EVE Energy Co., Ltd
Product Specification

File No	:	LF90-73103
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Product name	:	LFP Power Battery
Model name	:	LF90
Specification	:	3.2V 90Ah
Draft	:	Yong Zhang 2019.12.02
Checked	:	Si Huang 2019.12.02
Approved	:	ZhengZhong LYU 2020.11.7
Customer Approved	:	

Mail : sales@evebattery.com

Address : No .68 Jingnan Avenue, Jiaodao District, Jingmen High-tech Zone, Jingmen City, Hubei Province.

History of specification

Date	Contents	Remarks
2019-05-01	First issue	A
2019-07-26	Improving initial capacity	B
2019-09-27	Improving design capacity	C
2019-12-02	Revising /new technical requirements	D

Contents

1. Scope

This specification is applied to Rechargeable LFP Power Battery with aluminum shell (3.2V 90Ah) manufactured by EVE Energy Co., Ltd., in which the description and model, main performance, test conditions and precautions of the product are included.

The product can be applied for Vehicle power supply, Storage system, etc.

2. Description and Model

2.1 Description: LFP Li-ion Power Battery with aluminum shell.

2.2 Model: LF90

3. General Technical Parameter

#	Item		Parameter	Remark
1	Nominal Capacity		90.0 Ah	(25±2)℃, Standard charge and discharge
2	Typical Voltage		3.2V	
3	AC Impedance Resistance(1KHz)		≤0.5mΩ	
4	Standard charge and discharge	Charge / discharge current	1C/1C	(25±2)℃
		Cut off voltage of charge / discharge	3.65V/2.5V	
5	Maximum charge / discharge current	Continuous charge / discharge	1C/1C	According to continuous / pulse charge and discharge ammeters
		Pulse charge / discharge (30s)	3C/3C	
6	Recommended scope of SOC		10%～90%	N.A.
7	Charging Temperature		0℃～55℃	According to continuous / pulse charge and discharge ammeters
8	Discharging Temperature		-20℃～55℃	

#	Item		Parameter	Remark
9	Storage temperature	Short term (within 1 month)	-20℃~45℃	N.A.
		Long term (within 1 year)	0℃~35℃	
10	Storage humidity range		<95%	
11	Self-discharge rate per month		≤3%/month	Temperature: (25±2)℃, Storage scope of SOC: 30%~50%SOC
12	Dimension	Width	130.3 ±0.3mm	Refer to Appendix I
13		Thickness(30% SOC)	36.7 ±0.5mm	
14		High（total）	200.5 ±0.5mm	
15		High（subject）	195.5 ±0.5mm	
16		Tabs Distance	67.0±1.0mm	
17	Battery weight		1994±50g	

4. Test conditions

4.1 Test environment conditions

Temperature: 25±2℃

Relative humidity (RH): 15~90%

Atmospheric condition: 86KPa~106KPa

4.2 Standard Charge

The standard charge means charging the cell with charge current 1.0CA and constant voltage 3.65V at (25±2)℃, 0.05C cutoff.

4.3 Standard Discharge

The standard discharge means discharging the cell with discharge current 1.0CA and cutoff voltage 2.5V at (25±2) ℃.

5. Main Performance

5.1 Electrical performance

No.	Item	Requirements	Measuring Procedure
1	Rate discharge performance at 25℃	Discharge capacity/nominal capacity×100% A) 0.5CA ≥100% B) 1.0CA ≥100%	After standard charge and 1h rest, discharge to 2.5V cutoff with the current of 0.5 C(A), 1.0C(A), respectively. If the discharge capacity fails to meet the technical requirements, this test is allowed to be repeated three times
2	Discharge performance at different temperature	Discharge capacity/nominal capacity×100% A)55℃≥95% (Cutoff 2.5V) B)-20℃≥70% (Cutoff 2.0V)	Measure the initial capacity and state of the battery: A) after standard charge and 5h rest at 55℃, discharge to 2.5V cutoff with the current of 1.0C(A); B) after standard charge at 25±2℃ and 24h rest at -20℃±2℃, discharge to 2.0V cutoff with the current of 1.0C(A).
3	The capacity retention and recovery at 25℃	Capacity Retention≥95% Capacity Recovery≥97%	Measure the initial capacity and state of the battery, after standard charge and stored for 28 days, discharge to 2.5V cutoff with the current of 1.0C(A), calculate the remaining capacity, the retention can be expressed as a percentage of nominal capacity. After standard charged and 30mins rest, calculate the discharging capacity (Ah), the recovery can be expressed as a percentage of nominal capacity. The recovery is measured with discharge current 1.0CA with 2.5V cut-off at (25±2) ℃.
4	cycle life at 25℃	≥6000 cycle @1C/1C	Under the 300kgf clamp, after standard charged and 30mins rest, discharge to 2.5V cutoff with the current of 1.0C (A) at (25±2) ℃, and then start the next cycle, end with the capacity decreasing to 80% of the initial capacity. The number of cycles is defined as the cycle life of the battery.
5	cycle life at 45℃	≥2500 cycle @1C/1C	Under the 300kgf clamp, after standard charged and 30mins rest, discharge to 2.5V cutoff with the current of 1.0 C (A) at (45±2) ℃, and then start the next cycle, end with the capacity decreasing to 80% of the initial capacity. The number of cycles is defined as the cycle life of the battery.

