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# TS71173204-314A 产品规格书

## Specification of TS71173204-314A

电芯容量 Cell Capacity: 314Ah

江苏天合储能有限公司 Trina Energy Storage Solutions (Jiangsu) Co., Ltd			印章 Stamp
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## 1. 术语定义 Definitions

- **TES:** 江苏天合储能有限公司 Trina Energy Storage Solutions(Jiangsu) Co., Ltd.
- **客户:** 江苏天合储能有限公司电芯采购方。  
**Customer:** Companies and organizations that buy cells from TES.
- **产品:** 江苏天合储能有限公司生产的 314Ah 3.2V 储能用磷酸铁锂电池。  
**Product:** LFP cell (314Ah 3.2V) for energy storage produced by Trina Energy Storage Solutions(Jiangsu) Co., Ltd.
- **电芯:** 本规格书未特殊说明均指客户收货 7 天以内状态电池(此处仅限国内运输出货客户)。  
**Cell:** This specification refers to cells in a condition within 7 days of receipt by the customer unless otherwise stated.
- **物料编号:** 为了区别电池应用于不同使用区域或不同应用条件下, TES 为 314Ah 3.2V 可充电锂电池定义的物料编号。  
**Material Number:** In order to distinguish between cells used in different areas of use or under different application conditions, the TES defines material number for 314Ah 3.2V rechargeable lithium-ion cell
- **电池管理系统:** 用于对蓄电池充、放电过程进行管理, 提高蓄电池使用寿命, 并为用户提供相关信息的电路系统总称。  
**Cell Management System(BMS):** BMS is an electronic regulator that monitors and controls the charging and discharging of rechargeable cells.
- **额定功率:** 在规定试验条件和试验方法下, 电池可持续工作一定时间的充电或放电功率。  
**Rated Power:** The power that under specified test conditions and test method, the cell can continue to work for a certain period of charging and discharging.
- **额定容量:** 在规定试验条件和试验方法下, 电池以额定功率充电和放电容量。  
**Rated Capacity:** The capacity of cell that be charged and discharged with rated power under the specified test conditions and test methods.
- **额定能量:** 在规定试验条件和试验方法下, 电池以额定功率充电和放电能量。  
**Rated Energy:** The energy of cell that be charged and discharged with rated power under the specified test conditions and test methods.
- **标称电压:** 标志或识别一种电池或一种电化学体系的适当的电压近似值。  
**Nominal Voltage:** An appropriate voltage approximation that marks or identifies a cell or an electrochemical system.
- **恒功率:** 充放电过程电池的功率保持恒定。  
**Constant Power:** The power is maintained at a constant during charging state and discharging state of cell.
- **循环:** 电池按规定充放电标准充放一次。  
**Cycle:** The cell is charged and discharged once with the standard rate.

- **生产日期:** 电池制造日期, 每个电池顶盖刻码标示包含生产日期代码。  
**Production Date:** The QR code, including the date of production, and marked on the cover surface.
- **荷电状态:** 电池实际荷电量与满充容量比值, 表征电池荷电状态, 100%SOC 表示电池满充电至 3.65V, 0%SOC 表示电池放电至 2.5V。  
**State of Charge:** The ratio of the charged capacity of a cell to its full charge capacity. It represents the state of cell charge. 100%SOC indicates that the cell is fully charged to 3.65V, and 0%SOC indicates that the cell is discharged to 2.5V.
- **充电倍率:** 充电功率与电池管理系统多次测量电芯能量比值, 如: 电池能量 100Wh, 当以 50W 充电时, 充电倍率为 0.5P; 当电池能量衰减至 80Wh 时, 若以 40W 功率充电, 则充电倍率为 0.5P。  
**Charging Rate:** The ratio of charging power to the capacity of cells measured repeatedly by BMS. For example, when the cell energy is 100Wh and the charging power is 50W, the charging rate is 0.5P; when the cell energy is degraded to 80Wh and the charging power is 40W, the charging rate is 0.5P.
- **放电倍率:** 放电功率与电池管理系统多次测量电池能量值比率。例如: 电池能量为 100Wh, 放电功率为 50W 时, 则放电倍率为 0.5P。当电池能量衰减至 80Wh, 放电功率为 40W 时, 则放电功率为 0.5P。  
**Discharging Rate:** The ratio of discharging power to the capacity of cells measured repeatedly by BMS. For example, when the cell energy is 100Wh and the discharging Power is 50W, the discharging rate is 0.5P; when the cell energy is degraded to 80Wh and the discharging power is 40W, the discharging rate is 0.5P.
- **能量效率:** 按照标准充放电测试, 电池放电能量与充电能量的比值。  
**Energy Efficiency:** Based on the cell test standard of charging and discharging, the ratio of discharged energy to charged energy.

## 2. 适用范围 Scope of Application

本文件规定了江苏天合储能有限公司生产的 TS71173204-314A 314Ah 储能用磷酸铁锂电池产品性能要求、试验方法、运输、存储要求和注意事项等。

This document indicated that the performance, test methods, transportation, the conditions of storage and cautions for TS71173204-314A 314Ah LFP cell produced by TES.

