ENERGY VERY ENDURE

Specification for Lithium-ion Rechargeable Cell

锂离子电芯规格

Cell Type: C40

Document No.	**RD-C40-S01-LF**	**Effective Date**	**2021.08.05**
Edition 版本	**C**	**Pages**	**14**

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Catalogue

1. Preface

This Product Specification describes the technique requirements, test procedure and precaution notes of prismatic type Lithium-ion Rechargeable cell to be supplied to customer by HuiZhou EVE Energy Co., LTD.

2. Description（说明）

2.1 Product ： Lithium-ion Rechargeable cell

2.2 Model (Type) 电： C40

2.3 Designation ：

EVE—— C 40

① The letter "EVE" defines Huizhou EVE Energy Co., LTD.

② The letter "C" defines Aluminous Cylindrical Li-ion rechargeable cell.

③ The letter "40" defines the diameter of the cell.

3. Cell Size（电芯尺寸）

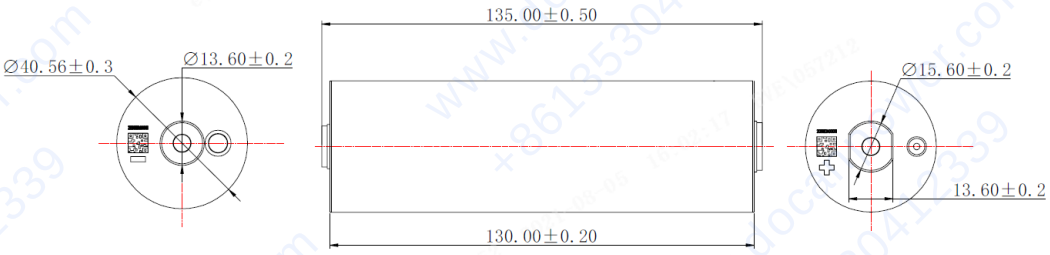

Figure A

4. Construction

A cell is made of cathode, anode, separator, aluminum can, cathode plate and anode plate etc.

5. Specification

Item		Specification			Remarks
5.1	Capacity@3.65~2.5V	Nominal Capacity	20000	mAh	0.33C discharge
		Minimum	19500	mAh	0.33C discharge
5.2	AC-IR		≤3	mΩ	AC 1 kHz, 50%SOC
5.3	Cell Weight		364±10	g	
5.4	End-of-charge Voltage		3.65	V	
5.5	End-of-charge Current		1000	mA	0.05C
5.6	End-of-discharge Voltage		2.5 2.0	V	T＞0℃ T≤0℃
5.7	Standard Charging current		10000	mA	Temperature gradient charging scheme
5.8	Fast charge		20000	mA	1C
5.9	Standard Discharge current		10000	mA	0.5C
5.10	Max Continuous Discharge current		60000	mA	3C

Item		Specification			Remarks
5.11	Operating Temperature Range（surface temperature of cell）	Charging Temp.	0~5	℃	≤5000mA
			5~10	℃	≤6000mA
			10~15	℃	≤8000mA
			15~45	℃	≤10000mA
			45~55	℃	≤10000mA
		Discharging Temp.	-20~60	℃	
		Storage Temp.	-20~50	℃	≤1 month
			-20~45	℃	≤3 months
			0~20	℃	≤1 year
		Storage Humidity	≤70	% RH	
5.12	Appearance	Without break, scratch, distortion, contamination, leakage and so on			
5.13	Cell Dimension	Diameter: Φ40.56 ± 0.3 mm（coated） Height : 135.0 ± 0.5 mm（pole contained）			

Note：Temperature gradient charging scheme

	SOC	Temperature Gradient				
		0℃~5℃	5℃~10℃	10℃~15℃	15℃~45℃	45℃~55℃
Charge Current	100%	0.05C	0.05C	0.05C	0.05C	0.05C
	90%	0.15C	0.3C	0.4C	0.5C	0.5C
	80%	0.25C	0.3C	0.4C	0.5C	0.5C
	70%	0.25C	0.3C	0.4C	0.5C	0.5C
	60%	0.25C	0.3C	0.4C	0.5C	0.5C
	50%	0.25C	0.3C	0.4C	0.5C	0.5C
	40%	0.25C	0.3C	0.4C	0.5C	0.5C
	30%	0.25C	0.3C	0.4C	0.5C	0.5C
	20%	0.25C	0.3C	0.4C	0.5C	0.5C
	10%	0.25C	0.3C	0.4C	0.5C	0.5C
	0%	0.25C	0.3C	0.4C	0.5C	0.5C

6. Test Conditions

6.1 Standard Test Conditions

Unless otherwise specified, all tests stated in this Product Specification should be conducted at temperature 25℃±2℃ and humidity 65%±20% RH.

