锂离子电池产品规格书

Lithium-ion Battery Product Specification

型号：DLP71173207-280Ah

Model：DLP71173207-280Ah

规格：

EES-LIB-LFP/C-L-HS-Cell-3.2V-476W-448W-952W • h-896W • h-DLP71173207

Specification：
EES-LIB-LFP/C-L-HS-Cell-3.2V-476W-448W-952W • h-896W • h-DLP71173207

编制 Prepared		审核 Checked		批准 Approved	
会签 Signature：					

客户确认 Customer Approval	公司名称 Company	
	签字 Signature	
	盖章 Company signet	

版本变更记录

Version History

序号 Serial No.	版本 Version	修改说明 Revision	编写 Author	审核 Checked	批准 Approved	日期 Date
1	V01	新制订				2022/9/12
2	V02	根据 GB/T 36276-2023 版修改				2024/7/1
3						

目录

1. 目的 Purpose

为建立健全的公司技术资料，确保产品质量，用于指导产品生产、出货。方便与客户确认产品规格，并达成一致，制定本产品规格书。

The specification sheet is designed to build up and improve technical documentation so as to instruct production and product shipment and consequently guarantee product quality. At the same time, it is convenient for to confirm product specifications with customers and finally reach an agreement.

2. 适用范围 Scope

本产品规格书规定了电芯的类型、尺寸、结构、电化学性能、安全性能及注意事项，本标准仅适用于湖南德赛电池有限公司生产的电芯。

This product specification describes the type, size, structure, electrochemistry performance, safety characteristics, warning and cautions of the cell. This specification only applies to the cell that supplied by Hunan Desay Battery Co., Ltd.

3.电池描述 Battery Specification

3.1 型号：DLP71173207-280Ah

Model : DLP71173207-280Ah

3.2规格：

EES-LIB-LFP/C-L-HS-Cell-3.2V-476W-448W-952W • h-896W • h-DLP71173207

Specification: EES-LIB-LFP/C-L-HS-Cell-3.2V-476W-448W-952W • h-896W • h-DLP71173207

备注：规格标识规则：EES(电力储能用)-LIB(锂离子电池)-A1/A2(电池正极/负极材料)-A3(电解质类型)-A4(壳体类型)-Level(电池层级)-U_{nom}(标称电压)-P_{rc}(额定充电功率)-P_{rd}(额定放电功率)-E_{rc}(额定充电能量)-E_{rd}(额定放电能量)-A5(电池型号)

Remarks: Specification marking rules: EES(Electrical energy storage)-LIB(Lithium ion battery)-A1/A2(Battery positive/negative material)-A3(Electrolyte morphology)-A4(Shell type)-Level (Hierarchy(Cell/Module/Cluster))-U_{nom}(Nominal voltage)-P_{rc}(Rated charging power)-P_{rd}(Rated Discharging power)-E_{rc}(Rated charging energy)-E_{rd}(Rated discharging energy)-A5(Battery model)

4.电池规格 Battery Property

项目 Item	标准 Specification
标称容量 Nominal capacity	285Ah(25±2℃，P_{rc}/P_{rd}，3.65-2.5V，BOL)
额定容量 Rated capacity	280Ah(25±2℃，P_{rc}/P_{rd}，3.65-2.5V，BOL)
额定充电能量 Rated charging energy	952Wh(25±2℃，P_{rc}/P_{rd}，3.65-2.5V，BOL)
额定放电能量 Rated discharging energy	896Wh(25±2℃，P_{rc}/P_{rd}，3.65-2.5V，BOL)
质量能量密度 Mass energy density	165Wh/kg (P_{rc}/P_{rd}，BOL)
体积能量密度 Volume energy density	350Wh/L (P_{rc}/P_{rd}，BOL)
充电截止电压 Charging cut-off voltage	3.65V
放电截止电压 Discharging cut-off voltage	2.5V(> 0℃)，2.0V(≤0℃)
标称电压 Nominal voltage	3.2V
额定充电功率 Rated charging power	476W(P_{rc})
额定放电功率 Rated discharging power	448W(P_{rd})
最大脉冲放电电流 Maximum pulse discharging current	560A (2.0C/30s，SOC≥30%)
电池重量 Cell Weight	5.47±0.1 kg