6	End of life management	capacity/nominal capacity <70%	During the use of the battery, the battery shall be stopped when the end of life regulations are exceeded.

5.2 Safety performance

No.	Item	Requirements	Measuring Procedure
1	Over Discharge	No fire、No explosion、No leakage	Reference: GB / T 31485-2015《safety requirements and test methods of power battery for electric vehicles》
2	Over Charging	No fire、No explosion	
3	Short-Circuit Test	No fire、No explosion	
4	Drop Test	No fire、No explosion、No leakage	
5	Heating	No fire、No explosion	
6	Extrusion Test	No fire、No explosion	
7	Nail Pricking	No fire、No explosion	
8	seawater immersion	No fire、No explosion	
9	Temperature cycling	No fire、No explosion、No leakage	
10	Low pressure test	No fire、No explosion、No leakage	

6. Transportation

Battery for shipping should be packed in boxes with the State of charge(30%~50%SOC). The Violent vibration, impact extrusion, sun and rain should be prevented during shipping.

7. Storage

Batteries should be stored (more than 1 month) indoor with a dry and clean environment at 0 ℃~35 ℃.

Avoiding contact with corrosive substances and staying away from fire and heat source. The battery should be charged and discharged every 6 months. The SOC for storage is between 30% ~ 50% .

8. Points for attention

1. When the battery is charged and discharged, the conditions for monitoring and protecting the battery voltage, current and temperature shall be ensured.
2. Please keep the battery away from the heat source, fire source and other corrosive environments such as heating, strong acid and strong alkali.
3. Do not short circuit the battery or install it with incorrect polarity at any time, otherwise it can cause serious damage to the battery and cause danger.
4. Do not mix batteries of different models or manufacturers.
5. Do not use external force to make the battery fall, impact or puncture. Do not disassemble the battery or change the external structure.
6. When the battery is not used for a long time, please keep the battery in the state of 30%-50% SOC, and avoid the environment of strong direct sunlight or high temperature and humidity.
7. When operating the battery, it is necessary to wear rubber gloves and other protective devices.
8. In case of leakage, smoke or damage of battery, please stop using immediately and contact our company for handling.

Appendix Ⅰ: Two-dimensional graphs of Battery:

