# Cell Specification

## INR 18650 25P

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# INR 18650 25P
# Cylindrical Lithium Ion Cell

## 1. Scope

The product specification describes the requirements of the Cylindrical Lithium-ion Cell to be supplied to the customer byTerraE Should there be any additional information required by the customer, customer are advised to contact TerraE.

## 2. Description and Model

| | | |
|---|---|---|
| **2.1** | **Description** | Cylindrical Lithium Ion Cell |
| **2.2** | **Model** | INR 18650 25P |

## 3. General Specifications

| | | |
|---|---|---|
| **3.1** | **Nominal Capacity** | 2500mAh (standard charge /500mA discharge, 2.5V cut- off) |
| **3.2** | **Minimum Capacity** | 2400mAh (500mA, 2.5V cut-off discharge) |
| **3.3** | **Internal Impedance at 1000 HZ** | ≤26 mΩ (25 ± 3°C) |
| **3.4** | **Charging Voltage** | 4.20 ± 0.05V |
| **3.5** | **Nominal Voltage** | 3.6V |
| **3.6** | **Charging Method** | CC-CV (50mA cut-off) |
| **3.7** | **Charging Current** | Standard charge: 2500mA<br>Rapid charge: 6000mA |
| **3.8** | **Charging Time** | Standard charge : 60 minutes<br>Rapid charge: 25 minutes (at 25 ± 3°C) |
| **3.9** | **Max. Discharge Current (Continuous)** | 30A with 80°C cut-off |
| **3.10** | **Discharge Cut-Off Voltage** | 2.5V |
| **3.11** | **Cell Weight** | 47.0g max. |
| **3.12** | **Cell Dimension** | Height : ≤65.15mm<br>Diameter: ≤18.45mm |
| **3.13** | **Cell Surface Temperature** | Charge : 0 to 60°C (Recommended recharge release < 45°C) 0.5C Cha/1C DCha<br>Discharge: -20 to 80°C (Recommended recharge release < 60°C) |
| **3.14** | **Storage Temperature** | 1 month: -20 ~ 60°C (*)<br>3 month : -20 ~ 45°C (*)<br>1 year: -20 ~ 25°C (*) |

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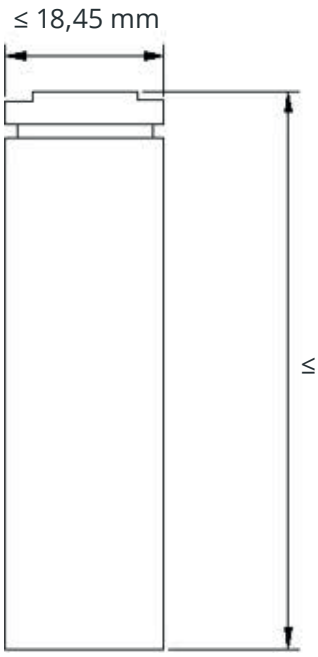
## 4. Outline Dimension (Unit: mm)

**Attached 1:** Outline Dimensions of INR 18160 25P




## 5. Cell Marking

**Attached 2 and 3 :** Side Printings


**Apperance**

There shall be no such defect as deep scratch, flaw, crack, rust, leakage, which may adversely affect commercial value of the cell.

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## 6. Test Condition and Definitions

**6.1 Measuring Equipment**

| | | |
|---|---|---|
| **6.1.1** | **Charge/Discharge Machine** | Voltage precision: ± 0.5mV<br>Current precision: ± 0.5mA |
| **6.1.2** | **Slide Caliper** | The slide caliper should have a scale of 0.01mm |
| **6.1.3** | **Voltage/Impedance Meter** | Impedance precision: ± 0.5mΩ<br>Voltage precision: ± 0.5mV<br>The impedance meter should be operated at AC 1kHz |

**6.2** Unless otherwise specified, all tests shall be performed at 25 ± 3°C and humidity of 65 ± 20% RH. The cells used for the test mentioned should be delivered within a week.

**6.3 Definition**

**C Rate ("C"):**
The rate (milliamperes) at which a fully charged cell is discharged to its end voltage in one (1) hour.

## 7. Characteristics

**7.1 Standard Charge**
This „Standard charge" means charging the cell with constant current 2500mA and then with constant voltage 4.2V 50mA cut-off at 25 ± 3°C.

**7.2 Standard Discharge Capacity**
The standard discharge capacity is the initial discharge capacity of the cell, which is measured with discharge current of 500mA with 2.5V cut-off at 25 ± 3°C after the standard charge. Standard discharge capacity ≥ 2400 mAh (96% of 2500mAh).

**7.3 Standard Rated Discharge Capacity**
The standard discharge capacity is the initial discharge capacity of the cell, which is measured with discharge current of 20A with 2.5V cut-off at 25 ± 3°C after the standard charge. Standard discharge capacity≥ 2400mAh.