电池尺寸 Cell Dimension	厚度：71.8±0.5mm 宽度：173.7±0.5 mm 高度：206.9±0.5mm Thickness:71.8±0.5mm Width: 173.7±0.5mm Height: 206.9±0.5mm
使用温度 Operating Temperature	充电：0～55℃ 放电：-20～55℃ Charge: 0～55℃ Discharge: -20～55℃
存储温度 Storage Temperature	-30～60℃（若预计电池存放30天以上，应每隔三个月将SOC调整为50%左右） -30～60℃（if the battery is expected to be stored for more than 30 days, the SOC should be adjusted to 50% every three months)
存储湿度 Storage humidity	≤ 95% ROH，无凝露 ≤ 95% ROH, no condensation
应用海拔 Altitude	≤4500m
电芯下线状态 Shipment status	17~40%SOC
月自放电 Residual capacity loss	≤3%/月（30~50% SOC，25±2℃） Per month ≤3.0%(30~50% SOC，25±2℃)

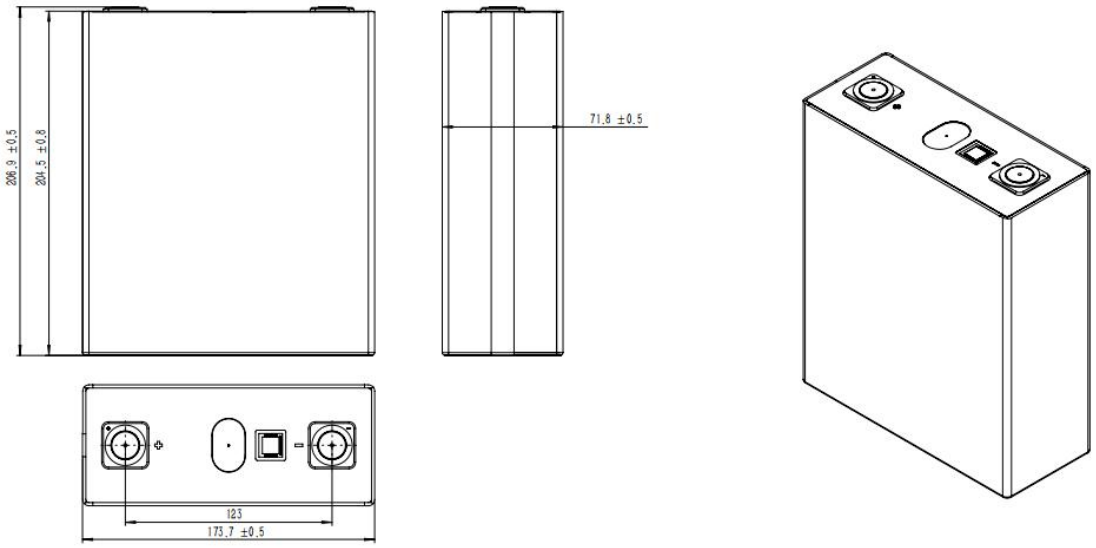
5. 电芯外部界面参数 External interface parameters of battery

项目 Item	标准 Specification
极柱直径 Diameter of pole	16±0.2mm

极柱焊接区域边界 Pole welding area boundary	可焊接区域： Φ2.8~Φ14.0mm 最大熔深：2.2mm 焊接温度150℃，时间≤5s 焊接前后密封圈压缩量的变化量≤10% 焊接过程中不允许出现极柱塑胶熔融现象 Welding area: Φ2.8~Φ14.0mm Maximum penetration: 2.2mm Welding temperature: 150℃, time≤5s Change in compression of the sealing ring before and after welding: ≤10% Melting of plastic at the pole is strictly prohibited during welding.
极柱定位孔要求 Requirements for pole location hole	直径2.8±0.2mm圆柱孔+直径2.8±0.2mm圆锥孔 Diameter 2.8 ± 0.2mm cylindrical bore + diameter 2.8±0.2mm tapered bore
极柱承受挤压力要求 Extrusion pressure requirement for the pole	+Z 方向最大：500N -Z 方向最大：500N +Z direction Max: 500N -Z direction Max: 500N
极柱承受剪切力要求 Shear pressure requirements for the pole	X Y方向最大：500N X Y direction Max: 500N
极柱承受扭力要求 Torsion requirements for the pole	≤6 Nm
对电芯Busbar焊接时施加预紧力及预紧力规格	电芯顶盖可承受的压力规格：最大500N The pressure for the battery top: 500N Max
组装预紧力要求 Preload requirements for assembly	500~5000N，电芯均匀受力壳体无变形 500~5000N, no deformation of the shell with uniform stress on the battery
循环预紧力要求 Preload requirements during the cycle	200~300Kgf
电芯膨胀力（寿命周期内） The expansion pressure of the battery (life cycle)	电芯最大膨胀力≤36KN，衰减至80% 电芯最大膨胀力≤50KN，衰减至70% The maximum expansion pressure of the battery ≤ 36KN, fading to 80% The maximum expansion pressure of the battery ≤ 50KN, fading to 70%
电芯能够承受的最大膨胀力 The maximum expansion pressure of the	64KN

battery	
电芯二维码等级 Battery QR code level	≥C class

6.电芯外观尺寸（单位：毫米）Appearance and Dimension (Unit: mm)



电芯的外观尺寸图

Appearance and Dimension of cell

序号	标注	尺寸	公差	备注
1	总高度	206.9	±0.5	
2	宽度	173.7	±0.5	
3	厚度	71.8	±0.5	
4	中心距	123	±0.5	
备注:使用平板测厚仪，测量压力 2kN，3sec				

电池外观应没有漏液、污渍、破损、明显划痕等影响商业价值的缺陷存在。

There shall be no such defect as leakage, scratch, damaged, obvious scratch which may adversely affect commercial.

