文控中心
2021-09-17
受控正本

产品规格书 PRODUCT SPECIFICATION

可充电锂离子电池 Rechargeable Lithium Ion Battery

型号 Type：71173204-280Ah

产品设计准备 Prepared by RD	产品设计审批 Approved by RD	销售审批 Approved by MS	项目工程审批 Approved by PE	品质保证审批 Approved by QA
高润 2021.9.17				

客户确认 Client Approval	签名 Signature：	公司印章 Company Stamp：
	日期 Date：	
	客户代码 Company Code：	

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Revision	Description	Date	Approval
A0	Original Release		
A1	ncrease the middle width of the battery cell		

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Customer Inquiry

Model: 71173204-280Ah

Version: A1

The Customer is requested to write down your information and contact GFL in advance, if and when the Customer needs applications or operating conditions other than those described in this document. GFL could design and build such products according to your special request.

No.	Special Request	Criteria
1		
2		
3		
4		
5		

Company code：_____Signature：_____Date：_____

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Definition and Note

Terms	Definition / Note
Product	Means the 280Ah 3.2V rechargeable lithium ion cells produced by GFL.
Client	Means the customer in the 《GFL product sales contract》.
GFL	Means Ganfeng Li-Energy Technology Co. Limited.
PN	Means the unique part number provided by GFL to identify the product supplied by GFL.
Ambient Temperature	Means the ambient temperature of the environment which the products are exposed.
（BMS）	Means an active tracking and control system to be developed and implemented by GFL to monitor and record the operating parameters, including but not limited to voltage, current and temperature, of each product in its entire service life, and to control the operation of each product to ensure a safe operation of product.
Cell Temperature	Means the temperature of the cell measured by the temperature sensor connected to the main part of cell.
Charge C-Rate	The ratio of charging current to the latest cell capacity as frequently measured by the Battery Management System, with a unit of measure denoted by 'C'. For example, the initial cell capacity is 280Ah and a Charge C-Rate of 0.2C equals to a charge current of 56A. The charge current shall be adjusted from time to time based on the latest cell capacity so that the Charge C-Rate complies with the requirement as set out in paragraph 2.2.
Cycle	Means a state when a total of charge and discharge according to rules from a cell as recorded by BMS and it may consist of a summation of a few segments of partial charge and discharges.
Production date	Date of battery manufacture. The clear date code on the top cap of each related battery is the manufacturing date.
（OCV）	Open circuit voltage.
Standard Charge	The default charging method set out in paragraph 2.2.1.

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Standard Discharge	A discharge current of 0.5C as set out in paragraph 2.3.1 with a discharge cut-off voltage of 2.50V or 2.00V as set out in paragraph 2.3.5.
(SOC)	The linear scale of charge held by a cell as measured by capacity either in Ah or Wh. 100% SOC means a cell is fully charged at 3.65V while 0% SOC means a cell is fully discharged down to 2.50V. The SOC should indicate a no load situation.
Temperature Rise	Means the temperature of the cell rises during the conditions specified in this document, such as the charging process or the discharging process.
Unit of measurement	"V" (Volt) (V) "A" (Ampere) (A) "Ah" (Ampere-Hour) (Ah) "Wh" (Watt-Hour) (Wh), "Ω" (Ohm) (Ω) "mΩ" (Milliohm) (mΩ), "℃" (Degree Celsius) (℃) "mm" (Millimeter) (mm) "s" (Second) (s) "Hz" (Hertz) (Hz)

1. Scope

The purpose of this document is to specify the specifications of 280Ah 3.2V rechargeable lithium ion LFP cells with GFL to be supplied by GFL

2. Electrical specification

Throughout this specification, numeric criteria annotated by '*' means such criteria are only applicable to fresh unused Product within 7 days from delivery by GFL. Products either have been used or stored for a period longer than 30 days by Client and/or its customer may exhibit an inferior numeric parameter than such criteria. Client agrees that such occurrence does not constitute nonconformance of specification.