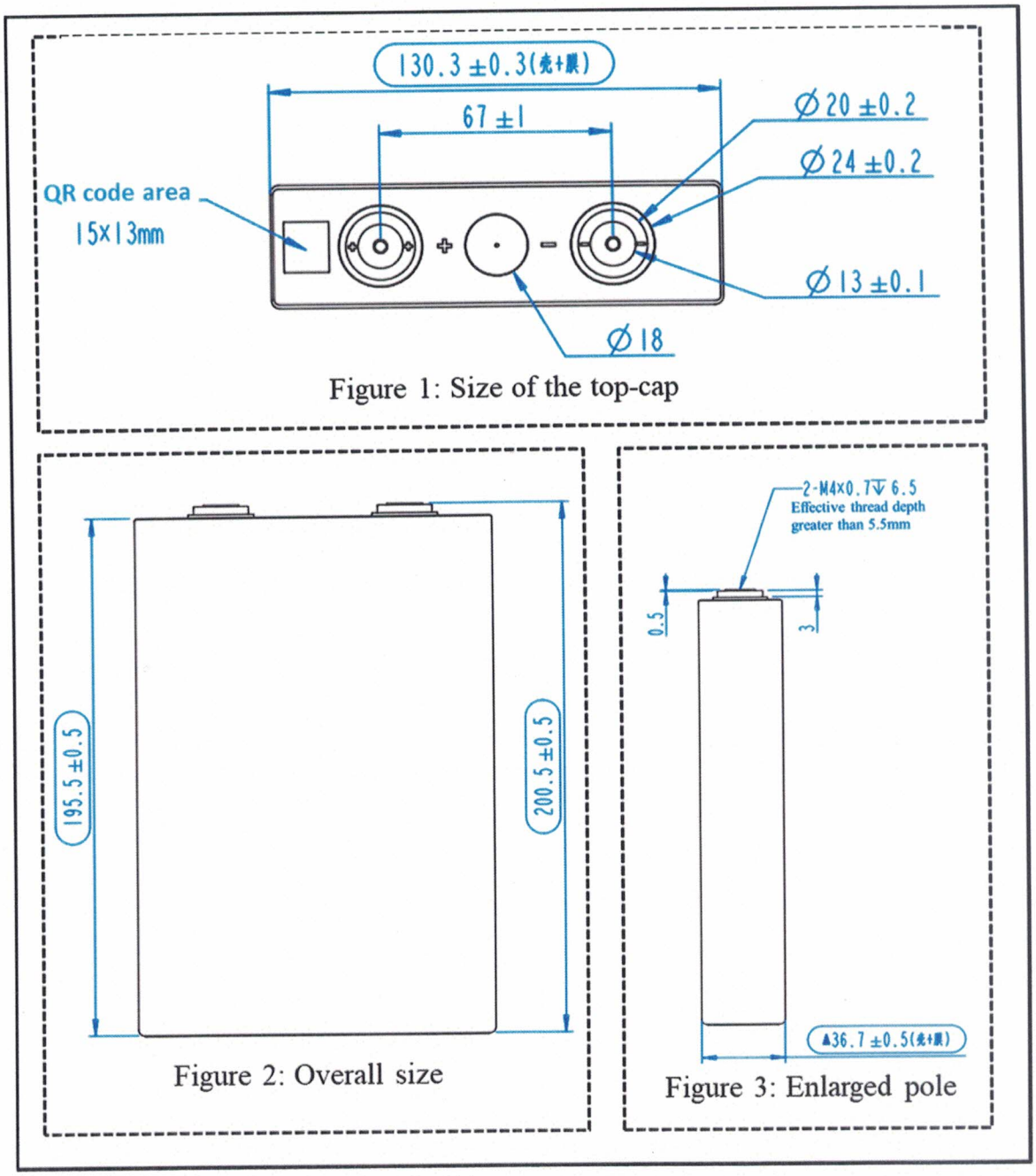


Figure 1: Size of the top-cap

Figure 2: Overall size

Figure 3: Enlarged pole

Appendix Ⅱ : Battery coding rules:

89C0000001

0000001: No.18 – 24, serial number of the same model produced on the same day

89C: No. 15 - 17 manufacture date , Sep 12, 2018,

02YCB64117400J

J: No.14, production address, J: Jingmen, H: Huizhou

117400: No.8 - 13, traceability code, 11/12: Q1 factory , production line 11/12, and so on, 74: the last two number of task oeder

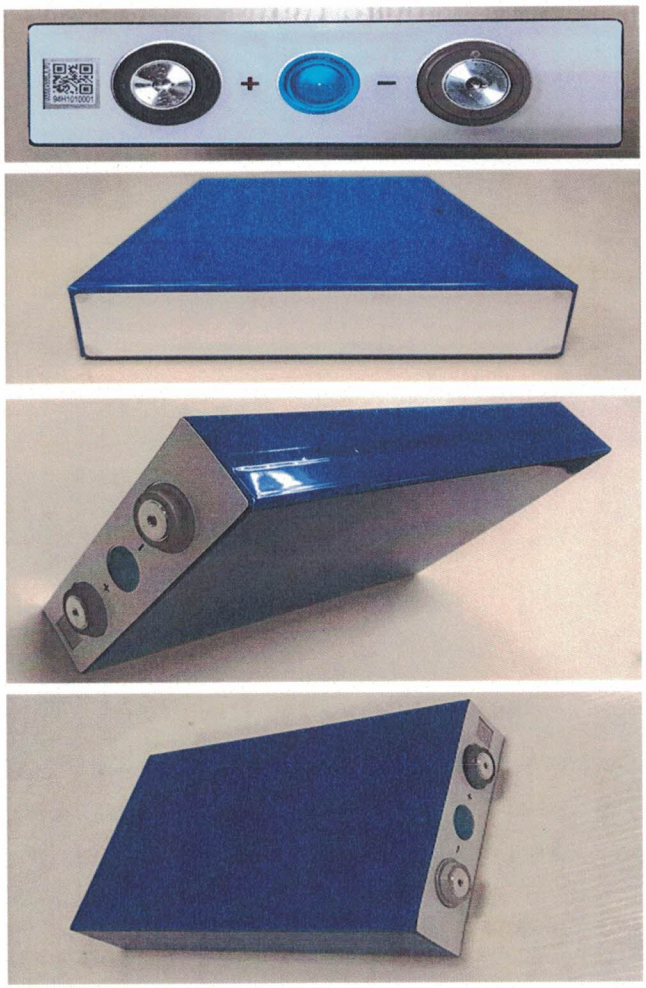
64: No. 6-7, code of cell specification , LF90 cell

