

PRODUCT SPECIFICATION

Lithium-ion rechargeable cell for power tools Model: EVE-ICR18650/20P

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Model	ICR18650/20P	Spec. No.	RD-EVE ICR18650/20P-S60-LF	Version No.	В

Revision history

Revision No.	Date	Page	Item	Description	Author
A	2018-12-14	/	/	First Edition	Walker
В	2019-4-16	1.Page1 2.Page1 3.Page4	 Max. Continuous Discharge; Cell Dimension Status of the cell as of ex-factory 	ParameterOptimization	Walker
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1.0. Scope

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

2.0. Description and Model

- 2.1 Description Lithium-ion rechargeable cell
- 2.2 Model name EVE-ICR18650/20P

3.0. Nominal Specifications

Item	Specification
3.1 Nominal Discharge Capacity	2000mAh Charge: 1A, 4.20V, CCCV 100mA cut-off Discharge: 0.4A, 2.50V DC cut-off
3.2Nominal Voltage	3.60V
3.3 Standard Charge	CCCV, 1A, 4.20 ± 0.05 V, 100mA cut-off
3.4Rapid Charge	CCCV, 4A, 4.20 \pm 0.05V, 100mA cut-off
3.5 Standard Discharge	DC, 0.4A, 2.50V cut-off
3.6 Max. Continuous Discharge	DC, 30A, 2.50V cut-off (cut-off temperature80°C)
3.7 Charge/Discharge Voltage Range	4.20~2.50V
3.8 Cell Weight	45.0g Max
3.9 Cell Dimension	Height: 65.00±0.15mm Diameter: 18.35±0.10mm
	Ambient Temperature: Charge: 0 to 45°C Discharge: -20 to 60°C
3.10 Operation Temperature	Cell Surface Cut-off Temperature: Charge: 0 to 50°C (recommended recharge release <45°C) Discharge: -20 to 80°C (recommended re-discharge release <60°C)



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3.11 Stora (At Shippir	ge Temperature ng SOC)	1 3 1	year months month	0~25° 0~45° 0~60°	2° 2° 2°	

4.0. Outline Dimensions

See the attachment (Fig. 1).

5.0. Appearance

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

6.0. Standard Test Condition

6.1 Environment Condition

Unless otherwise specified, all tests stated in this specification are conducted at temperature $25\pm2^{\circ}$ 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 1kHz should be used.

7.0. Characteristics

7.1 Standard Charge

Standard Charge means charging the cell CCCV with charge current 1A(0.5C), constant voltage 4.20V and 100mA cut-off in CV mode at 25°C for capacity.

7.2Rapid Charge

Rapid Charge means charging the cell CCCV with charge current 4A (2C), constant voltage 4.20V and 100mA cut-off in CV mode at 25°C.

7.3 Standard Discharge Capacity

The Standard Discharge Capacity is the initial discharge capacity of the cell, which is measured with discharge current of 0.4A(0.2C) with 2.50V cut-off at 25°C within 1 hour after the standard charge.



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Discharge Capacity ≥ 1900mAh

(Referring IEC61960 standard)

7.4 Initial Internal Impedance

Initial Internal Impedance is measured at AC 1kHz at shipping SOC.

Initial Internal Impedance $\leq 18m\Omega$

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.

Item	Discharge Condition				
Current	0.4A	2A	10A	15A	20A
Relative Capacity	≥100%	≥95%	100%	≥95%	≥95%

Note: Relative capacity is divided by the discharge capacity of 10A.

7.6 Temperature dependence of discharge capacity

Capacity comparison at each temperature, measured after 3 hours storage at the test environment with discharge constant current 10A and 2.50V cut-off after the standard charge at 25°C.

ltem	Discharge temperature				
Temperature	-20°C	-10°C	0°C	25°C	60°C
Relative Capacity	≥60%	≥75%	≥80%	100%	≥100%

Note: Relative capacity is divided by the 10A discharge capacity at 25°C.

7.7 Cycle Life

7.7.1 20A Cycle Life

Charge: rapid charge(4A, 4.20V, 100mA cut-off).

Discharge:20A discharge, cut-off temperature 80°C(2.50V cut-off).

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

Capacity after 300cycles.

Capacity \geq 1200mAh (60% of the nominal capacity at 25 \pm 2°C)





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7.8 Storage Characteristics

Initial Capacity: Standard discharge capacity.

Retention Capacity: The standard discharge capacity after fully standard charged storage at condition in the following table.

Recovery Capacity: The standard discharge capacity of three times cycles after fully standard charged storage at condition in the following table.

Retention Ratio= Retention Capacity/ Initial Capacity*100%

Recovery Ratio= Recovery Capacity/ Initial Capacity*100%

Item	Retention Ratio	Recovery Ratio
60°C30Days	≥80%	≥90%

7.9 Status of the cell as of ex-factory

The cell should be shipped in 3.550V to 3.600V charging voltage range.

8.0. Mechanical Characteristics

8.1 Drop test

Test method: Each fully charged cell is dropped three times from a height of 1.0m onto a concrete floorat20±5°C. The cells are dropped so as to obtain impacts in random orientations. After the test, the cells shall be put on rest for a minimum one hour and then a visual inspection shall be performed.

Criteria: No fire, no explosion.

Drop test shall be performed with the IEC62133 standard.

8.2 Vibration test

Test method: For X and Y axis with cylindrical cell 7Hz→200Hz→7Hz for 15min, repetition 12times totally 3hours, the acceleration 1g during 7 to 18Hz,then amplitude 1.6mm and maximum 8g up to 200Hz. Tests are to be conducted at 20±5°C.

Criteria: No fire, no explosion, no leakage, with less than 10% of OCV drop.

Vibration test shall be performed with the UN38.3 standard.

9.0. Safety

- 9.1 Overcharge test
 - Test method: Fully standard discharged cell is charged with 8.2A to 7.5V, until charging time up to 7h.



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Criteria: No fire, no explosion.

9.2 External Short-circuit test

Test method: Fully standard charged cell is to be short-circuited by connecting thepositive and negative terminals of the cell with a circuit load having aresistance load of 80±20mΩ. Until the test time is lasting to 10min.

Criteria: No fire, no explosion.

External short-circuit test shall be performed with the UL1642 standard.

9.3 Forced Discharge test

Test method: A discharged cell is subjected to a reverse charge at2A(1C) for 90minat 20±5°C.

Criteria: No fire, no explosion.

Forced discharge test shall be performed with the IEC62133 standard.

9.4 Heating test

Test method: To heat up the standard charged cell at heating rate 5°C per minute up to 130°C and keep the cell in oven for 10 minutes.

Criteria: No fire, no explosion.

Heating test shall be performed with the UL1642 standard.

9.5 Low Pressure test

Test method: Fully standard charged cell is to be stored at a pressure of 11.6 kPa or less for at least six hoursat ambient temperature.

Criteria: No fire, no explosion and no leakage with less than 10% of OCV drop.

Low pressure test shall be performed with the UN38.3 standard.

10.0. Warranty

The warranty period ofcellsare made according to business contract. However, even though the problem occurs 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.