## 3. 测试条件 Test Conditions

若无特殊说明, 电芯参数均为温度  $25\pm 2^{\circ}\text{C}$ , 标准湿度 ( $55\pm 20\%$ ), 大面夹具力  $3000\pm 200\text{N}$ , 标准充放电倍率条件下的新鲜电芯性能参数 (自放电除外)。

The test object is fresh cell (except for self-discharge test). The performance are under conditions that  $25\pm 2^{\circ}\text{C}$ ,  $55\pm 20\%$  humidity, the force of the fixture on the main surface is  $3000\pm$

200N, and standard charge-discharge rate unless other statement be pointed out.

### **3.1 测试设备要求 The Requirements of Test Equipment**

3.1.1 充放电测试设备电流、电压、功率的准确度 0.1%FS。

The accuracy of current, voltage, and power of charge-discharge test equipment is 0.1%FS.

3.1.2 时间测量装置：准确度 $\pm 0.1S$ ;

Time test equipment: Errors within 0.1S.

3.1.3 测试设备温度监控精度：准确度 $\pm 1^{\circ}C$ ;

Temperature monitoring accuracy of test equipment: Errors within  $1^{\circ}C$ .

3.1.4 尺寸测试装置：准确度 $\pm 1mm$ ;

Dimension test equipment: Errors within 1 mm.

3.1.5 质量测试装置：准确度 0.1%FS，样品测试测量误差 $\leq 0.5\%$ ;

Mass test equipment: Accuracy is 0.1%FS, sample measurement error within 0.5%.

### **3.2 焊接要求 The Requirements of Welding**

3.2.1 极柱可承受扭矩 $\leq 6N\cdot m$ 。

Torque on the pole should be less than  $6N\cdot m$ .

3.2.2 极柱可承受压力： $\leq 800N$  (x, y 方向),  $\leq 1000N$  (z 方向)。

Pressure on the pole should be less than 800N in x, y-axis, and less than 1000N in z-axis.

3.2.3 焊接过程中，极柱边缘温度 $\leq 150^{\circ}C$ ，时间 $\leq 5s$ 。

In the welding process, the temperature at the edge of the pole is less than  $150^{\circ}C$  and the time is  $\leq 5s$ .

3.2.4 焊接熔深 $\leq 2.1mm$ 。

The depth of welding is less than 2.1mm.

3.2.5 可焊接区域 $\Phi 2mm\sim\Phi 16mm$  (不含极柱表面中心定位孔)。

The weldable area is  $\Phi 2mm\sim\Phi 16mm$  (excluding the center positioning hole on the pole surface) .

3.2.6 焊接过程中对顶盖施加预紧力 $\leq 500N$ 。

The pre-tightening force applied to the top cap during welding is less than 500N.

## **4. 电性能指标 Electrical Performance Specification**

### **4.1 概要 General**

No.	参数 Parameter	产品规格 Specification	条件 Condition
4.1.1	标称能量 Nominal energy	1004.8Wh	新电池状态, 标准充放电 Fresh cell , standard charge
4.1.2	标称容量 Nominal capacity	314Ah	and discharge
4.1.3	工作电压 Operating voltage	2.5~3.65V 2.0~3.65V	电芯温度 $T > 0^{\circ}\text{C}$ Cell temperature $T > 0^{\circ}\text{C}$ 电芯温度 $T \leq 0^{\circ}\text{C}$ Cell temperature $T \leq 0^{\circ}\text{C}$
4.1.4	交流内阻 Impedance(1KHz)	$0.20 \pm 0.05\text{m}\Omega$	新电池状态 (30%SOC) Fresh cell (30%SOC)
4.1.5	出货容量 Shipping capacity	$30\% \pm 2\%\text{SOC}$	$25^{\circ}\text{C} \pm 2^{\circ}\text{C}$
4.1.6	月自放电 Self-discharge	$\leq 3.0\%/月$ $\leq 3.0\% \text{ per month}$	出货三个月以后电芯, 标准充电 到 30%SOC, $25 \pm 2^{\circ}\text{C}$ 储存 Fresh cell after 3months, $30\%\text{SOC}, 25 \pm 2^{\circ}\text{C}$ storage
4.1.7	工作温度(充电) Operating temperature (charging)	$0 \sim 60^{\circ}\text{C}$	NA
4.1.8	工作温度(放电) Operating temperature (discharging)	$-30 \sim 60^{\circ}\text{C}$	N.A.
4.1.9	电芯重量 Cell weight	$5.52 \pm 0.30\text{Kg}$	N.A.
4.1.10	存储温度 Storage temperature	$-30 \sim 60^{\circ}\text{C}$	存储环境湿度 $\leq 85\%\text{ROH}$ , 无凝露 Storage ambient humidity $\leq 85\% \text{ ROH}$ , no condensation
4.1.11	电芯尺寸 Cell dimension	宽度(Width): $174.7 \pm 0.8\text{mm}$ 肩高(Shoulder height): $204.9 \pm 0.8\text{mm}$ 含极柱高(height with terminal): $207.5 \pm 0.8\text{mm}$ 厚度(Thickness): $71.8 \pm 0.8\text{mm}$	详见第 10 条电芯图纸 Refer to article 10 cell drawing
4.1.12	静置 SOC Rest SOC	$\geq 8\%$	无负载或充电时的最小 SOC The minimum SOC of

			charging or without load
4.1.13	应用海拔 Altitude	≤5000m	N.A.
			25±2°C, 带两片铝质夹具 (15mm 厚), 初始预紧力 3000 ±200N, 标准充放电测试
4.1.14	循环寿命 Cycle performance	≥8000cycles @70%SOH	25±2°C, Cycle test by the standard charge and discharge method under 3000±200N preload. The cell is fixed with 15mm thickness aluminum plate.