6.2 Standard Charge Method

The "Standard Charge" means charging the cell at a constant current of 0.5C until the voltage is 3.65V, then charged at a constant voltage of 3.65V until its current is less than 0.05C. For test purpose, charging shall be performed at 25℃±2℃

6.3 Standard discharge method

The "Standard Discharge" means discharging the cell at a constant current of 0.5C until the voltage is 2.5V. For test purpose, discharging shall be performed at 25℃±2℃

7. Electrical Characteristics

	Test Item	Test Method	Criteria					
7.1	Discharge Rate Capabilities	The cell is measured with the various discharge currents in right table to the cut-off voltage after the standard charge.（2.5V）	Discharge Condition					
			Discharge Current	1C		2C		
			Relative Capacity Rate of 0.33C	≥95%		≥90%		
7.2	Temperature Dependence of Discharge Capacity	The cell is measured with discharge constant current of 1C to 2.5V with follow discharge temperature and rest for 6h after the standard charging.	Discharge Temperature	-20℃	-10℃	0℃	25℃/ 45℃	60℃
			Standing Time	12h	12h	12h	6h	6h
			Relative Capacity	⩾ 70%	⩾ 85%	⩾ 90%	⩾ 100%	⩾ 95%
7.3	100% SOC Temperature Charge Retention and Regain 100% SOC	Capacity after storage at certain time and temperature after the standard charged measured with discharge current of 0.5C to cut-off voltage.Then capacity after 0.5C charge and 0.5C dischage for 3 cycles.	Storage Condition	Retention		Regain		
			30d，25℃	⩾95%		⩾97%		
			28d，45℃	⩾90%		⩾95%		
			28d，60℃	⩾85%		⩾90%		

	Test Item	Test Method	Criteria
7.4	Normal Temperature Cycle Life	Each cycle is an interval between 0.5C charges to 3.65V with 0.05C cut-off and 0.5C discharge with 2.5V cut-off at 25℃±2℃. Capacity after 2000cycles.	After 2000 cycles, Capacity retention≥70% Initial capacity
7.5	45℃ Cycle Life	Each cycle is an interval between 0.5C charges to 3.65V with 0.05C cut-off and 0.5C discharge with 2.5V cut-off at 45℃±2℃. Capacity after 1000cycles at 25℃.	After 1000 cycles,Capacity retention≥70% Initial capacity

8. Safety Test

All below tests are carried out on the equipment with forced ventilation and explosion-proof device. Before test, all cells should be charged in accordance with 6.2, and stored 24h prior for testing.

Test Item		Test Method	Criteria
8.1	Drop Test	A fully charged cell drop onto the cement floor from 1.5m height t in a vertical direction, then observed for 1h.	No explosion, no fire
8.2	Crush Test	A cell is to be crushed between two flat surfaces. The force for the crushing is to be applied by a hydraulic ram or similar force mechanism. The flat surfaces are to be brought in contact with the cells and the crushing is to be continued until an applied force of 13±1 KN is reached. Once the maximum force has been obtained is to be released.	No explosion, no fire
8.3	Heating Test	A cell is to be heated in a gravity convection or circulating air oven. The temperature of the oven is to be raised at a rate of 5 ℃±2 ℃ per minute to a temperature of 130 ℃±2 ℃ and remain for 30 min and observed 1h.	No explosion, no fire
8.4	Sea Water Immersion Test	The cell was immersed in 3.5%Nacl solution (mass fraction, simulated seawater composition at normal temperature) for 2h.	No explosion, no fire
8.5	Low Pressure Test	The cell cell was placed in a low pressure box, the pressure in the test box was adjusted to 11.6kPa, the temperature was room temperature, then standing and observed for 1h.	No explosion, no fire, no leakage

