Model	INR21700/50E	Spec. No.	PBRI-INR21700/50E-D06-26	Version No.	A

1. Scope

This product specification has been prepared to specify the rechargeable lithium-ion cell to be supplied to customer by Energy CO., LTD.

2. Description and Model

2.1 Description Lithium-ion rechargeable cell

2.2 Model name INR21700/50E

3. Nominal Specifications

Item	**Specification**
3.1 Standard Discharge Capacity	Minimum 4950mAh Nominal 5000mAh Charge: 1.0A(0.2C), 4.20V, CCCV 0.1A cut-off Discharge: 1.0A(0.2C), 2.50V cut-off *1C=5.0A
3.2 Nominal Voltage	3.65V
3.3 Standard Charge	1.0A(0.2C), 4.20±0.05V, CCCV 0.1A cut-off
3.4 Maximum Charge	10.0A(2C), 4.20±0.05V, CCCV 0.1A cut-off (not for cycle life)
3.5 Standard Discharge	1.0A(0.2C), 2.50V cut-off
3.6 Maximum Discharge	15.0A(3C), 2.50V cut-off (not for cycle life)
3.7 Charge/Discharge Voltage Range	4.20~2.50V
3.8 Cell Weight	68.0±2.0g
3.9 Cell Dimensions	Height: 70.15±0.15mm Diameter: 21.15±0.10mm
3.10 Operation Temperature	Ambient Temperature: Charge: 0 to 45°C Discharge: -20 to 60°C
	Cell Surface Temperature： Charge Temperature: 0 to 60°C (recommended recharge release <45°C) Discharge Temperature: -20 to 70°C (recommended re-discharge release <60°C)

3.11 Storage Temperature (At Shipping SOC)	1 year	-20~25°C
	3 months	-20~45°C
	1 month	-20~60°C
3.12 Storage Humidity	≤65% RH	

Remark: The recovery capacity is more than 90% of standard discharge capacity (=4950mAh) after storage at the condition of 3.11.

4. Outline Dimensions

See the attachment (Fig. 1).

5. Appearance

There shall be no such defects as rust, discoloration, leakage which may adversely affect commercial value of the cell.

6. Standard Test Condition

6.1. Environment Condition

Unless otherwise specified, all tests stated in this specification are conducted at temperature 25±2°C and humidity under 65% RH.

6.2. Measuring Equipment

(1) Amp-meter and volt-meter

The amp-meter and volt-meter should have an accuracy of the grade 0.5mA and 0.5mV or higher.

(2) Slide caliper

The slide caliper should have 0.01mm scale.

(3) Impedance meter

The impedance meter with AC 1 kHz should be used.

7. Characteristics

7.1. Standard Charge

Standard charge means charging the cell CCCV with charge current 1.0A (0.2C), constant voltage 4.20V and 0.1A cut-off in CV mode at 25°C for capacity.

7.2. Maximum Charge

Maximum charge means charging the cell CCCV with charge current 10.0A (2C), constant voltage

4.20V and 0.1A cut-off in CV mode at 25°C.

7.3. Standard Discharge Capacity

Standard discharge capacity is measured with discharge current of 1.0A (0.2C) and cut-off voltage of 2.50V at 25°C after the standard charge.

Standard Discharge Capacity ≥ 4950mAh

(Referring IEC61960 standard)

7.4. Initial Internal Impedance

Initial internal impedance is measured at AC 1kHz at shipping SOC.

Initial Internal Impedance ≤ 18mΩ

7.5. Discharge Rate Capabilities

Discharge capacity is measured with the various currents in the following table and 2.50V cut-off after the standard charge, rest 30 min between charge and discharge.

Item	Discharge Condition				
Current	1.0A	2.5A	5.0A	10.0A	15.0A
Rate	0.2C	0.5C	1.0C	2.0C	3.0C
Relative Capacity	100%	≥97%	≥95%	≥93%	≥90%

Note: Relative capacity is divided by the standard discharge capacity (=4950mAh).

7.6. Temperature Dependence of Discharge Capacity

Capacity comparison at each temperature, measured after storage at the test environment according to the below table with discharge constant current 1.0A (0.2C) and 2.50V cut-off after the standard charge at 25°C.

Item	Discharge Temperature		
Temperature	-20°C	25°C	55°C
Storage Time	4h	4h	4h
Relative Capacity	≥70%	100%	≥95%

Note: Relative capacity is divided by the standard discharge capacity (=4950mAh).

7.7. Cycle Life

①Charge: 2.5A(0.5C) to 4.2V, CCCV 0.25A cut-off.

Discharge: 5.0A(1C) to 3.0V cut-off.

Rest time: 10min after charge and 30min after discharge.

Capacity after 1000 cycles.

Capacity ≥70% Ci

Note: C_i is the first discharge capacity of cycle life test at 25±2℃.

②Charge: 5.0A(1C) to 4.2V, CCCV 0.25A cut-off.

Discharge: 5.0A(1C) to 3.0V cut-off.

Rest time: 10min after charge and 30min after discharge.

Capacity after 500 cycles.

Capacity ≥70% Ci

Note: C_i is the first discharge capacity of cycle life test at 25±2℃.

7.8. Storage Characteristics

Recovery Capacity: The capacity of standard discharge of three times cycles after fully standard charged storage at condition as follows.

After storage for 28days at 25℃.

Recovery Capacity ≥ 4455mAh (90% of Standard Discharge Capacity (=4950mAh))

After storage for 7days at 55℃.

Recovery Capacity ≥ 4455mAh (90% of Standard Discharge Capacity (=4950mAh))

7.9. Status of the Cell as of Ex-factory

The cell should be shipped in 3.450V to 3.600V charging voltage range.

8. Mechanical Characteristics

8.1. Free Fall Test

Test method: Each fully charged cell is dropped three times from a height of 1.0m onto a concrete floor. The cells are dropped so as to obtain impacts in random orientations. After the test, the cells shall be put on rest for 1h and then a visual inspection shall be performed.

Criteria: No fire, no explosion.

Free fall test is according to the IEC62133 standard.

8.2. Vibration Test

Test method: For X and Y axis with cylindrical cell 7Hz→200Hz→7Hz for 15min, repetition 12 times totally 3 hours, the acceleration 1g during 7 to 18Hz, then amplitude 1.6mm and maximum 8g up to