7. 标准测试环境 Standard Test Conditions

测试环境：除另作说明，所有的测试的标准测试环境是：温度25±2℃，湿度15%~90%，大气压86kPa~106kPa。

Standard environmental conditions: Unless otherwise specified, all tests stated in this specification are conducted at temperature 25±2℃, humidity 15%~90% and air pressure between 86kPa to 106kPa.

8. 电池性能及测试方法 Performances and Test Method

8.1 标准充电方法：电池以P_{rc}恒功率充电至3.65V，静置10min。

标准放电方法：电池以P_{rd}恒功率放电至2.5V停止，静置10min。

初始化充电方法：将电芯在25±2℃下静置5h，电池按照标准放电后再进行标准充电。
初始化放电方法：将电芯在25±2℃下静置5h，电池按照标准充电后再进行标准放电。
Standard charging：Charge the cell with constant power P_{rc} to 3.65V，rest 10min.
Standard discharging：Discharging the cell with constant power P_{rd} to 2.5V，rest 10min.
Initialized charging： Leave the cell at 25±2 ℃ for 5h, the cell according to standard discharge then according to standard charge.
Initialized discharging： Leave the cell at 25±2 ℃ for 5h, the cell according to standard charge then according to standard discharge.

8.2 电性能参数 Electrochemistry performance

序号 No	项目 Item	标准 Criteria	测试方法和环境 Test Method and Condition
1	额定容量 Rated Capacity	≥280Ah	电池按标准方法充放电，重复 3 次，以 3 次试验的放电容量均值为结果 The battery was charged and discharged according to the standard method, repeated 3 times, to test three times the mean discharge capacity for results.
2	交流内阻 ACR	≤0.3 mΩ	在 50%SOC，1kHz 的频率下测试。 AC impedance of the cell is measured at 1kHz and 50%SOC after standard charging.
3	初始充放电性能 Initialized charging/discharging performance	初始充电能量≥额定充电能量 初始放电能量≥额定放电能量 5℃的初始能量效率≥80% 25℃的初始能量效率≥93% 45℃的初始能量效率≥93% Initialized charging energy ≥ Rated charging energy Initialized discharging energy	25±2℃初始充放电性能： 1)电池单体初始化放电； 2)P_{rc} 恒功率充电至终止电压，静置 10min； 3)P_{rd} 恒功率放电至终止电压，静置 10min。 45±2℃初始充放电性能： 1)电池单体初始化放电； 2)在 45±2℃下搁置 16h； 3)在 45±2℃下，P_{rc} 恒功率充电至终止电压，静置 10min； 4)在 45±2℃下，P_{rd} 恒功率放电至终止电压，静置 10mi。 5±2℃初始充放电性能： 1)电池单体初始化放电； 2)在 5±2℃下搁置 20h；

			≥ Rated discharging energy 5℃ Energy efficiency ≥80% 25℃ Energy efficiency ≥93% 45℃ Energy efficiency ≥93%	3)在 5±2℃下，P_{rc} 恒功率充电至终止电压，静置 10min； 4)在 5±2℃下，P_{rd} 恒功率放电至终止电压，静置 10min。 25±2°C initialized charge/discharge performance: 1)Initialized discharge the battery; 2)Charge the battery to the termination voltage at a constant power of P_{rc}, and rest for 10min; 3)Discharge the battery to the termination voltage at a constant power of P_{rd}, and rest for 10min. 45±2°C initialized charge/discharge performance: 1)Initialized discharge the battery; 2)The battery is left to rest for 16h at 45±2°C; 3)At 45±2°C, charge the battery to the termination voltage at a constant power of P_{rc}, and rest for 10min; 4)At 45±2°C, discharge the battery to the termination voltage at a constant power of P_{rd}, and rest for 10min. 5±2°C initialized charge/discharge performance: 1)Initialized discharge the battery; 2)The battery is left to rest for 20h at 5±2°C; 3)At 5±2°C, charge the battery to the termination voltage at a constant power of P_{rc}, and rest for 10min; 4)At 5±2°C, discharge the battery to the termination voltage at a constant power of P_{rd}, and rest for 10min.
4	高海拔初始充放电性能（适用于高海拔地区） Initialized charging/discharging performance in high altitude	初始充电能量≥额定充电能量 初始放电能量≥额定放电能量 能量效率≥93% Initialized charging energy ≥	1)电池单体初始化放电； 2)将电池置于低气压试验装置中，设置试验气压，在 25±2℃下静置 6h； 3)以 P_{rc} 恒功率充电至终止电压，静置 10min； 4)以 P_{rd} 恒功率放电至终止电压，静置 10min； 1)Initialized discharge the battery; 2)Place the battery in a low-pressure test device,

