



Specification Approval Sheet

Name: Cylindrical Lithium Ion Cell

Model: 30286-0

SPEC: 14500-750

Approved By	Checkup	Make

Customer Confirmation	Signature	Date
	Company Name :	
	Stamp :	

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Content

1 Revision History.....	3
2 Scope.....	4
3 Initial Dimension.....	4
4 Product Specification.....	5
5 Electrical Performance.....	6
6 Safety Performance.....	7
7 Safety Instructions.....	8
7.1 Protection Function.....	9
7.2 Danger.....	8
7.3 Warning.....	9
7.4 Caution.....	9
8 Guarantee Period of Quality.....	10
9 Others.....	10



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1 Revision History

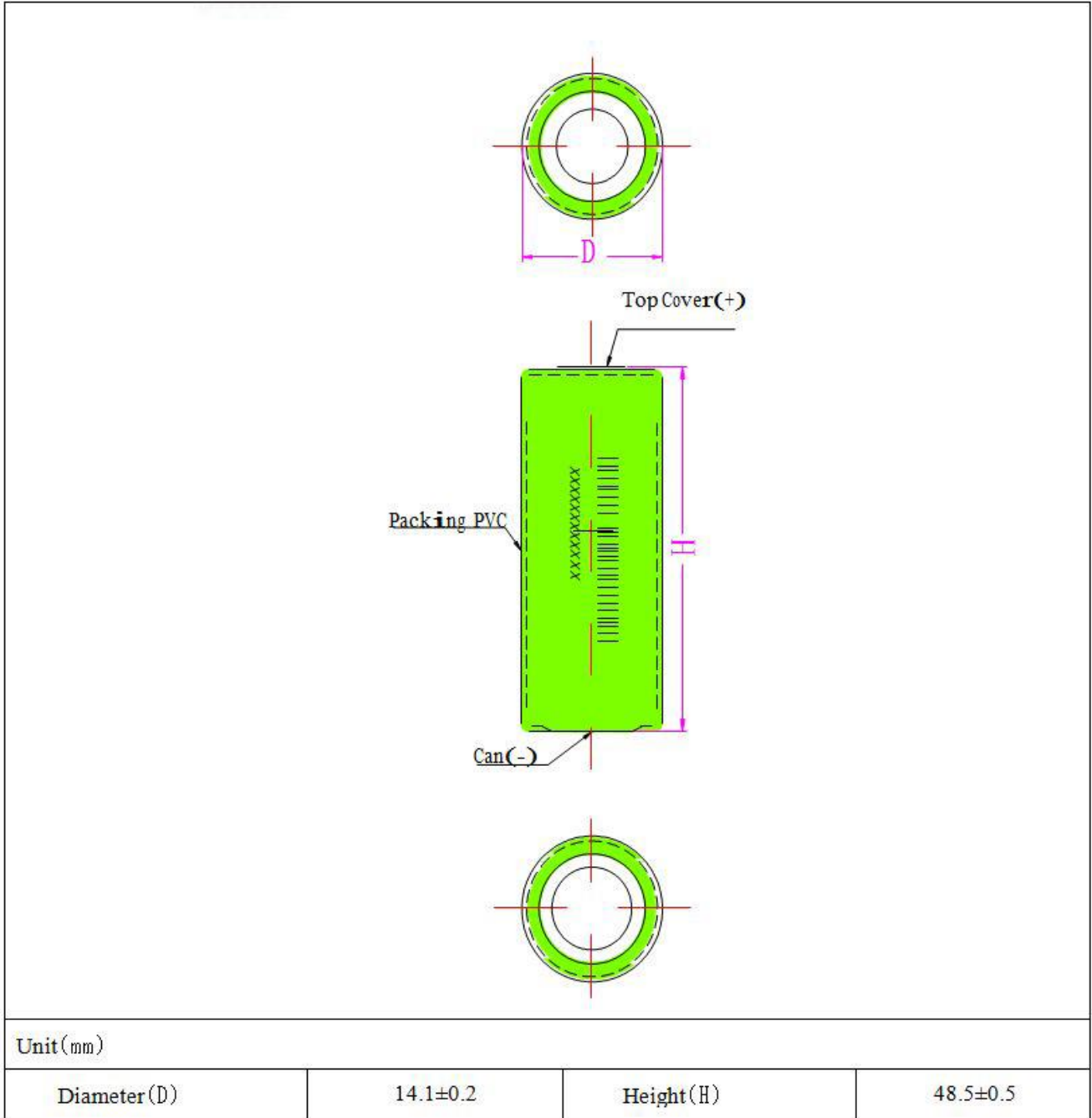
Product Revision History

REV.	S.No.	Date	Mark	Revision Description	Originator
A0	1	2010-5-26	/	First issue	
A1	2	2015-6-19	/	Updated format, added drawing, specified min. cap	
A2	3	2017-7-20	/	Updated format added max discharge data	
A3	4	2018-8-30	/	Model update	

2 Scope

This specification is made to describe the product, product characteristics and performance, relevant measurement conditions and methods, and safety Instructions of the Cylindrical Lithium ion cell as specified in following details. The specification only applies to Tenergy Corporation.

3 Initial Dimension





4 Product Specifications

NO.	Items	Specifications	Remark
4.1	Capacity	Min. Capacity: 750mAh	Charge the cell as item 4.7 to FC, then discharged by current 0.2C to FD. 1.0C=750mA, nC=n*750mA.
4.2	Open Circuit Voltage	3.70~3.91V	/
	State of Charge	50%-80%	/
4.3	Initial Internal Impedance	≤70mΩ	/
4.4	Weight	Approx. : 19g	/
4.5	Voltage	Nominal Voltage: 3.60V	/
		Fully Charge (FC) Voltage: 4.20V	
		Fully Discharge (FD) Voltage: 3.00V	
4.6	Standard Charge Current	0.5 C	/
4.7	Standard Charge Method	0.5C CC (constant current) charge to FC Voltage, then CV (constant voltage) charge till charge current decline to 0.01C.	/
4.8	Charge Time	Approx 3.5 hrs.	With Standard Charge Method.
4.9	Standard Discharge Method	Using 0.2C constant current discharge to FD Voltage.	/
4.10	Max. Continuous Charge Current	0°C~15°C:0.2C	/
		15°C~45°C:1.0C	/