## 4.2 充电模式/参数 Charging/Parameter

No.	参数 Parameter	产品规格 Specification	条件 Condition
4.2.1	标准充电功率 Standard charge power	0.5P	25±2°C
4.2.2	标准充电模式 Standard charge method	电芯温度 25±2°C, 0.5P 恒功率充电至 3.65V, 静置 10min The temperature of cell is maintained at 25±2°C, 0.5P constant power charge to 3.65V, rest 10min	
4.2.3	最大持续充电功率 Maximum continuous charge Power	0.5P	25±2°C
4.2.4	标准充电温度 Standard charge temperature	25±2°C	电芯温度 Cell Temperature
4.2.5	充电上限电压 Charging upper limit voltage	最大 3.65V Max 3.65V	无论电芯处在何种充电模式, 一旦发现电芯电压超过充电上限电压即停止充电 No matter what charge mode the cell is in, stop charging once the cell voltage exceeds charging upper limit voltage
4.2.6	充电温度 (电芯温度) Charging temperature (Cell Temperature)	0~60°C	无论电芯处于何种充电模式, 一旦发现电芯温度超过充电温度范围即停止充电 No matter what charge mode the cell is in, stop charging once the cell temperature exceeds absolute charge temperature range.

### 4.3 其他充电条件 The other Charge Condition

参数 Parameter	电芯温度/°C Cell Temperature/°C	0	5	10	15	20	25	45	55	60
最大充电功率/P Max charge power/P	70%~100% SOC	0	0.15	0.25	0.35	0.5	0.5	0.5	0.5	0

### 4.4 放电模式/参数 Discharging/ Parameter

No.	参数 Parameter	产品规格 Specification	条件 Condition
4.4.1	标准放电功率 Standard discharge power	0.5P	25±2°C
4.4.2	标准放电模式 Standard discharge method	电芯温度 25±2°C, 0.5P 恒功率放电至 2.5V, 静置 10min The temperature of cell is maintained at 25±2°C, 0.5P constant power discharge to 2.5V, rest 10min	
4.4.3	最大持续放电功率 Maximum continuous discharge Power	0.5P	25±2°C
4.4.4	标准放电温度 Standard discharge temperature	25±2°C	电芯温度 Cell temperature
4.4.5	放电截止电压 Discharge cut-off voltage	2.5V 2.0V	温度 (Temp.) T>0°C 温度 (Temp.) T≤0°C
4.4.6	放电温度 (电芯温度) Discharging temperature (Cell Temperature)	-30~60°C	无论电芯处在持续放电模式或脉冲放电模式, 若电芯温度超过放电温度范围, 则停止放电 Stop discharging once cell temperature is outside this range regardless of whether continuous or pulse current is adopted

### 4.5 其他放电条件 D-rate of other Discharge Condition

	电芯温度/°C Cell Temperature/°C	-30	-20	0	10	25	45	55	60
最大放电功率/P Max discharge power/P	0%~100% SOC	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0

#### 4.6 高低温容量 High & Low Temperature Capacity

No.	参数 Parameter	产品规格 Specification	条件 Condition
4.6.1	45°C 的容量 Capacity@45°C	≥314Ah	新电池状态, 25±2°C标准充电, 45±2°C 0.5P 放电至 2.5V Fresh cell, standard charge at 25±2°C, 0.5P constant power discharge to 2.5V at 45±2°C.
4.6.2	5°C 的容量 Capacity@5°C	≥270Ah	新电池状态, 25±2°C标准充电, 5±2°C 0.5P 放电至 2.5V Fresh cell, standard charge at 25±2°C, 0.5P constant power discharge to 2.5V at 5±2°C.
4.6.3	-20°C 的容量 Capacity@-20°C	≥260Ah	新电池状态, 25±2°C标准充电, -20±2°C 0.5P 放电至 2.0V Fresh cell, standard charge at 25±2°C, 0.5P constant power discharge to 2.0V at -20±2°C.

#### 4.7 电芯温升 Cell Temperature Rise

本规格书中温升指电池表面温度放电前与放电后温度差值，温升的测量应在环境温度稳定且空间足够大的房间里进行，每个电池温度测量应选取经过校正后可记录时间的温度感应器。

The temperature rise refers to the difference between the temperature of the cell surface before and after discharge. The measurement should be carried out in a room where the ambient temperature is relatively stable and the space is large enough. For each cell temperature measurement, a calibrated temperature sensor that records time data should be selected.

No.	参数 Parameter	产品规格 Specification	条件 Condition
4.7.1	持续放电温升 Continuous discharge temperature rise	≤10°C	电池以标准放电模式进行放电 The cell is discharged in the standard discharge method.