B: NO.5, code of cell type , $LiFePo_4$

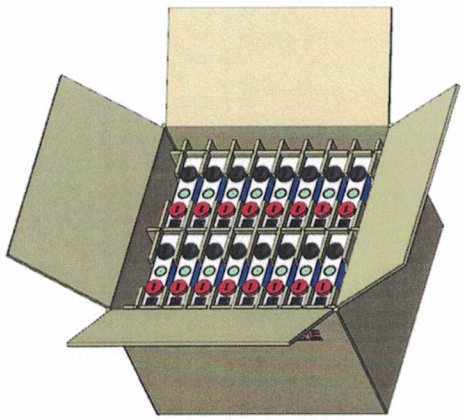
C: NO.4, code of production type , cell

02Y: No.1-3, vendor code, Jinquan; 04Q, EVE

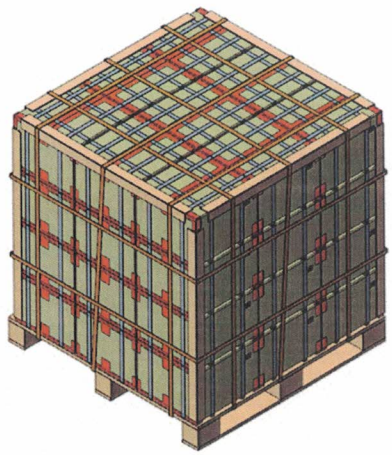
Appendix Ⅲ: photos of battery appearance:



Appendix IV: battery packaging drawing



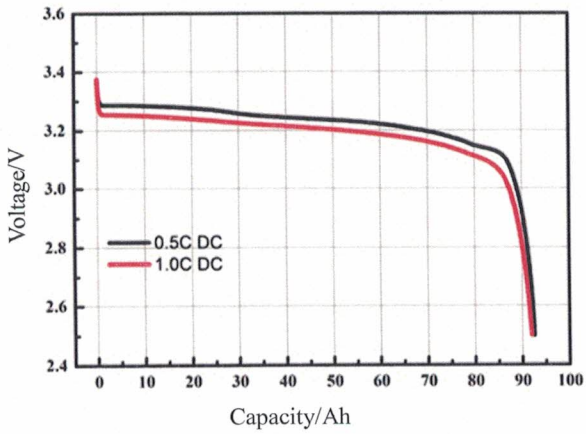
Length*width*height: 420*343*255mm



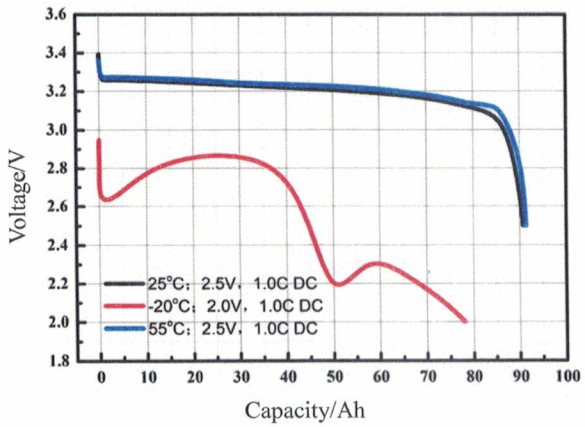
Length*width*height: 1300*1100*1140mm

Appendix V: electric performance curve:

1、Rate discharge curve at 25 ℃



2、Discharge curve at different temperatures



3. Cycle curve (charge/discharge: 1C/1C, 3.65V-2.5V)