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2.1 General

No.	Parameter	Specification	Condition / Note
2.1.1	Typical capacity	*280.0Ah	At a 1C discharge current (25±2℃)
2.1.2	Operating voltage	2.50V~3.65V	0℃ < T≤60℃
		2.00V~3.65V	-20℃≤T≤0℃
2.1.3	Impedance (1KHz)	≤0.4mΩ	at a fresh state
2.1.4	Shipping capacity	3~30% SOC	
2.1.5	Operating temperature (charging)	0~60℃	See paragraph 2.2
2.1.6	Operating temperature (discharge)	-20~60℃	See paragraph 2.3
2.1.7	Optimum operating temperature		
	Charging	15~35℃	
	Discharging	15~35℃	
2.1.8	Storage temperature		
	One month	-30-45℃	SOC:20%~50%SOC
	Six months	-20~35℃	SOC:20%~50%SOC
2.1.9	Weight	≤5.60Kg	N.A.
2.1.10	Self-discharge	≤3.5%/月 ≤3.5%/month	Count after fresh cell need Standard Charge to 50%SOC and storage at 25±2°C for 3 month
2.1.11	Cell dimension	Reference specification 9	Thickness: 71.8±0.5mm (300±50Kgf pressure) Width:174.2±0.8mm Height: 207.1±0.8mm

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2.2 Charging mode/Parameters

No.	Parameter	Specification	Condition /Note
2.2.1	Standard charge current	0.5C	25±2C
2.2.2	Standard charge voltage	3.65V Cell max voltage 3.65V	25±2C
2.2.3	Maximum charge current (continuous)	1.0C	25±2C
2.2.4	Standard charge method	0.5C constant current charge to 3.65V for cell, then switch to constant voltage charge until charge current declines to 0.05C.	
2.2.5	Standard charge temperature	25±2C	
2.2.6	Absolute charge temperature (Cell temperature)	0~60C	Stop charging once cell Temperature is outside this range regardless of the charging mode adopted.
2.2.7	Absolute charge voltage	3.65V max.	Stop charging once voltage exceeds this voltage regardless of the charging mode (including regeneration) adopted.

2.2.7 Other Continuous Charge Conditions (C)

SOC/T	0	10%	20%	30%	40%	50%	60%	70%	80%	85%	90%	100%
0℃	0	0	0	0	0	0	0	0	0	0	0	0
2℃	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.100
5℃	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.100
7℃	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.200
10℃	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.200
12℃	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.200
15℃	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.200
20℃	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.75	0.75	0.30
25℃	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.80	0.80	0.30
45℃	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.80	0.80	0.30
50℃	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.30
55℃	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.20
60℃	0	0	0	0	0	0	0	0	0	0	0	0

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2.3 Discharging mode/Parameters

No.	Parameter	Specification	Condition /Note
2.3.1	Standard discharge current	0.5C	25±2℃
2.3.2	Maximum discharge current (continuous)	1.0C	N.A.
2.3.3	Discharge cut-off voltage	2.50V	0℃ < T≤60℃
		2.00V	-20℃≤T≤0℃
2.3.4	Standard discharge temperature	25±2℃	N.A.
2.3.5	Absolute discharge temperature (Cell temperature)	-20~60℃	Different current at different temperature.

2.3.6 Other continuous discharge Conditions (C)

SOC/T	0	5%	10%	20%	30%	40%	50%	60%	70%	80%	85%	90%	100%
-30℃	0	0.02	0.03	0.10	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
-25℃	0	0.03	0.05	0.15	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
-15℃	0	0.03	0.05	0.15	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
-10℃	0	0.05	0.10	0.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
-5℃	0	0.10	0.20	0.50	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
0℃	0	0.10	0.20	0.50	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
5℃	0	0.10	0.20	0.50	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
10℃	0	0.10	0.20	0.50	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
15℃	0	0.20	0.30	0.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20℃	0	0.20	0.30	0.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
25℃	0	0.20	0.30	0.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30℃	0	0.20	0.30	0.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
35℃	0	0.20	0.30	0.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40℃	0	0.20	0.30	0.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
45℃	0	0.20	0.30	0.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
50℃	0	0.10	0.20	0.50	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
55℃	0	0.03	0.05	0.15	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
60℃	0	0	0	0	0	0	0	0	0	0	0	0	0

2.4 Regeneration

Regeneration means a cell is charged or discharged by pulse current regenerated during application. The regenerated voltage should be strictly regulated at all SOC and Cell Temperature. The magnitude and duration of pulse charging or discharging current should be strictly regulated according to the SOC and Cell Temperature listed on the table below. Regeneration charging or discharging of the cell outside this allowable condition may cause permanent internal damage to the Product and shall render GFL' s warranties under the Contract inapplicable, thereby releasing GFL from any liability in connection therewith.