4.11	Max. Continuous Discharge Current	-20°C~60°C:1.0C	/
4.12	Storage Temperature	≤1 month: -20°C~60°C ≤3 months: -20°C~45°C ≤1 year: -20°C~30°C The recoverable capacity no less than 80% of the initial capacity.	The cell should cycle once every 3 months. Recommended storage temperature is 25±2°C of half charge state.
4.13	Storage Humidity	60 ±25%RH	/
4.14	Recoverable Capacity Measurement Method	Charge the cell as per Item 4.7, rest for 10min, constant current 0.5C discharge to FD Voltage, rest for 10min. Repeat above steps 3 times, record the maximum capacity.	/



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4.15	Cosmetic Appearance	No dirt, No rupture, No leakage.	/
4.16	Standard Testing Condition	Temperature: 25±2°C Humidity: 60 ±25%RH Atmospheric Pressure: 86-106 k Pa	/

Note: 1. From 4.1 to 4.11 and 4.14, the testing condition is following 4.16 (standard testing condition).

2. If the working condition is out of 4.16, the performance may have some deviation.

5 Electrical Performance

No.	Items	Test Methods and Condition	Criteria
5.1	Rated Capacity	At item 4.16 condition, charge the cell as per Item 4.7, rest for 10min, then discharge at 0.2C, 0.5C or 1C to voltage FD Voltage, record the discharge time.	0.2C: ≥300min 0.5C: ≥114min 1.0C: ≥54min
5.2	Temperature Characteristics	At item 4.16 condition, charge the cell as per Item 4.7. Stored the recharged cell for 3hrs at 55 ± 2°C, 25±2°C or -10 ± 2°C, and discharged at 0.2C to FD Voltage at the same temp., record the discharge time.	55°C: ≥285min 25°C: ≥300min -10°C: ≥180min
5.3	Cycle Life	At item 4.16 condition, constant current 0.5C charge to FC Voltage, then constant voltage FC Voltage charge to current declines to 0.01C, rest for 10min, constant current 0.5C discharge to FD Voltage, rest for 10min. Repeat above steps 3 times till continuously discharge capacity lower than 80% of the initial capacity of the cell.	Cycle times: ≥300 times
5.4	Store Characteristics	At item 4.16 condition, charge the cell as per Item 4.7. No outer loading circuit store the cell 28days, discharge at 0.2C to FD Voltage, record the discharge time.	≥270min