		（Suitable for high altitude）	Rated charging energy Initialized discharging energy ≥ Rated discharging energy Energy efficiency ≥93%	set the test pressure, and left it to rest for 6h at 25±2℃; 3)Charge the battery to the termination voltage at a constant power of P_{rc}, and rest for 10min; 4)Discharge the battery to the termination voltage at a constant power of P_{rd}, and rest for 10min.
	5	功率特性 Power characteristic	不同充放电功率条件下： 充电能量≥额定充电能量 放电能量≥额定放电能量 能量效率≥93% Under different charging/discharging power conditions: Charging energy ≥ Rated charging energy Discharging energy ≥ Rated discharging energy Energy efficiency ≥93%	1)在 25±2℃下静置 5h； 2)以 100%P_{rd} 恒功率放电至终止电压，静置 10min； 3)以 100%P_{rc} 恒功率充电至终止电压，静置 10min； 4)以 100%P_{rd} 恒功率放电至终止电压，静置 10min； 5)以额定充放电功率的 5%为步长，逐次递减充放电功率至 5%额定充放电功率，重复步骤 2) ~ 4)。 1)The battery is left to rest for 5h at 25±2°C; 2)Discharge the battery to the termination voltage at a constant power of 100%P_{rd}, and rest for 10min; 3)Charge the battery to the termination voltage at a constant power of 100%P_{rc}, and rest for 10min; 4)Discharge the battery to the termination voltage at a constant power of 100%P_{rd}, and rest for 10min.; 5)Repeat steps 2) ~ 4), take 5% of the rated charging/discharging power as a step, reduce the charging/discharging power to 5% of the rated charging/discharging power one by one.
	6	倍率充放电性能 Rate charging/ discharging performance	$2P_{rc}/P_{rc}$ 条件下的充电能量保持率 ≥95% $2P_{rd}/P_{rd}$ 条件下的放电能量保持率 ≥95%	1)电池单体初始化放电； 2)以 P_{rc} 恒功率充电至终止电压，静置 10min； 3)以 P_{rd} 恒功率放电至终止电压，静置 10min； 4)以 $2P_{rc}$ 恒功率充电至终止电压，静置 10min； 5)以 P_{rc} 恒功率充电至终止电压，静置 10min； 6)以 $2P_{rd}$ 恒功率放电至终止电压，静置 10min；

			$2P_{rc}/2P_{rd}$ 条件下的能量效率≥90% $2P_{rc}/P_{rc}$ Charge energy retention rate ≥95% $2P_{rd}/P_{rd}$ discharge energy retention rate ≥95% $2P_{rc}/2P_{rd}$ energy efficiency ≥90%	7)以 P_{rd} 恒功率放电至终止电压，静置 10min； 8)以 $2P_{rc}$ 恒功率充电至终止电压，静置 10min； 9)以 $2P_{rd}$ 恒功率放电至终止电压。 1)Initialized discharge the battery; 2)Charge the battery to the termination voltage at a constant power of P_{rc}, and rest for 10min; 3)Discharge the battery to the termination voltage at a constant power of P_{rd}, and rest for 10min; 4)Charge the battery to the termination voltage at a constant power of $2P_{rc}$, and rest for 10min; 5)Charge the battery to the termination voltage at a constant power of P_{rc}, and rest for 10min; 6)Discharge the battery to the termination voltage at a constant power of $2P_{rd}$, and rest for 10min; 7)Discharge the battery to the termination voltage at a constant power of P_{rd} and rest for 10min; 8)Charge the battery to the termination voltage at a constant power of $2P_{rc}$, and rest for 10min; 9)Discharge the battery to the termination voltage at a constant power of $2P_{rd}$.
7	能量保持与能量恢复能力 Energy retention and energy recovery	能量保持率≥95% 充电能量恢复率≥95% 放电能量恢复率≥95% Retention rate of energy ≥95% Recovery rate of charging energy ≥ 95% Recovery rate of discharging energy ≥ 95%	1)电池单体初始化充电； 2)在 45±2℃静置 30d； 3)在 25±2℃静置 5h； 4)以 P_{rd} 恒功率放电至终止电压，静置 10min； 5)以 P_{rc} 恒功率充电至终止电压，静置 10min； 6)以 P_{rd} 恒功率放电至终止电压。 1)Initialized charge the battery; 2)The battery is left to rest for 30d at 45±2°C; 3)The battery is left to rest for 5h at 25±2°C; 4)Disharge the battery to the termination voltage at a constant power of P_{rd}, and rest for 10min; 5)Charge the battery to the termination voltage at a constant power of P_{rc}, and rest for 10min; 6)Disharge the battery to the termination voltage