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2.4.1 Regeneration voltage 3.65V maximum,2.50V minimum

2.4.2 Allowable regeneration pulse charging current and duration 10s 再生脉冲充电电流(C)

Regeneration pulse charging for 10s (C)

SOC/T	0%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%	100%
0℃	0	0	0	0	0	0	0	0	0	0	0	0	0
5℃	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.30	0
10℃	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.60	0
15℃	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	0.80	0
20℃	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.00	0
25℃	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.00	0
30℃	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.00	0
35℃	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.00	0
40℃	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.00	0
45℃	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.00	0
50℃	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.00	0
55℃	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	0.80	0
60℃	0	0	0	0	0	0	0	0	0	0	0	0	0

2.4.3 Allowable regeneration pulse discharging current and duration 10s Regeneration pulse discharging for 10s (C)

SOC/T	0%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%	100%
-30℃	0	0.03	0.06	0.13	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
-25℃	0	0.06	0.13	0.25	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
-15℃	0	0.06	0.13	0.25	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
-10℃	0	0.10	0.20	0.40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
-5℃	0	0.15	0.30	0.60	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
0℃	0	0.25	0.50	1.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
5℃	0	0.25	0.50	1.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
10℃	0	0.25	0.50	1.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
15℃	0	0.30	0.60	1.20	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
20℃	0	0.30	0.60	1.20	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
25℃	0	0.38	0.75	1.50	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
30℃	0	0.38	0.75	1.50	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
35℃	0	0.38	0.75	1.50	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
40℃	0	0.38	0.75	1.50	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
45℃	0	0.38	0.75	1.50	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
50℃	0	0.25	0.50	1.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
55℃	0	0.15	0.30	0.60	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
60℃	0	0	0	0	0	0	0	0	0	0	0	0	0

2.4.4 After each regeneration pulse, there should be a 'rest period' with duration equal to or long than the relevant regeneration pulse. A 'rest period' can either be discharging or zero current state. No regeneration is allowed within a rest period.

2.5 Discharge Capacity of different temperature

No.	Parameter	Specification	Condition / Note
2.5.1	Capacity at 25°C	*≥280.0Ah	Standard Charge at 25±2°C, Standard Discharge at 25±2°C.
2.5.2	Capacity at 55°C	*≥266.0Ah	Standard Charge at 25±2°C, Standard Discharge at 55±2°C.
2.5.3	Capacity at -20°C	*≥196.0Ah	Standard Charge at 25±2°C, Standard Discharge at -20±2°C.

2.6 Safety and Reliability

2.6.1 Description of service conditions: safety test、cycle life test and pack design need to add pre-tightening force, and the range of pre-tightening force of fresh cell is 1500N~5000N.

2.6.2 All test meet GB 38031.

3. Cycle Performance

No.	Parameter	Specification	Condition / Note
3.1	RT Storage performance	Cap.Retention*≥95%	Standard Charge to 100% SOC, storage at 25±2°C for 30 days, discharge 1.0C at 25±2°C
3.2	Cycled Capacity	Cap. Retention*≥196Ah	Within 6000 Cycles, 0.5C charge and discharge, Temp.: 25±2°C 300±50Kgf preload.

4. Product End of Life Management

This cell is designed to service with a finite life time. Client shall develop and implement an active tracking system to monitor and record impedance of each Product in its entire service life. Client and/or its customer shall stop using any of the Products when its impendence exceeds 150% or capacity less than 70% (25°C) of the value when it was fresh. Failure to comply with this requirement shall render GFL’s warranties under the Contract inapplicable, thereby releasing GFL from any liability in connection therewith.

5. Application Conditions

Client shall ensure that the following application conditions in connection with the Products are strictly observed:

5.1 A reasonable number of thermal sensors shall be installed by Client in proximity each Product in use to sense and measure Cell Temperature. Client shall make use of this sensor to monitor and record Cell Temperature throughout the entire service life of such cell. The Cell Temperature is a critical parameter for determining whether Client shall be entitled to GFL’s warranties under the Contract.