#### 4.8 安全与可靠性 Safety and Reliability

使用条件说明：安全测试、寿命测试、系统成组设计需施加预紧力，新鲜电芯预紧力为2000N~5000N，建议大面的预紧力控制公差为±200N。

Description of service conditions: preload force should be added under safety

test, cycle life test and pack design, and the range of preload force of fresh cell is 2000N~5000N, the recommended preload tolerance is  $\pm 200N$ .

产品在使用过程中会产生膨胀力,电芯在 15mm 铝板+0.0mmGAP(可供电芯膨胀的空间)测试条件下衰减至 70%SOH 时膨胀力约为 50000N, 客户在产品的设计过程中需要考虑结构强度可靠性, 建议电芯成组预留 1.5~2.5mm 的膨胀空间。

The cell will generate swelling force during degradation. The swelling force of the cell at 70%SOH under the test condition of 15mm aluminum plate with a swelling space of 0mm, which is about 50000N. The customer needs to consider the reliability of structural strength in the product design process. It is suggested that 1.5~2.5mm Gap (which would provide space for swelling while the using of cell) be reserved for the cell assembly module.

No.	项目 Item	标准 Criteria	条件 Condition
4.8.1	过充电试验 Over charge test	不起火, 不爆炸 No explosion, no fire	参考 GB/T 36276-2023 过充测试方法 Refer to the over-charge test method of GB/T 36276-2023
4.8.2	过放电试验 Over discharge test	不起火, 不爆炸 No explosion, no fire	参考 GB/T 36276-2023 过放测试方法 Refer to the over-discharge test method of GB/T 36276-2023
4.8.3	短路试验 Short test	不起火, 不爆炸 No explosion, no fire	参考 GB/T 36276-2023 的短路测试方法 Refer to the short-circuit test method of GB/T 36276-2023
4.8.4	挤压测试 Crush test	不起火, 不爆炸 No explosion, no fire	参考 GB/T 36276-2023 的挤压测试方法 Refer to the crush test method of GB/T 36276-2023
4.8.5	跌落试验 Drop test	不起火, 不爆炸 No explosion, no fire	参考 GB/T 36276-2023 的跌落测试方法 Refer to the drop test method of GB/T 36276-2023
4.8.6	过载试验 Thermal Abuse Test	不起火, 不爆炸 No explosion, no fire	参考 GB/T 36276-2023 过载测试方法 Refer to the Overload Test method of GB/T 36276-2023
4.8.7	热失控试验 Thermal runaway test	不起火, 不爆炸 No explosion, no fire	参考 GB/T 36276-2023 热失控测试方法

备注：若 GB/T 36276 版本升级，请与 TES 确认后以最新测试方法为准。

Note: If the version of GB/T 36276 is upgraded, please refer to the latest test method after confirm with TES.

## 5. 产品寿命终止管理 Product End of Life Management

### 5.1 寿命终止条件 Condition for End of Life

电芯使用寿命有限, 客户应建立有效的跟踪系统监测, 记录每个使用期限内电池内阻和容量。容量测量和计算方法需客户和 TES 共同讨论确认。当电池的内阻超过这个电池最初内阻的 200% 或容量小于等于标称容量 70% (25°C, 219.8Ah), 应停止使用电池。若违反该项要求, 将免除天合储能依据产品销售协议以及本技术协议所应承担的产品质量保证责任。

The life time of the cell is limited. Customer should develop and implement an active tracking system to monitor and record impedance of each product in its entire service life. TES and its customer shall come into agreement about capacity measurement methods. The cell should be prohibited from being used when its resistance exceeds 200% of its internal resistance or its capacity fading to 70% of nominal capacity (219.8Ah) @25 °C. Failure to comply with this requirement shall render TES' s warranties under the contract inapplicable, thereby releasing TES from any liability in connection therewith.

## 6. 应用条件 Application Conditions

### 6.1 电池管理系统应用 The Application of Cell Management System

电芯使用时必须配置电池管理系统监控、管理与保护每个电池电压、温度。首次使用时, 必须使用小于等于标准充放电电流满充满放, 以保证电芯容量得到充分发挥。

BMS must be equipped to monitoring, managing and protecting the cell when it working. When the cell is used for the first time, it should be fully charged and discharged with a current less than the standard charge and discharge rate to provide adequate capacity for the whole lifetime.

### 6.2 电池管理系统评估 The Assessment of BMS

客户应向天合储能提供电池管理系统详细的设计方案、系统特点、框架、系统数据、格式等相关信息, 以供 TES 对该系统进行设计评估, 并建立电池管理档案。

Customer shall provide detailed information of the BMS, including but not limited to its design, features, setting, and data file format to TES for design review and record setting up.

### 6.3 电池管理系统更新 The Update of BMS

未经 TES 同意，客户不可擅自修改或者改变电池管理系统的设计和框架，以免影响电池使用性能。

Customer shall prevent the design, features, setting or data file format of the BMS from being modified or changed without the agreement of TES, to avoid cell performance being effected.