6 Safety Performance

No.	Item	Test Methods and Condition	Criteria
6.1	Overcharge Test	At item 4.16 condition, charge cells with constant current 3C to voltage 4.6V, then with constant voltage 4.6V till current decline to 0.005C. Charge time no less than 8hrs.	No fire, No explosion
6.2	Short-Circuit Test	At item 4.16 condition, charge the cell as per Item 4.7, then connecting the positive and negative terminals of the cell with a circuit load having a resistance load of $80 \pm 20 \text{ m}\Omega$. The temperature of the battery case is to be recorded during the test. Stop the test until the cell surface temperature has returned to $\pm 10^\circ\text{C}$ of ambient temperature.	No fire, No explosion
6.3	Flat Crush Test	At item 4.16 condition, charge the cell as per Item 4.7. Then the 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' wide sides and the crushing is to be continued until an applied force of $13 \pm 1 \text{ kN}$ ($3000 \pm 224 \text{ lbs}$) is reached. Once the maximum force has been obtained it is to be released, then rest for 1 hrs at $25 \pm 2^\circ\text{C}$.	No fire, No explosion
6.4	Heating Test	At item 4.16 condition, charge the cell as per Item 4.7. Put the cells in the oven, the temperature of the oven is to be raised at $5 \pm 2^\circ\text{C}$ per minute to a temperature of $130 \pm 2^\circ\text{C}$ and remain for 10 minutes.	No fire, No explosion
6.5	Drop Test	At item 4.16 condition, charge the cell as per Item 4.7. Then cells or batteries were dropped from a height of 1m to a concrete surface, each cell or battery is to be dropped once in the positive and negative directions of three mutually perpendicular mounting positions for a total of 6 times, then rest for 1 hr.	No fire, No explosion
6.6	Vibration Test	At item 4.16 condition, charge the cell as per Item 4.7. Cells are firmly secured to the platform of the vibration machine without distorting the cells in such a manner as to faithfully transmit the vibration. A cell or battery is to be subjected to simple harmonic motion with the amplitude for 0.8 mm [1.6 mm total maximum excursion]. The frequency is to be varied at the rate of 1 hertz per minute between 10 and 55 hertz and return in not less than 90 no more than 100 minutes. The cell or battery is to be tested in three mutually perpendicular directions. For a cell or battery that has only two axes of symmetry, the sample is to be tested perpendicular to each axis.	No fire, No explosion
6.7	Low Pressure Test	At item 4.16 condition, charge the cell as per Item 4.7. After standard charge, store for 6h at an absolute pressure of 11.2KPa, next rest for 2hrs at $25 \pm 5^\circ\text{C}$.	No leakage, no fire and no explosion

Remark: Above safety characteristics must be tested with protective equipments.



7 Safety Instructions

The battery contains flammable materials such as organic solvents. Mishandling the battery may cause fire, smoke, or an explosion and the battery's functionality will be seriously damaged. Protection circuitry must be designed into the application device to protect the battery. Additionally, Tenergy Corporation highly recommends adding these instructions to the owner's manual. Please read and check the following prohibited actions.

7.1 Protection Function

The battery shall be with the overcharge protection, over-discharge protection, and over-current protection during using. Protective circuit must have protective functions as follows:

(1) Overcharge protection

Overcharge protection stops charging if any cell of the battery pack reaches 4.25V.

(2) Over-discharge protection

The Over-discharge protection monitors the voltage of any cell in the pack and works to avoid a drop in the cell voltage to 2.8V or less.

(3) Over-current protection

The cell shall be discharged at less than the maximum discharge current specified in the Specification Approval Sheet. A high discharge current may reduce the discharge capacity observably or cause overheating.