			at a constant power of P_{rd}.
8	低温适应性 Low temperature adaptability	充电能量≥额定充电能量 放电能量≥额定放电能量 能量效率≥93% Charging energy ≥ Rated charging energy Discharging energy ≥ Rated discharging energy Energy efficiency ≥93%	1)电池单体初始化充电； 2)在-30±2℃静置 24h； 3)在 25±2℃静置 24h； 4)以 P_{rd} 恒功率放电至终止电压，静置 10min， 5)以 P_{rc} 恒功率充电至终止电压，静置 10min； 6)以 P_{rd} 恒功率放电至终止电压。 1)Initialized charge the battery; 2)The battery is left to rest for 24h at -30±2°C; 3)The battery is left to rest for 24h at 25±2°C; 4)Disharge the battery to the termination voltage at a constant power of P_{rd}, and rest for 10min; 5)Charge the battery to the termination voltage at a constant power of P_{rc}, and rest for 10min; 6)Disharge the battery to the termination voltage at a constant power of P_{rd}.
9	高温适应性 High temperature adaptability	充电能量≥额定充电能量 放电能量≥额定放电能量 能量效率≥93% Charging energy ≥ Rated charging energy Discharging energy ≥ Rated discharging energy Energy efficiency ≥93%	1)电池单体初始化充电； 2)在 50±2℃静置 24h； 3)在 25±2℃静置 12h； 4)以 P_{rd} 恒功率放电至终止电压，静置 10min， 5)以 P_{rc} 恒功率充电至终止电压，静置 10min； 6)以 P_{rd} 恒功率放电至终止电压。 1)Initialized charge the battery; 2)The battery is left to rest for 24h at 50±2°C; 3)The battery is left to rest for 12h at 25±2°C; 4)Disharge the battery to the termination voltage at a constant power of P_{rd}, and rest for 10min; 5)Charge the battery to the termination voltage at a constant power of P_{rc}, and rest for 10min; 6)Disharge the battery to the termination voltage at a constant power of P_{rd}.
10	循环性能 Cycle Life	6000 次循环，容量≥196Ah 6000 cycles, Remaining capacity≥196Ah	25℃，在 200±20 kgf 的压力条件下，电池进行标准充放电，循环 6000 次。测试电芯当前容量。 在（25±2）℃下，当前容量标定测试按照下列步骤进行： a)电池以 0.5C 电流恒流放电至终止电压，静

				置 30min； b)以 0.5C 电流恒流恒压充电至终止电压，截止电流 0.05C，静置 30min； c)电池以 0.5C 电流恒流放电至终止电压，静置 30min，记录此时容量为当前容量。 25℃，Under the pressure condition of 200±20 kgf, the battery was charged and discharged standardly, Circular 6000 times. Test batteries current capacity. Under (25±2) ℃, the current capacity calibration test according to the following steps: a) Cell with 0.5C current to constant exile electric voltage, let stand for 30 min. b) Charge at a constant current and voltage of 0.5C to the termination voltage, with a cut-off current of 0.05C, let stand for 30 min. c) Battery in 0.5C current to constant exile electric voltage, let stand for 30 min, record the capacity of current capacity.
	11	贮存性能 Storage	充电能量恢复率 ≥96.5% 放电能量恢复率 ≥96.5% Recovery rate of charging energy ≥ 96.5% Recovery rate of discharging energy ≥ 96.5%	1)电池单体初始化充电； 2)以 P_{rd} 恒功率放电至放电能量达该电池初始放电能量的 50%。 3)在 50±2℃静置 30d； 4)在 25±2℃静置 5h； 5)以 P_{rd} 恒功率放电至终止电压，静置 10min； 6)以 P_{rc} 恒功率充电至终止电压，静置 10min； 7)以 P_{rd} 恒功率放电至终止电压。 1)Initialized charge the battery; 2)Disharge the battery to 50% of the initialized discharging energy at a constant power of P_{rd}; 3)The battery is left to rest for 30d at 50±2°C; 4)The battery is left to rest for 5h at 25±2°C; 5)Disharge the battery to the termination voltage at a constant power of P_{rd}, and rest for 10min; 6)Charge the battery to the termination voltage at a constant power of P_{rc}, and rest for 10min; 7)Disharge the battery to the termination voltage at a constant power of P_{rd}.