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### 7.4 Temperatur Dependence of Discharge Capacity

Capacity comparison at each temperature, measured with discharge constant current 10A and 2.5V cut-off after the standard charge is as follows.

| Temperature | Available Capacity |
|---|---|
| -20°C | 60% |
| -10°C | 75% |
| 0°C | 80% |
| 25°C | 100% |
| 60°C | ≥100% |

Note: If charge temperature and discharge temperature is not the same, the interval for temperature change is two (2) hours.

### 7.5 Discharge Rate Capabilities

Discharge capacity is measured with the various currents in under table and 2.5V cut-off at 25 °C after the standard charge.

| Discharge Condition | | | | | | |
|---|---|---|---|---|---|---|
| Current | 0.5A | 2.5A | 5A | 10A | 20A | 30A |
| Relative Capacity | 100% | ≥95% | ≥93% | ≥90% | ≥90% | ≥90% |

Note: Percentage as an index of the capacity at 25°C (=2500mAh) is 100%.

### 7.6 Cycle Life

Each cycle is an interval between the standard charge at 25±3°C, rest 5 minutes, and the discharge (discharge current 20A) with 2.5V cut-off, then rest 45 minutes. After 300 cycles, Capacity ≥ 2000mAh (80% of the standard discharge capacity at 25±3°C).

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**7.7 Storage Characteristics**

Storage for 28 days at 25 ± 3°C from the standard charge, measured with discharge constant current 10 000mA with 2.5V cut-off at 25°C. Capacity retention (after the storage) ≥ 2000mAh (85% of the standard discharge capacity at 25°C).

**7.8 Status of the Cell as of Ex-Factory**

The cell should be shipped in 30% charged state. In this case, OCV is from 3.5V to 3.7V within 90 days from shipping date. (Temperature condition: 15 ~ 30°C).

## 8. Mechanical Characteristics

| | | |
|---|---|---|
| **8.1** | **Vibration Test** | **UN38.3 standard** |
| **8.2** | **Mechanical Shock** | **UN38.3 standard** |

## 9 . SAFETY

| | | |
|---|---|---|
| **9.1** | **Abnormal Charging Test** | **UL1642 & IEC62133-2:2017** |
| **9.2** | **Over-Discharge Test** | **IEC62133-2:2017** |
| **9.3** | **Short-Circuit Test** | **UL1642 & IEC62133-2:2017** |
| **9.4** | **Crush Test** | **UL1642 & IEC62133-2:2017** |
| **9.5** | **Heating Test** | **UL1642** |
| **9.6** | **Free Falling (Drop)** | **IEC62133-2:2017** |

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## 10. Warranty

**10.1** The warranty period of a Cell is one (1) year after the delivery to the Customer. However, even though the problem occurs within this period, TerraE won't replace a new cell for free as long as the problem is not due to the failure of TerraE manufacturing process or the problem is due to Customer's abuse or misuse.

**10.2** TerraE will not be responsible for trouble occurred by handling outside of the precautions in safety instructions.

**10.3** TerraE will not be responsible for packing, trouble occurred by matching electric circuit, cell pack and charger.

**10.4** TerraE will be exempt from warrantee any defect cells during assembling after acceptance by the Customer.

## 11. Others

**11.1** **Storage for a long Time**
If the cell is kept for a long time (3 months or more), it is strongly recommended that the cell is preserved at dry and low temperature.

**11.2** **Others**
Any matter not included in that specification should be discussed and confirmed by both parties.

## 12. Packing

100 cells per carton box, 2 boxes in an outer box, in total 200 cells.

## 13. Shipping

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

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The following caution and warning should appear in manuals and/or instructions for users, especially at the point of use.

# Handling Instructions for Lithium Ion Rechargeable Cell

## 1. Charging Electric Car, Charger and Battery Pack Design Considerations

**1.1** Charging voltage must be set 4.2V/cell. Concerning charge voltage tolerance of charger, charging voltage must be set below 4.25V/cell. Even if the charge could be out of order, charge voltage of charger should not be above 4.25V/cell to avoid over-charging. Cell life will be shorten by charging voltage above 4.25V, leading to cell failure, serious can appear safety problems.

**1.2** Cell must be charged with CC (constant current) - CV (constant voltage) method. Do not use the continuous charging method.

**1.3** In case of cell voltage is below 3.0V, Cell should be charged with pre-charge that current is below 0.2C. Then cell voltage reach over 3.0V, standard charge starts. And if cell voltage never reaches to 3.0V in specified period (timer), charger will stop charging.

**1.4** By timer, current detection and open circuit voltage detection, charger detects full charge. When charger detect cell is full charged, charger stop charging.

## 2. Discharging

**2.1** The discharge current of a cell must be below specified in the product specification.

**2.2** The discharge end voltage of a cell must be over specified in the product specification.

**2.3** The cell should not be over-discharged below 2.0V.

**2.4** The cell should be discharged within a range of temperatures specified in the product specification.

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## 3. Storage

**3.1** The cell should be stored in a dry area and no corrosive gas.

**3.2** No press on the cell.

**3.3** When stored within 1 month : -20°C ~ +60°C When stored within 3 months: -20°C ~ +45°C. When stored within 12 months : -20°C ~ +25°C

**3.4** After the cell assembled in pack, the pack should be recharged to 30% SOC if the pack has never been used for one (1) year, this will avoid the cell voltage drop too low.

