



## Specification Approval Sheet

Name : *Lithium Ion Cylindrical Battery*

Model : 30036

SPEC : 18500 1400mAh

Approved By	Checkup	Make

Customer Confirmation	Signature	Date
	Company Name :	
	Stamp :	

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### 1 - Modified list

Product modified record list

Revision	Date	Mark	Modified content	Approved by
A0	2009-11-10	/	NEW RELEASE	
A1	2010-3-3	7	Add PCM	
A2	2010-5-4	5	Nominal Capacity change to Minimal Capacity	

Specifications and data are subject to change without notice. Contact Tenergy for latest information.

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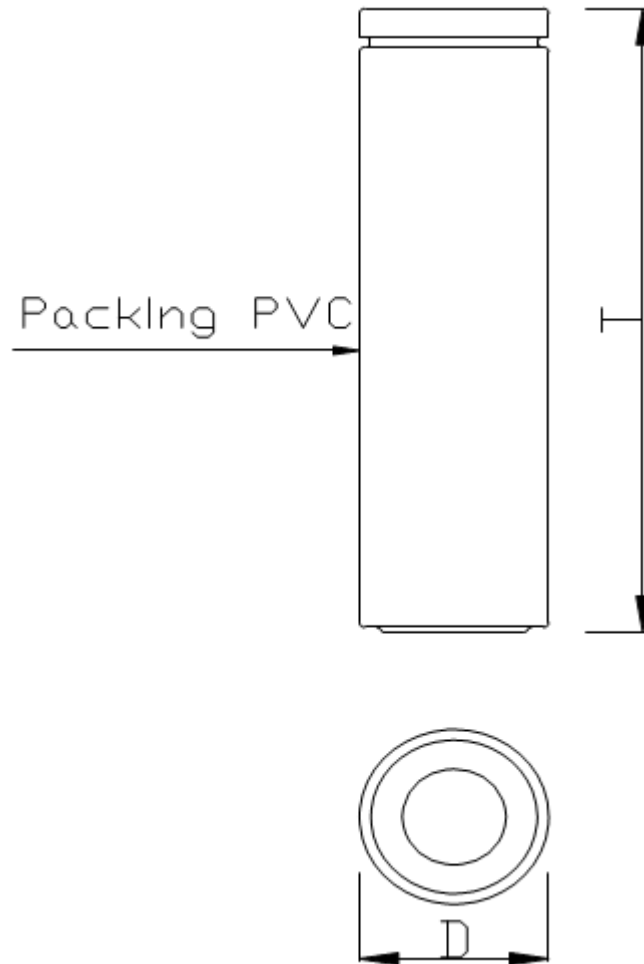
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## 2 .Scope

This specification describes the basic performance, technical requirement ,testing method ,warning and caution of the Li- ion Cylindrical rechargeable battery .The specification only applies to Tenergy Co.

## 3. Initial dimension



T	48.5±0.5	D	18.2±0.2	UNIT	mm
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#### 4.Specification

NO.	Item		Specifications	
4.1	Min capacity		1400mAh      0.2C Discharge	
4.2	Nominal voltage		3.7V	
4.3	Charge current		Standard Charge: 0.2C Rapid charge    : 0.4C	
4.4	Standard charging method		0.5C CC ( constant current ) charge to 4.2V,then CV(constant voltage 4.2V)charge till charge current decline to ≤0.01C	
4.5	Charging time		Standard Charging Approx 5 hours Rapid charge Approx 2 .5 hours	
4.6	Max.charge current		Constant Current 1C Constant Voltage 4.2V 0.01 C cut-off	
4.7	Max.discharge current		Constant current 1C    end voltage3.0V	
4.8	Standard dscharge current		Constant current 0.2 C    end voltage3.0V	
4.9	Discharge lower limit voltage		3.0V	
4.10	Charge upper limit voltage		4.20V	
4.11	Initial impedance		≤80mΩ	
4.12	Weight		Approx: 28g	
4.13	Operating temperature		Charging:                0℃~45℃ Discharging: -20℃~60℃	
4.14	Storage temperature	-20℃~60℃	≤1 month	Percentage of recoverable capacity no less than 80% of the initial capacities
		-20℃~45℃	≤3 month	
		-20℃~20℃	≤1 year	
4.15	Recoverable capacity		Constant current 0.5C charge to 4.2V, then constant voltage charge to current declines to 0.01C, rest for 10min, constant current 0.5C discharge to 3.0V, rest for 10min.Repeat above steps 3 times, recording the maximum capacity	
4.16	Storage humidity		≤75% RH	
4.17	Appearance		Without scratch,distortion,contamination and leakage	
4.18	Standard environmental condition		Temperature                : 23±5℃ Humidity                    : 45-75%RH Atmospheric Pressure: 86-106 Kpa	