8.3 安全性能Safety Performances

序号 No.	项目 Item	标准 Criteria	测试方法和环境 Test Method and Condition
1	挤压性能 Crush Test	不漏液、不冒烟、不起火、不爆炸、不在防爆阀及泄压点之外的位置发生破裂 No leakage, no smoke, no fire, no explosion, no damage occurred at locations other than valves or leak points.	初始化充电后的电池按以下方法操作： 挤压方向：垂直于电池面积最大的外表面 挤压头：半径为 75mm、长度大于电芯被挤压面尺寸的半圆柱体 挤压速度：5mm/s 挤压程度：挤压力达到 50kN 时保持该挤压力 10min，停止挤压，观察 1h。 After Initialized charging, the battery shall be operated as follows： Crush direction: perpendicular to the largest surface of the battery Indenter type: a semi-cylinder with a radius of 75 mm and a length greater than the size of the extruded surface of the core Crush speed: 5 mm/s Crush extent: the battery is extruded until the extrusion pressure reach 50 kN, keep the pressure for 10min, stop crushing and observe for 1 h.
2	短路性能 Short circuit Test	不起火、不爆炸、不在防爆阀及泄压点之外的位置发生破裂 No fire, no explosion, no damage occurred at locations other than valves or leak points.	电池单体初始化充电后，短路试验装置连接电池的正负极，调节试验装置电阻至 0.8~1.0mΩ；启动试验装置，在电池正负极之间形成电流回路，持续 10min 后断开电流回路，观察 1h。 Initialized charge the battery, the short-circuit test device is connected to the positive and negative poles of the battery, and the resistance of the device is adjusted to 0.8~1.0mΩ. The device is then activated to create a current loop between the positive and negative poles of the battery for 10 min. Afterward, the current loop is disconnected, and observe for 1h.
3	跌落性能 Drop Test	不冒烟、不起火、不爆炸、不在防爆阀及泄压点之外的位置发生破裂	电池单体初始化充电，将电池正极或负极朝下从 1.5m 高度处自由跌落到水泥地面上，观察 1h。 Initialized charge the battery, the battery tab down from 1.5 m high free fall to the cement ground with the tab towards the ground,observe for 1 h.

		No smoke, no fire, no explosion, no damage occurred at locations other than valves or leak points.	
4	过充电性能 Overcharge Test	不起火、不爆炸、不在防爆阀及泄压点之外的位置发生破裂 No fire, no explosion, no damage occurred at locations other than valves or leak points.	电池单体初始化充电，以 $I=P_{rc}/U_{nom}$ 恒流充电至电压达到其充电终止电压的 1.5 倍或时间达到 1h 时停止充电，观察 1h。 Initialized charge the battery, charge the battery to 1.5 times of the termination voltage or charging time reach 1h with the constant current of $I=P_{rc}/U_{nom}$, observe for 1 h.
5	过放电性能 Overdischarge Test	不漏液、不冒烟、不起火、不爆炸、不在防爆阀及泄压点之外的位置发生破裂 No leakage, no smoke, no fire, no explosion, no damage occurred at locations other than valves or leak points.	电池单体初始化放电，以 $I=P_{rd}/U_{nom}$ 恒流放电至电压达到 0V 或时间达到 1h 时停止放电，观察 1h。 Initialized discharge the battery, discharge the battery to 0V or discharging time reach 1h with the constant current of $I=P_{rd}/U_{nom}$, observe for 1 h.
6	过载性能	不漏液、不冒烟、不起火、不爆炸、不在防爆阀及泄压点之外的位置发生破裂 No leakage, no smoke, no fire, no explosion, no damage occurred at locations other than valves or leak points.	1)电池单体初始化放电； 2)以 $4P_{rc}$ 恒功率充电至终止电压，静置 10min； 3)以 $4P_{rd}$ 恒功率放电至终止电压，观察 1h。 1)Initialized discharge the battery; 2)Charge the battery to the termination voltage at a constant power of $4P_{rc}$, and rest for 10min; 3)Discharge the battery to the termination voltage at a constant power of $4P_{rd}$, and observe for 1 h.