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5.2 Client shall procure that each Product shall be used under the strict monitor, control and protection by the Battery Management System to be incorporated by Client.

5.3 Client shall provide detailed information of the BMS, including but not limited to its design, features, setting, and data file format to GFL for design review and record keeping.

5.4 Once the detailed information of the BMS has been reviewed and agreed by GFL, Client shall not modify or change the design, features, setting or data file format of the BMS without the prior written agreement by Client.

5.5 Client shall keep complete 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 will be used in the determination and judgment of any product warranty and liability claim entitlement. No warranty or liability claim will be considered without a complete set of BMS monitoring records capturing the entire service life of the relevant Product.

5.6 The BMS shall include the following monitoring and control features as a minimum requirement.

No.	Parameter	Specification	Action
5.6.1	Stop charging	3.65V maximum	Stop charging when cell voltage reaches 3.65V
5.6.2	1st Overcharge protection	≥3.69V	Stop charging when cell voltage reaches 3.69V
5.6.3	2nd Overcharge protection	≥3.80V	When cell voltage reaches 3.80V, lock up BMS until technical trouble shooting
5.6.4	Stop discharging	2.50V minimum	When cell voltage falls lower than 2.50V, decrease the current to a minimum
5.6.5	1st Over discharge protection	2.40V minimum	When cell voltage falls lower than 2.40V, decrease the current to a minimum
5.6.6	2nd Over discharge protection	2.00V minimum	When cell voltage falls lower than 2.00V, lock up BMS until technical trouble shooting
5.6.7	Short circuit protection	No short circuit allowed	Disconnect cell terminals by over-current protector or internal fuse when short circuit occurs

5.6.8	Over current protection	See paragraph 2.3	Limit discharge current by BMS to values within specification
5.6.9	Overtemperature protection	See paragraphs 2.2 and 2.3	Stop charging and discharging when temperature exceeds specification
5.6.10	Charging time out limit	The charging time is within 8 hours	Stop charging if changing time exceeds 8 hours

Note: The above No. 5.6.2,5.6.3, 5.6.5, 5.6.6 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 GFL shall not take any responsibility for the damage in connection therewith.

5.7 Prevent draining any Product down to over discharge state. A Product may be permanently damaged internally when the Products voltage is lower than 2.00V and therefore should be strictly prohibited, failing which GFL's warranties under the Contract shall cease to apply, thereby releasing the GFL from any liability in connection therewith. After discharge cut- off in accordance with paragraph 2.3.5, internal power consumption of the system should be reduced to a minimum to prolong the idle time before recharge. Client undertakes to educate the users of the Products or other parties who may come to handle the Products to recharge the Products at minimum time intervals to prevent reaching the over discharge state.

When the Products are intended to be stored for a prolonged period of time (more than one month), reduce SOC to around 50%. After three months of 50% SOC storage, should be charged and discharged once, reduce SOC to around 50%. 50% SOC storage lasts for more than 6 months, irreversible capacity loss will be about 4% without charge-discharge maintenance. If 50% SOC storage exceeds 9 months without charge and discharge maintenance, GFL will not be responsible for quality protection due to capacity loss or other defects.
Method of storage maintenance to 50%SOC:
Discharge at the rated current or power to the minimum cut-off voltage specified by the system manufacturer.
Charge at the rated current or power to the maximum cut-off voltage specified by the system manufacturer.
Discharge at the rated current or power to the minimum cut-off voltage specified by the system manufacturer.
Charge to 50% of the rated capacity of the system with the rated current or power specified by the system manufacturer.

5.9 Prevent charging the Products at a temperature which is not allowed under the specification hereunder (including standard charge, optional fast charge, emergency charge and regeneration), otherwise unnecessary degradation of the capacity of the Products may occur. Follow the specification on minimum charging and regeneration temperature and use the BMS to control it. Charging at temperature lower than the specification hereunder shall render GFL's warranties under the Contract inapplicable, thereby releasing GFL from any liability in connection therewith.

5.10 The heat dissipation of the Products should be fully considered in the design of the battery system. Because of the overheating damage of the Products caused by the heat dissipation design of the battery system. GFL will not responsible for quality assurance.

