停用。

In case the cell terminals get dirty, clean the terminals with a dry cloth before use.

如果电芯弄脏，使用前应用干布抹净。

7 The restriction of the use of hazardous substances 有害物质控制要求

This model of lithium-ion cell is in accordance with our company's request of "environmental substances control standard".

本型号锂离子电芯符合本公司“环境物质控制标准”要求！

8 Contact information 联系方式

If you have any questions regarding the cell, please contact the following address:

如有疑问，请按以下地址联系：

Headquarter : NO.20 Changdong street, Changlong village, Huangjiang town Dongguan city Guangdong province

厂址：广东省东莞市黄江镇长龙村长洞街20号

Tel: 0769-82698612

电话：0769-82698612