	7	绝热温升特性 Adiabatic temperature rise characteristic	1) 电池表面温度小于或等于电池单体高温一级报警温度时，温升速率＜0.02℃/min； 2) 不起火、不爆炸、不在防爆阀及泄压点之外的位置发生破裂 1) When the surface temperature of the battery is at or below the high temperature primary alarm temperature, the temperature rise rates ＜ 0.02℃/min; 2) no fire, no explosion, no damage occurred at locations other than valves or leak points.	1)电池单体初始化充电，置于绝热模拟装置中； 2)加热电池至表面温度达 40℃时保持当前温度，静置 5h； 3)继续加热电池至表面温度达 45℃时保持当前温度，静置 1h； 4)控制装置恒定当前温度 20min； 5)重复步骤 3)~4)，以 5℃为步长逐次递增至电池表面温度为 130℃。 1)The battery is placed in the tester after initial charging; 2)Heat the battery until the surface temperature reaches 40℃, and maintain this temperature for 5h; 3)Increase the temperature to 45℃, and maintain it for 1h; 4)Keep the device at the current temperature for 20 min; 5)Repeat steps 3)~4) in 5°C increments until the battery surface temperature reaches 130°C.
	8	热失控性能 Thermal runaway	不起火、不爆炸、不在防爆阀及泄压点之外的位置发生破裂 No fire, no explosion, no	1)电池单体初始化充电后置于热失控试验装置中； 2)以 $I=P_rc/U_{nom}$ 恒流充电，启动加热； 3)触发热失控的判定条件或温度达到 300℃或试验时间达 4h 时，停止充电和加热，观察 1h； 4)热失控的判定条件：连续监测到三个温升速率值均≥3℃/s 或起火或爆炸。

		damage occurred at locations other than valves or leak points.	1)The battery is placed in the thermal runaway tester after initial charging; 2)Charge the battery with the constant current of $I=P_{rc}/U_{nom}$, and heating; 3)Trigger the judgement conditions of thermal runaway or when the temperature reaches 300℃ or the test time reaches 4h, stop charging and heating, observe for 1h; 4)Determination conditions of thermal runaway: three successive temperature rise rates ≥3℃/s or fire or explosion.

备注：电芯安全性可满足 GB/T 36276-2023 标准要求。

Remark: The cell safety performance meet GB/T 36276-2023 standard requirement.

9.警告及注意事项 Warning and Caution

消费者必须严格按照规格书要求使用电池，避免充放电方法或储存维护不当而影响电池使用寿命和安全性。由于误用会引起电池过热，发生火灾，或爆炸以及其他没有按照规格书进行操作所造成的任何意外事故，湖南德赛电池有限公司不负任何责任。请严格遵守以下安全条款：

Cells must be applied in strict accordance with the specification. Abused of a battery may cause the battery to get heat, ignite, or explode and cause serious injury. Hunan Desay battery Co.,Ltd has no legal liability on any overheat, fire, explosion or other situations when the cells are used not according to the specifications. Be sure to abide by the safety rules as following:

- 不要拆解电池，不要把电池放到火中或者水中。
  Do not disassemble cells; Do not put cells in water or fire.
- 请用指定充电器按标准充电。电池只能在指定设备上使用，不要在其他设备上使用。
  Please charge the cells with specified charger and follow the specifications. The cells can only be used in the specified equipment. It's not allowed for other applications.
- 如果电池发出异味，发热，变色，变形或使用、存储、充电过程中出现任何异常现象，立即将电池从装置或充电器中移开并停用。
  If the battery 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 battery charger and stop using it.
- 电池不能在靠近火源或者超过60℃的环境中使用、放置和存储。
  Cell can't be placed or used near fire or where it is over 60℃ or stored in such area.
- 不要使用金属导体短路电池的正负极；也不要把电池同项链、发夹、硬币或镙钉等金属品一起放在兜里或包中，也不要把电池同上述物品一起储存。

Do not connect the positive (+) and negative (-) terminals with a metal object; Do not put the cells together with necklace, hairpin, coins or screws or other metal.

- 不要使用锐利的物品刺穿电池。
  Please be careful and not damage the cells with sharp objects.
- 请仔细阅读操作说明书，任何不恰当的操作可能导致过热、着火、爆炸、电池损伤或者容量衰减。
  Please read the operation manual carefully. Any improper operation may lead to overheat, fire, explosion, damage or loss of capacity.