5.11 The problem of waterproof and dust-proof of the battery system should be fully considered. The battery system must meet the waterproof and dust-proof grades stipulated by the relevant national standards. GFL are not responsible for quality assurance due to damages (such as corrosion, rust, etc.) of Products caused by waterproof and dust-proof problems.

5.12 It is forbidden to mix different P/N Products in the same battery system (or vehicle), otherwise GFL will not responsible for quality protection.

6. Safety Precautions

6.1 Do not immerse cells into water.

6.2 Do not drop cells into fire or expose them to any high temperature environment exceeding operation temperature as set out in the specification, otherwise fire hazards may present. At all time, Cell Temperature should not exceed 60°C, shut down system by BMS when it occurs.

6.3 Do not short circuit cell terminals, otherwise high current and temperature may cause body injury or fire hazards. Metallic cell terminals are exposed from plastic packaging and ample safety precautions should be implemented to avoid short circuiting them during system integration or connections.

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

6.5 It is extremely dangerous to overcharge a cell which may cause overheating and fire hazards. Multiple level of fail safe overcharge protection should be implemented in a BMS. See paragraph 5.6.3 for minimum requirement to be adopted by the BMS for protection. See also paragraph 6.11.

6.6 Normal charging should finish within a charging time out limit as set out in paragraph 5.6.10. When charging continues longer than charging time out limit, it tends to overheat the cells which may cause overheating and fire hazards. A timer should be implemented in the charger circuit and set up properly. In case charging does not terminate normally within charging time out limit, ensure that the timer will intervene and stop the charging. See also paragraph 6.11.

6.7 Products 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.

6.8 Do not service cells and electrical connections within plastic package of cell. Improper electrical connection within a cell may cause overheating in service.

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6.9 In the event of electrolyte leakage, avoid contacting electrolyte with skin or eyes. In case come into contact, wash affected area with large amount of water and seek medical help. Do not swallow any parts or substances within a cell.

6.10 Protect cells from mechanical shock, impact and pressure. Internal electrical circuit may short circuit to generate high temperature and fire hazards.

6.11 When cells charging is terminated improperly for reasons such as exceeding allowable charging time, cut-off due to exceeding charging voltage or cut-off due to exceeding charging current, all these events are defined as 'improper charge termination'. Such event may indicate that there is current leaking within a cell system or some components have started to malfunction and subsequent charging of such cell system without finding and fixing root cause of problem may cause potential overheat or fire hazards. 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 vehicle to dealer 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'.

6.12 Performing tests may result in fire or explosion of the Products. Such tests shall only be performed in qualified laboratories by qualified personnel with proper safety precautions taken. Running these tests in an improper way may result in severe personal body injury or property damages.

6.13 The usage of the cells without a BMS or similar System is strictly prohibited.

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7. Disclaimer

7.1 If the product demand company is not used according to the regulations in the specification, the social influence is caused, and the reputation of the GFL is influenced, the GFL will be investigated for the responsibility of the requirement unit. According to the degree of influence on the GFL, the product demand company needs to provide compensation for the GFL.

7.2 GFL reserves the right to modify the specifications and performance parameters of the product. The buyer needs to confirm the latest status of the GFL in advance before ordering the GFL product.

7.3 English specifications are for reference only. Please refer to the technical specifications of the Chinese version.

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8. Hazard Warning

8.1 Warning statement

WARNING

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.

8.2 Types of Hazards

Client acknowledges the following potential hazards in connection with the usage and handling of the Products.

8.2.1 Working with battery can expose the handler to chemical, shock and/or arcing hazards. Although a person's body might react to contact with direct current voltage differently than from contact with alternate current voltage, Client shall take a conservative position and consider the risk of shock or electrocution to be the same for both alternate current and direct current exposures greater than 50 volts.

8.2.2 Cells expose its handler to chemical hazards associated with the electrolyte used in the cell.

8.2.3 When selecting work practices and personal protective equipment, Client and its employees shall consider potential exposure to these hazards and therefore prevent accidental short-circuit that can result in electrical arcing, explosion, and/or 'thermal runaway' of the cells.

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9. Mechanical Drawing