Test Item		Test Method	Criteria
8.6	Over-discharge Test	Constant discharge with 1C current for 90min ， then observed for 1h.	No explosion, no fire, no leakage
8.7	Over-charge Test	以 1C 电流恒流充电至达到企业规定的充电终止电压的 1.5 倍，或充电时间达到 1.5h 后停止充电。	No explosion, no fire
8.8	Short-circuit Test	Short-circuit the standard charged cell by connecting positive and negative terminal by less 5 mΩ wire, until the cell case temperature has returned to be 20% less then peak temperature.	No explosion, no fire

9. Shipment

The capacity of delivery cell is approximately at 30% of charging. It is not specified more than 30% capacityremain at customer, because of self-discharge. During transportation, keep the cell from acutely vibration, impacting, solarization, drenching.

10. Warranty

The warranty period of cell is made according to business contract. However, even though the problemoccurs within this period, EVE won't replace a new cell for free as long as the problem is not due to the failure of EVE manufacturing process or is due to customer's abuse or misuse.

＞ EVE will not be responsible for trouble occurred by handling outside of the precautions in instructions.

＞ EVE will not be responsible for trouble occurred by matching electric circuit, cell pack and charger.

＞ EVE will be exempt from warrantee any defect cells during assembling after acceptance.

11. Precautions and Safety Instructions

Lithium-Ion rechargeable batteries subject to abusive conditions can cause damage to the cell and/or personal injury. Please read and observe the standard cell precautions below before using utilization.

Note 1. The customer is required to contact EVE in advance, if and when the customer needs other applications or operating conditions than those described in this document.

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Note 2. EVE will take no responsibility for any accident when the cell is used under other conditions than those described in this document.

11.1 Standard Cell Precaution

a. Do not expose the cell to extreme heat or flame.

b. Do not short circuit, over-charge or over-discharge the cell.

c. Do not subject the cell to strong mechanical shocks.

d. Do not immerse the cell in water or sea water, or get it wet.

e. Do not reverse the polarity of the cell for any reason.

f. Do not disassemble or modify the cell.

g. Do not handle or store with metallic like necklaces, coins or hairpins, etc..

h. Do not use the cell with conspicuous damage or deformation.

i. Do not connect cell to the plug socket or car-cigarette-plug.

j. Do not make the direct soldering onto a cell.

k. Do not touch a leaked cell directly.

l. Do not use for other equipment.

m. Do not use Lithium-ion cell in mixture.

n. Do not use or leave the cell under the blazing sun (or in heated car by sunshine).

o. Keep cell away from children.

p. Do not drive a nail into the cell, strike it by hammer or tread it.

q. Do not give cell impact or fling it.

11.2 Cell Operation Instruction

11.2.1. Charging

a. Charge the cell in an ambient temperature range of 0 ℃ to 55 ℃.

b. Charge the cell at a constant current of 10000mA until 3.65V is attained. Charge rates greater than 10000mA are not recommended.

c. Maintain charge voltage at 3.65V for 1hour (recommended for maximum capacity).

* Cell must be charged with constant current-constant voltage method.

* Do not continue to charge cell over specified time.

11.2.2. Discharging

a. Recommended cut-off voltage to 2.5V. Recommended max continuous discharge current is 60000mA.

b. For maximum performance, discharge the cell in an ambient temperature range of -20 ℃ to 60 ℃.

11.2.3. Storage Recommendations

a. Short Period Storage

- Storage the cell at temperature of -20℃ ~ 45℃（less than 3 months）, low humidity and no corrosive gas atmosphere.

- No press on the cell

b. Long Period Storage

- In case of long period storage (more than 3 months), storage the cell at temperature range of 0℃ ~ 25℃, low humidity, no corrosive gas atmosphere.

- No press on the cell

12. Consultation （

As to the obscurity, contact the following:

Address: HuiZhou EVE Energy Co., Ltd.—EVE Industrial Park on No.38,Huifeng 7th Road, Zhongkai Hi-Tech Zone, Huizhou

Tel No.: 86-755-3270571

Fax No.: 86-752-2606033

Website: http://www.evebattery.com.cn

13. Requirement for Safety Assurance

For the sake of safety assurance, please discuss the equipment design, its system and protection circuit of Lithium-ion cell with EVE in advance. And consult about the high rate current, rapid charge and special application in the same way.