10.应用条件 Application conditions

- 客户应当确保严格遵守以下与电池相关的应用条件：
  Customer shall ensure that the following application conditions in connection with the products are strictly observed:
- 客户应配置电池管理系统，严密监控、管理与保护每个电池。电芯初次使用必须进行小电流满充满放以激活，以保证后续使用中容量的充分发挥。
  Customers should configure a battery management system to closely monitor, manage and protect each battery. When the cell is first used, it must be fully charged and discharged for activating it and giving fully capacity.
- 客户应向湖南德赛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，以供湖南德赛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, and data file format to DESAY for design review and record keeping.
- 未经湖南德赛同意，客户不可擅自修改或者改变电池管理系统的设计和框架，以免影响电池的使用性能。
  Once the detailed information of the BMS has been reviewed and agreed by DESAY, customer shall not modify or change the design, features, setting or data file format of the BMS without the prior written agreement by DESAY.
- 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。不具备完整的电池系统使用期限内的监测数据的，湖南德赛不承担产品质量保证责任。
  Customer shall keep relevant records of the BMS monitoring data throughout the entire service life of each product, including keeping record of number of occurrence of rush charge, which could be used in the determination and judgment of any product warranty and liability claim entitlement. No warranty or liability claim should be considered without BMS diagnosis records (at a regular basis, esp. during maintenance) of the relevant product.
- 电池管理系统需满足以下最基本的检测和控制要求：
  The BMS shall include the following monitoring and control features as a minimum requirement.

参数 Parameter	产品规格 Specification	保护动作 Action
充电终止 Stop charging	3.65V	电池的电压达到 3.65V 时，BMS 申请终止充电 Stop charging when cell voltage reaches 3.65 V
第一级过充电保护 First overcharge protection	≥3.69V	当电池电压达到 3.69V，BMS 强制终止充电 Stop charging when cell voltage reaches 3.69 V
第二级过充电保护 Second overcharge protection	≥3.8V	当电池电压达到 3.8V ，BMS 强制终止充电，且 BMS 应锁定直到技术人员解决问题 When the battery voltage reaches 3.8V, the BMS is forced to terminate charging, and the BMS should be locked until technicians solve the problem.
放电终止 Stop discharge	最小 2.8V Minimum 2.8V	当电池的电压到达 2.8V，BMS申请终止放电 Minimize the discharging current when cell voltage reaches 2.8V.
第一级过放保护 First over discharge protection	最小 2.7V Minimum 2.7V	当电池的电压到达 2.7V，BMS 强制终止放电 Stop discharging when cell voltage reaches 2.7V
第二级过放保护 Second over discharge protection	最小 2.2V Minimum 2.2V	当电池电压低于 2.2V 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 cell voltage is less than 2.2V, the cell should be charged back to 50% SOC at 0.1C in time, and the BMS should be locked until technicians solve the problem.
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(电池) When a short circuit occurs, the battery (cell) is disconnected by the overcurrent protection device.
过流保护 Over current protection	参考充放电电流要求 Reference charge and discharge current requirements	电池管理系统控制充放电电流符合规格 Control discharge current by BMS to values within specification
过热保护 Over temperature protection	充电:55℃ 放电:55℃ Charge: 55℃ Discharge:55℃	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
充电时间过长保护 Charging time out limit	充电时间在8小时内	充电时间长于8小时，则终止充电 If the charging time is longer than 8 hours, the charging will be terminated

	Charging completes within 8 hours	

备注：以上第一级/第二级过充/放电保护为警示条款，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，湖南德赛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 first/second level overcharge/discharge protection are the warning clause, draw the attention of customers: When the battery reaches any of the terms described in the above, means that the battery has been used beyond the specifications, the customer shall take protective measures on the battery in accordance with the "protection action" and other relevant provisions of this specification. At the same time, the DESAY shall not take any responsibility for the damage in connection therewith.

- 电芯使用过程中应充分考虑电芯的散热问题，由于散热设计问题导致的电芯或电池过热损坏，湖南德赛不承担质量保证责任。

  The heat dissipation of the battery should be fully considered during the use of the battery. DESAY does not take the responsibility due to the overheating of the cell or batteries caused by the thermal design problem.

- 电芯使用过程中应充分考虑电芯的防水、防尘问题，所有设计必须满足 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或电池的损坏（如腐蚀、生锈等），湖南德赛不承担质量保证责任。

  During the use of the battery cell, the waterproof and dustproof problems of the battery cell should be fully considered. All designs meet the waterproof and dustproof grade stipulated by the relevant national standards. The DESAY does not take the responsibility due to damage to the cell or batteries (such as corrosion, rust, etc.) caused by water and dust.

11.运输及存放 Shipment and Storage

如无特别说明，我公司电池在 17~40%的荷电状态下运输，并做好抗震防护措施。电池存储应避免光照，远离热源和危险化学品，我们建议电池在 30~50%SOC 状态下存储，防止造成过放。长期存储请每三个月充放电一次，若无条件，我公司不承担质保责任。

Without special instructions，the cell should be shipment about 17~40%SOC, and do a good job for anti-vibration protection measures. Cells should be stored where it is cool, no light and away from heat sources and hazardous chemical, we advise the cells storage about 30~50%SOC, prevent overdischarge, please charge the cells every three months. Otherwise, we are not liable for warranty.

12.其他 Others

本说明未包括事项应由双方协商确定。

Any other which are not covered in this specification shall be agreed by both parties.