## 4. Cycle Life

**4.1** Charge or discharge out of recommended range might cause the generating heat or serious damage of cell. And also, might it cause the deterioration of cell's characteristics and cycle life.

**4.2** **Cycle Life Performance**
The cell can be charged/ discharged repeatedly up to times with a certain level of capacity specified in the production specification.

**4.3** Cycle life may be determined by conditions of charging, discharging, operating temperature and storage.

## 5. Precautions on Battery Pack Design

**5.1** Do not make the shape and mechanism which static electricity and water easy go through the battery pack inside.

**5.2** Overcharge protection should work below 4.25V/cell by charge. Then charge current shall be shut down.

**5.3** Within a voltage range of 2.5V/cell, over-discharge protection should work. Then discharge current shall be shut down and consumption current is below 1μA.

**5.4** To avoid discharging during storage, design the low consumption current electronic circuit (e.g. Protection circuit, fuel gauge, etc) inside battery pack.

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## 6. Battery Pack Assembly

**6.1** Prohibition of usage of damaged cell. Do not use abnormal cell which has been damaged by shipping stress, drop, short, twice spot or something else, and which gives off electrolyte odor.

**6.2** The cell should be inspected visually before battery assembly.

**6.3** Inspect voltage and internal impedance before using.

**6.4** Do not solder onto a cell in order to avoid damage on the cell. Weld spot welding lead plate onto cell, and solder lead wire or lead plate.

**6.5** The battery assembly must pay attention to anti-static, Avoid electronic components damaged by electrostatic.

**6.6** Battery assembly should pay attention to prevent the short circuit.

## Safety Instruction

Lithium-ion battery if use undeserved can cause cell damage and even harm the personal safety, read it carefully before using and pay attention to the prevention measures. Should there be any additional information required by the Customer, please contact BMZ Germany GmbH, Zeche Gustav 1, 63791 Karlstein

## Danger

**1. Electrical Misusage**

**1.1** Use or charge the battery only in the stipulated application.

**1.2** Use the correct charger for Lithium-ion batteries.

**1.3** When connecting a battery pack to a charger, ensure correct polarity.

**1.4** Do not reverse charge batteries.

**1.5** Do not maintain secondary batteries on charge when not in use.

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**2. Environmental Misusage**

**2.1** Never put a battery into water or seawater.

**2.2** Don't throw the battery into the fire.

**2.3** Do not use or leave the cell under the blazing sun (or in heated car by sunshine). The cell may generate heat, smoke or flame. And also, it might cause the deterioration of cell's characteristics or cycle life.

## Warning

**1.1** When using a new battery or a battery to be used for the first time after long term storage, please fully charge the battery before using.

**1.2** Reverse charge is prohibited. Cells shall be connected correctly. The polarity has to be confirmed before wiring. If a cell is connected improperly, the cell cannot be charged. Simultaneously, the reverse charging may cause damage to the cell which may lead to degradation of cell performance and damage the cell safety, and could cause heat generation or leakage.

**1.3** Do not mix our batteries with other battery brands or batteries of a different chemistry such as alkaline and zinc carbon.

**1.4** Do not mix new batteries in use with semi-used batteries, over-discharge may occur.

**1.5** If find any noise, excessive temperature or leakage from a battery, please stop its use.

**1.6** When the battery is hot, please do not touch it and handle it, until it has cooled down.

**1.7** Do not remove the outer sleeve from a battery pack nor cut into its housing.

**1.8** When find battery power down during use, please switch off the device to avoid over discharge.

**1.9** After using, if the battery is hot, before recharging it, allow it to cool in a well-ventilated place out of direct sunlight.

**1.10** Do not attempt to take batteries apart or subject them to pressure or impact. Heat may be generated or fire may result. The alkaline electrolyte is harmful to eyes and skin, and it may damage clothing upon contact.

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**1.11** Never put a battery into water or seawater.

**1.12** Keep the battery away from babies and children. If swallowed, see a doctor immediately.

**1.13** In the event of a cell leaking, do not allow the liquid to come into contact with the skin or eyes. If contact has been made, wash the affected area with copious amounts of water and seek medical advice.

## Caution

**1.1** When not using a battery, disconnect it from the device.

**1.2** Unplug a battery by holding the connector itself and not by pulling at its cord.

**1.3** Used batters should be treated by authorized units.

**1.4** After extended periods of storage, it may be necessary to charge and discharge the batteries several times to obtain maximum performance.

**1.5** Secondary batteries give their best performance when they are operated at normal room temperature.

**1.6** Keep batteries clean and dry.

**1.7** Wipe the battery terminals with a clean dry cloth if they become dirty.

**1.8** When disposing of secondary batteries, keep batteries of different electrochemical systems separate from each other.

# Any questions?

Contact us, we will be pleased to advise you.

## A full load of advantages

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