#### 6.4 电池运行数据保存 The Monitoring Data History File of BMS

客户应保存完整的电池运转的监测数据，用作产品质量责任划分的参考。客户如不具备完整的电池系统使用期限内的监测数据，TES 不承担产品质量保证责任。

Relevant BMS monitoring data should be recorded throughout the entire service life of each product for the judgment of any product warranty and liability claim entitlement. No warranty or liability claim should be considered without BMS diagnosis records of the relevant product.

#### 6.5 电池管理系统功能 The Basic Requirements of BMS

电池管理系统需满足以下最基本的检测和控制要求

Following monitoring and control features should be included in BMS as basic requirements.

No.	参数 Parameter	产品规格 Specification	条件 Condition
6.5.1	充电终止 Charge cutoff	3.65V	电池的电压达到 3.65V 时, BMS 申请终止充电。 BMS requests to stop charging when cell voltage reaches 3.65 V
6.5.2	三级过充电 保护 Third overcharge protection	≥3.7V	当电池电压达到 3.7V, BMS 强制终止充电。 BMS is forced to stop charging when cell voltage reaches 3.7 V.
6.5.3	二级过充电 保护 Second overcharge protection	≥3.75V	当电池电压达到 3.75V, BMS 强制终止充电。 BMS is forced to stop charging when cell voltage reaches 3.75 V.
6.5.4	一级过充电 保护 First overcharge protection	≥3.85V	当电池电压达到 3.85V, BMS 强制终止充电, 且 BMS 应锁定至技术人员解决问题。 When the cell voltage reaches 3.85V, the BMS is forced to stop charging, and the BMS should be locked until technicians solve the problem.
6.5.5	放电终止 Discharge cutoff	2.5V (> 0°C) 2.0V (≤0°C)	当电池电压到达 2.5V (> 0°C) 或 2.0V (≤ 0°C), BMS 申请终止放电。 BMS requests to stop discharging when

			cell voltage reaches 2.5V(T > 0°C) or 2.0V(T≤0°C)
6.5.6	三级过放保护 Third over discharge protection	2.4V (> 0°C) 1.95V (≤0°C)	当电池的电压到达 2.4V (> 0°C) 或 1.95V (≤0°C), BMS 强制终止放电。 BMS requests to stop discharging when cell voltage reaches 2.4V(T > 0°C) or 1.95V(T≤0°C).
6.5.7	二级过放保护 Second over discharge protection	2.2V (> 0°C) 1.9V (≤0°C)	当电池电压低于 2.2V (> 0°C) 或 1.9V (≤ 0°C) 时, BMS 强制终止放电, 应及时以 0.1C 回充至 50%SOC, 且 BMS 应锁定直到技术人员解决问题。 When the voltage is less than 2.2V(T > 0°C) or 1.9V(T≤0°C), the cell should be charged back to 50%SOC with 0.1C in time, and the BMS should be locked until technicians solve the problem.
6.5.8	一级过放保护 First over discharge protection	2.0V (> 0°C) 1.8V (≤0°C)	当电池电压低于 2.0V (> 0°C) 或 1.8V (≤ 0°C) 时, BMS 强制终止放电, 应及时以 0.1C 回充至 50%SOC, 且 BMS 应锁定直到技术人员解决问题。 When the voltage is less than 2.0V(T > 0°C) or 1.8V(T≤0°C), the cell should be charged back to 50%SOC with 0.1C in time, and the BMS should be locked until technicians solve the problem.
6.5.9	短路保护 Short circuit protection	不允许短路 No short circuit allowed	发生短路时, 由过流保护装置断开电池 When a short circuit occurs, the cell (cell) is disconnected by the overcurrent protection device.
6.5.10	过流保护 Over current protection	参考第 4.2 和 4.3 条 Refer to paragraph 4.2 & 4.3	电池管理系统控制充放电电流符合规格 The charge and discharge current controlled by BMS meets specifications
6.5.11	过热保护 Over temperature protection	参考第 4.2 和 4.3 条 Refer to paragraph 4.2 & 4.3	当温度超过本技术协议规定时, 终止充电/放电 Stop charging and discharging when temperature exceeds specification
6.5.12	充电容量保护 Charging upper limit capacity	充电容量小于 351.7Ah Charging capacity < 351.7Ah	充电容量上限保护, 充电容量小于标称容量的 112% Charging capacity protection, charging capacity must be less than 112% of the nominal capacity

6.5.13	充电时间过长保护 Charging time out limit	充电时间在 8 小时内 Charging completes within 8 hours	充电时间长于 8 小时，则终止充电 Stop charging if charging time exceeds specification
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备注：以上 No. 6.5.2、6.5.3、6.5.4、6.5.6、6.5.7、6.5.8 为警示条款。提请客户注意：当电池达到上述任何一项条款描述的指标和参数状态时，意味着电池已超出本技术协议规定的使用条件，客户需依保护动作及本技术协议其他相关规定对电池采取保护措施。同时，TES 声明对上述使用状态的电池质量不承担任何保证责任，并对因此而导致的客户及第三方的任何损失不予赔偿。

Note: The above No. 6.5.2, 6.5.3, 6.5.4, 6.5.6, 6.5.7, 6.5.8 are the warning clause, draw the attention of customers: When the cell reaches any of the terms described in the above, means that the cell has been used beyond the specifications, the customer shall take protective measures on the cell in accordance with the "protection action" and other relevant provisions of this specification. At the same time, TES shall not take any responsibility for the damage in connection therewith.