7.2 Danger

- Do not immerse the battery in liquid such as water, beverages, or other fluids.
- Do not use or place the battery near a fire, heater or high temperature environment (above 60°C).
- Do not use unauthorized chargers.
- Do not attach or insert battery with polarity reversed.
- Do not connect the battery to an AC outlet or DC automotive plug.
- Do not use the battery in equipment for which it was not intended.
- Do not incineration the battery in fire or heat it.
- Do not short-circuit the battery by directly connecting the positive and negative terminal with metal object such as wire.
- Do not excessive impact to the battery such as striking, throwing, trampling, etc.
- Do not penetrate the battery with a nail or other sharp object.
- Do not disassemble the battery.
- Do not charge the battery at high temperature (>45°C) or discharge it at high temperature (>60°C).



7.3 Warning

- Keep the battery away from small children. If the battery or any of its component parts is swallowed, seek medical attention immediately.
- Do not place the battery in or near a microwave or other cooking appliances. If subjected to heat or strong electromagnetic radiation, the battery may leak, generate heat, smoke, catch fire, or explode.
- Do not mix with other batteries. The battery should not be used with other batteries having a different capacity, chemistry, or manufacturer. Doing so could cause the battery to generate heat, smoke, catch fire, or explode.
- Immediately remove it from the device or charger, and stop using it, if there are noticeable abnormalities, such as smell, heat, discoloration, or deformity. The battery may be defective and could generate heat, smoke, catch fire, or explode with continued use.
- Stop charging if the charge process cannot be finished within the specified time.
- Do not use a leaking battery near open flame.
- Do not touch a leaking battery. If liquid leaking from the battery gets into your eyes, immediately flush your eyes with clean water and seek medical attention. If left untreated, it will cause significant eye damage.
- To prevent short-circuit or damage during transport or store, securely pack the battery in a case or carton. Do not transport and store the battery together with metal objects such as necklaces, hairpins, etc.

7.4 Caution

- Read the manual before use. Keep for future reference.
- Do not use or leave the battery at very high temperature (>60°C, for example, at strong direct sunlight or a vehicle in extremely hot conditions). Otherwise, it can overheat or fire or its performance will be degenerate, and its service life will be decreased.
- Do not use the battery at the place of strong static electricity as it may damage the protection circuit and cause hidden trouble of safety.
- Only charge the battery between 0°C and 45°C. Charging outside of this temperature range may cause the battery to leak, generate heat, or result in serious damage. It may also cause the battery's performance and life to deteriorate.
- Read the charger's manual before use for proper charge method.
- Please contact the supplier if the battery gives off an unusual odor, generates heat, or shows signs of rust prior to its initial use.
- Parents must explain how to use the system and the battery. Please check back periodically to ensure children are using the system and the battery correctly.
- Do not charge or discharge near flammable materials. Doing so could result in fire.
- If electrolyte leaks from the battery and comes into contact with skin or clothing, immediately flush with water. Otherwise, it may cause skin irritation.
- If the battery pack have a system interface consisting of stripped lead wires or exposed contact plates, handle with due care. Temporarily insulate exposed contacts and conductors with an insulator such as polypropylene tape or polyvinylchloride tape. Failure to do so could result in an electrical shock, a short circuit causing the battery to generate heat, smoke, catch fire, or the combustion of other materials.



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- When disposing of the battery, be aware discharged battery may cause fire, tape the terminals to insulate them. Recycle it according to local rules and regulations.
- In case the battery terminals are dirt, clean the terminals with a dry cloth before use. Otherwise power failure or charge failure may occur due to the poor connection with the instrument.
- The batteries should be stored at room temperature, charged to about 40% to 60% of capacity. In case of over-discharge, batteries should be charged to 3.90V with standard charge method for one time every 3 months while storing and batteries should be charge-discharged with standard method for one time after being stored more than one year in order to activate it and restore energy.

8 Others

(1) The customer is requested to contact Tenergy Corporation in advance, if the customer needs other applications or operating conditions out of those described in this document. Additional experimentation may be required to verify performance and safety under such conditions.

(2) Tenergy Corporation will take no responsibility for any accident when the battery is used under other conditions than those described in this Document.

(3) Tenergy Corporation will inform the customer in a written form regarding proper use and handing of the battery, if it is necessary.

(4) Product comply with 《Hazardous substances control standards of Tenergy Green Product》 .

(5) Any matters not mentioned in this specification, shall be negotiated.