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**5 General performance**

No.	Item	Test methods and condition	Criteria
5.1	0.2C Capacity	After standard charging, rest battery for 10min, then discharging at 0.2C to voltage 3.0V, recording the discharging time.	$\geq 300\text{min}$
5.2	1C Capacity	After standard charging, rest battery for 10min, then discharging at 1C to voltage 3.0V, recording the discharging time.	$\geq 54\text{min}$
5.3	Cycle life	Constant current 0.5C charge to 4.2V, then constant voltage charge to current declines to 0.01C, rest 10min, constant current 0.5C discharge to 3.0V, rest 10min. Repeat above steps till continuously discharging capacity Higher than 80% of the Initial Capacities of the Cells	$\geq 300$ times
5.4	Capability of keeping electricity	$20\pm 5^{\circ}\text{C}$ After standard charging, rest the battery 28days, discharging at 0.2C to voltage 3.0V, recording the discharging time.	$\geq 240\text{min}$

**6 Environment performance**

No.	Item	Test methods and condition	Criteria
6.1	Discharge at high temperature	After standard charging, rest the cells 4h at $60\pm 2^{\circ}\text{C}$ then discharging at 1C to voltage 3.0V, recording the discharging time.	$\geq 54\text{min}$
6.2	Discharge at low temperature	After standard charging, rest the cells for 16h at $-20\pm 2^{\circ}\text{C}$ then discharging at 0.2C to voltage 3.0V, recording the discharging time.	$\geq 210\text{min}$
6.3	Thermal shock	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 remains 30 minutes.	No fire, no smoke

**7 Safe characteristic**

No.	Item	Test methods and condition	Criteria
7.1	Over charge testing	At $23\pm 5^{\circ}\text{C}$ charging cells with constant current 3C to voltage 4.6V, then with constant voltage 4.6V till current decline to 0A. Stop test till cells temperature $10^{\circ}\text{C}$ lower than max temperature.	No smoke or fire



7.2	Over discharge testing	At $23\pm5^{\circ}\text{C}$ According to the requirements of standard charge, the cells will be discharge to cut-off voltage, then connect with external load of 30 ohm for 24 hours.	No fire, no smoke, no leakage.
7.3	Short-circuit testing	At $23\pm5^{\circ}\text{C}$ After standard charging, connect cells anode and cathode by wire which impedance less than 50m $\Omega$ , keep 6h.	No smoke or fire

※ Above testing of safe characteristic must be with protective equipment.

## 8. Battery Protection

The battery shall be with the over-charging prevention, over-discharging prevention, and over-current prevention during use. Protective circuit shall have protective functions as follows:

1) Over-charging protection

Overcharging prevention stops charging if any cell of the battery pack reaches 4.25V.

2) Over-discharging protection

The Over-discharging 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 discharging current may reduce the discharge capacity significantly or cause overheating.

## 9. Caution in use

To ensure proper use of the battery please read the manual carefully before using it.

- Handling

- f Do not expose to, dispose of the battery in fire.

- f Do not put the battery in a charger or equipment with wrong terminals connected.

- Avoid shorting the battery

- f Avoid excessive physical shock or vibration.

- f Do not disassemble or deform the battery.

- f Do not immerse in water.

- f Do not use the battery mixed with other different make, type, or model batteries.

- f Keep out of the reach of children.

- Charge and discharge

- f Battery must be charged in appropriate charger only.

- f Never use a modified or damaged charger.

- f Do not leave battery in charger over 24 hours.

- Storage

- f Store the battery in a cool, dry and well-ventilated area.



- Disposal
  - f Regulations vary for different countries. Dispose of in accordance with local regulations.

## **10. Battery operation instruction**

### **10.1 Charging**

Charging current: Cannot surpass the biggest charging current which in this specification book stipulated.

Charging voltage: Does not have to surpass the highest amount which in this specification book stipulated to decide the voltage.

Charge temperature: The battery must carry on the charge in the ambient temperature scope which this specification book stipulated.

Uses the constant electric current and the constant voltage way charge, the prohibition reverse charges. If the battery positive electrode and the cathode meet instead, can damage the battery.

### **10.2 Discharging current**

The discharging current does not have to surpass this specification book stipulation the biggest discharging current, the oversized electric current electric discharge can cause the battery capacity play to reduce and to cause the battery heat.

### **10.3 discharge temperature**

The battery discharge must carry on in the ambient temperature scope which this specification book stipulated.

### **10.4 Over-discharges**

After the short time excessively discharges charges immediately cannot affect the use, but the long time excessively discharges can cause the battery the performance, battery function losing. The battery long-term has not used, has the possibility to be able to be at because of its automatic flashover characteristic certain excessively discharges the condition, for prevented excessively discharges the occurrence, the battery should maintain the certain electric quantity.

### **10.5 Storing the Batteries**

The battery should store in the product specification book stipulation temperature range. If has surpasses above for six months the long time storage, suggested you should carry on additional charge to the battery.



### **11. Period of Warranty**

The period of warranty is half a year from the date of shipment. Tenergy guarantees to give a replacement in case of cells with defects proven due to manufacturing process instead of the customers abuse and misuse.

### **12. Other The Chemical Reaction**

Because batteries utilize a chemical reaction, battery performance will deteriorate over time even if stored for a long period of time without being used. In addition, if the various usage conditions such as charge, discharge, ambient temperature, etc. are not maintained within the specified ranges the life expectancy of the battery may be shortened or the device in which the battery is used may be damaged by electrolyte leakage. If the batteries cannot maintain a charge for long periods of time, even when they are charged correctly, this may indicate it is time to change the battery.

### **13.Note:**

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