## 6.6 电池过放 The Over-discharge of Cell

电池电压低于 2.0V 时，电池内部可能会遭到永久性的损坏，此时 TES 的产品质量保证责任失效。根据本技术协议 6.5.8 部分，当实际放电截止电压低于标准放电截止电压时，应将系统内部能耗降低到最小，以便延长休眠时间。客户需要培训使用者在最短的时间内重新充电，防止电池进入过放状态。

When the cell is over discharged below 2.0V, it may be permanently damaged internally, and the warranties of TES is invalid. After discharge cut off in accordance with paragraph 6.5.8, internal power consumption of the system should be reduced to a minimum to prolong the idle time before recharge. The customer needs to train the user to recharge the cell immediately to prevent the cell from reaching over-discharge state.

## 6.7 存储维护 The Maintenance of Storage

如果预估电池将存放 30 天以上时，应每隔 3 个月将 SOC 调整为 20%~40%。

If the cells are expected to be stored for more than 30 days, the SOC of cells should be adjusted to 20%~40% periodically (a three-month period is recommended).

## 6.8 低温禁用 Disabling under Low Temperature

电池应避免在本技术协议禁止的低温条件下充电（包括标准充电），否则可能出现容量降低现象和安全问题。电池管理系统应依照最小的充电温度进行控制。禁止在低于本技术协议规定的温度条件下充电，否则 TES 不承担质量保证责任。

The cell is prohibited from being charged at the low temperature defined in this technical agreement (including standard charging), otherwise capacity reduction and safety problems may occur. BMS should be controlled according to the minimum

charging temperature. It is forbidden to charge under the temperature defined in this technical agreement. Otherwise, TES will not undertake the responsibility of warranties.

## 6.9 电箱散热 The Thermal Management of Pack

电箱设计应充分考虑电芯散热问题，由于电箱散热设计问题导致电箱或电池过热损坏，TES 不承担质量保证责任。

The heat dissipation of the cell should be fully considered in the design of pack. TES is not responsible for the over-heating damage of pack or cell due to incorrect design of heat dissipation.

## 6.10 电箱防护 The Protection of Pack

电箱设计中应充分考虑电芯的防水、防尘问题，电箱必须满足 UL 和 IEC 有关标准规定的防水、防尘等级。由于防水、防尘问题而导致的电芯的损坏（如腐蚀、生锈等），TES 不承担质量保证责任。

Waterproof and dustproof of the cells should be fully considered in the design of the pack. The pack must meet the waterproof and dustproof grade stipulated by the relevant national standards. The TES does not take the responsibility due to damage to the cell or cells (such as corrosion, rust, etc.) caused by water and dust.

## 6.11 电箱成组 The Assembly of Pack

禁止不同批次号电芯在同一电池系统中混用，否则天合储能不承担质量保证责任。

It is forbidden to mix different P/N cells in the same cell system, otherwise, TES will not be responsible for warranties.

# 7. 安全防范 Safety Precautions

## 7.1 禁止浸水 No Immersion in Water

## 7.2 禁止超温 No Ultra High Temperature

将电池投入火中或长时间暴露在超过本技术协议第 4.1.7 条，第 4.1.8 条和第 4.1.10 条规定的温度条件环境中，可能会导致火灾。在任何正常的充放电使用情况下，电芯温度不能超过 60°C，如果电芯温度超过 60°C，电池管理系统需关闭电池，停止电池运行。

Do not drop cells into fire or expose them to any high temperature environment exceeding operation temperature as set out in paragraphs 4.1.7, 4.1.8 & 4.1.10, otherwise it may cause fire. Cell temperature should not exceed 60 °C anytime, otherwise BMS should shut down the system when it occurs.

## 7.3 禁止外短 No Short Circuit

电池正负极短路时，否则强电流和高温可能导致人身伤害或者火灾。在电池系统组装和连接时，应有足够的安全保护，以避免短路。

Do not short circuit cell poles, otherwise high current and temperature may cause body injury or fire hazards. When assembling and connecting the battery system, there

should be adequate safety protection to avoid short circuit.

#### **7.4 禁止反向充电 No Reverse Charging**

严格按照标示和说明连接电池正负极，禁止反向充电。

Always connect cell poles according to its label(s) in right polarity. Reverse charging is strictly prohibited.

#### **7.5 禁止超功率充电和过充 No Charging or Discharging above Maximum Power**

超过最大功率充电和过充，可能导致电池过热和火灾事故发生。在电池安装和使用中，硬件和软件需实行多重过充失效安全保护。最低保护要求见本技术协议第 6.5.1、6.5.2、6.5.3、6.5.4 条。

It may cause overheating and fire in the cell when it is over charged above the maximum power. Overcharge protection should be implemented by hardware and software during the installation and operation. Refer to paragraph 6.5.1, 6.5.2, 6.5.3, 6.5.4.

#### **7.6 安装要求 Installation Requirements**

客户应将电池安全固定在固体平面上，并将电源线安全地束缚在合适位置，避免摩擦引起电弧和火花。

Cell should be securely fixed to solid platform, and power cables should be securely attached by fastener to avoid intermittent contact which may cause arcing and sparks.

#### **7.7 电气连接禁用塑料件 The Plastic Parts is Prohibited for Electrical Connections**

严禁使用塑料封装电池或用塑料进行电气连接。不正确的电气连接方式可能会造成电池使用过程中发生过热现象。

It is forbidden to wrap the cell in plastic or to make electrical connections with plastic. Incorrect connections may lead to a risk of overheating and explosion of the cell.

#### **7.8 电解液防护与应急处置 Protection and Emergency Disposal for Electrolyte**

当电解液泄露时，应避免皮肤和眼睛接触电解液。如有接触，应使用大量的清水清洗接触到的区域并向医生寻求帮助。禁止任何人或动物吞食电池的任何部件或电池所含物质。

When the electrolyte leaks, skin and eye contact with the electrolyte should be avoided. In case of contact, a large amount of clean water should be used to clean the contact area and seek help from the doctor. It is forbidden for any person or animal to swallow any part or substance contained in the cell.

#### **7.9 冲击保护 Impact Protection**

尽力保护电池，使其免受机械震动、碰撞及压力冲击，否则电池内部可能短路产生高温和火灾。

Protect cells from mechanical vibration, impact and pressure. Otherwise internal

electrical circuit may short circuit to generate high temperature and fire hazards.

## 7.10 电池充电注意事项 Cautions of Charging

电池充电过程中可能发生不适当的终止充电现象。如充电超出允许充电时间，充电电压过高而终止充电或充电电流过强而终止充电。上述现象被定义为不适当的终止充电。当发生以上现象时，可能意味着电池系统出现漏电或某些部件出现故障。在没有找到根本原因并彻底解决之前继续对该电池充电可能会引起电池过热或发生火灾。当发生以上现象时，电池管理系统应该通过自动锁定功能，禁止后续的充电并提醒使用者将装载有该电池的储能系统退回到经销商处进行系统维护。该电池只有经过有认证资格的技术人员全面检查，确定根本原因并彻底解决、改善后方可恢复充电。

When cells charging is terminated improperly for reasons such as exceeding allowable charging time, charging voltage or charging current, all these events are defined as "improper charge termination". Such situation may indicate that there is current leaking within a cell system or some components have started to malfunction. Keeping charging for such cell system without finding and fixing root cause may cause potential overheat or fire. When such event occurs, the BMS should lock itself up to prevent subsequent charging and notice should be given to the user to return the energy storage system to distributor for servicing. Subsequent charging should only be resumed after the system has been thoroughly checked by qualified technician who can identify and fix root cause attributed to the "improper charge termination".

## 7.11 滥用测试防护 Protections of Abuse Testing

在进行滥用测试实验时如操作不当可能会引起电池起火或者爆炸。该测试实验只能由配备适当的防护装备的专业人员在专业的实验室进行。否则，可能会导致严重的人身伤害和财产损失。

Fire or explosion may be caused by improper operation during cell abuse test. The test can only be carried out in a professional laboratory by professionals equipped with appropriate protective equipment. Otherwise, it may lead to serious personal injury and property loss.

## 8. 免责声明 Disclaimer

8.1 如果由于产品需求单位不按本说明书中的规定进行使用，造成社会性影响，并对 TES 的声誉造成影响的，TES 将会追究产品需求单位的责任。根据对 TES 造成的影响程度，产品需求单位需向 TES 提供赔偿。

If the product demand side does not use the product according to the specification, causing social impact and affecting the reputation of TES, TES will investigate the responsibility of the product demand side. According to the degree of impact on TES, the product demander should provide compensation to TES.

8.2 本规格书在现有资料、数据和参数等资料的基础上尽可能全面、详细的描述了本产品的特性，本公司保留修订的权力，最终解释权归 TES 所有，买方在订购 TES 产品前，需要与 TES 提前确

认产品的最新状态。

This product leaflet is as comprehensive and detailed as possible on the basis of existing information, data, parameters and other information the company reserves the right to modify. The final right of interpretation belongs to TES, the buyer needs to confirm the latest status of the products in advance with TES.

## 9. 风险警告 Risk Warning

### 9.1 警示声明 Warning statement

#### 警告 WARNING

电池存在潜在的危险，在操作和维护时必须采取适当的防护措施！不正确地滥用测试实验，可能导致严重的人身伤害和财产损失！必须使用正确的工具和防护装备操作电池。电池的维护必须由具有电池专业知识并经过安全培训的人士执行。不遵守上述警告可能造成多种灾难。

CELLS ARE POTENTIALLY DANGEROUS AND PROPER PRECAUTIONS MUST BE OBSERVED IN HANDLING AND MAINTENANCE. RUNNING TESTS ON THE CELLS IMPROPERLY MAY RESULT IN SEVERE PERSONAL BODY INJURY OR PROPERTY DAMAGES. WORK ON CELLS MUST BE PERFORMED ONLY WITH PROPER TOOLS AND PROTECTIVE EQUIPMENT MUST BE USED. CELL MAINTENANCE MUST BE CARRIED OUT BY PERSONNEL KNOWLEDGEABLE OF CELLS AND TRAINED IN THE SAFETY PRECAUTIONS INVOLVED. FAILURE TO OBSERVE THE ABOVE MAY CAUSE VARIOUS HAZARDS.

### 9.2 危险类型: Types of Hazards

客户知悉在电池使用和操作过程中存在以下潜在的危险：

Customers should acknowledge the following potential hazards during the use and operation of products:

9.2.1 操作者在操作时可能会受到化学品、电击或电弧伤害。尽管人体遭受直流与交流电反应不同，但高于 50V 直流与交流电压对人体伤害同样严重，因此客户必须在操作中采取保护以避免受到伤害。

Working with cell can expose the operator to chemical, shock and/or arcing hazards. Although the human body may react differently to contact with DC voltage than to contact with AC voltage, DC above 50V can be just as harmful to the human body as AC. Customers must take protection during operation to avoid injury.

9.2.2 存在来自电池中的电解液的化学风险。

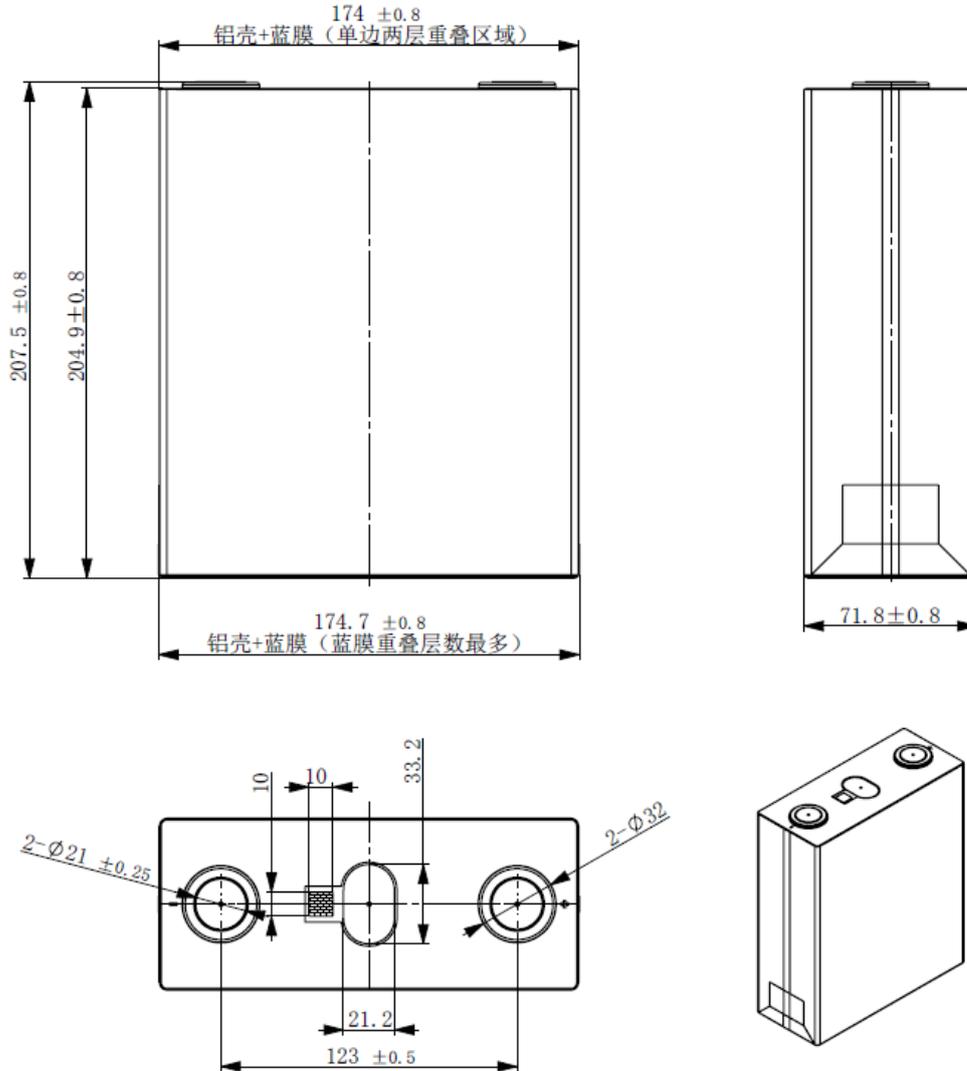
The electrolyte contained in cell could be chemical risk to operators.

9.2.3 在操作电池和选择防护装备时，客户及其雇员必须考虑到以上潜在风险，防止发生意外短路，造成电弧、爆炸或热失控。

When working with cell and selecting protective equipment, customer and its employees must consider above potential risks in case of accidental short circuit

resulting in electrical arcing, explosion, or thermal runaway of the cells.

## 10. 电芯图纸 Cell Drawing



注：电芯厚度在 30%SOC，大面夹紧力  $3000 \pm 200$ N 条件下测试。

Note: The cell thickness is measured under the conditions of 30%SOC and large surface clamping force of  $3000 \pm 200$ N.