**Test Report issued under the responsibility of:**

Truron Testing™
储融检测

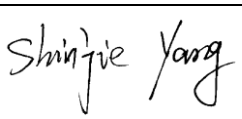
# TEST REPORT
# EN 62133
## Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications

| | |
|---|---|
| **Report Number.** ..... : | CE-4787190938-A-1 |
| **Date of issue** ..... : | 2016-03-30 |
| **Total number of pages** ..... | 28 |
| **Applicant's name** ..... : | JIANGSU SUNPOWER CO.,LTD |
| **Address** ..... : | ZhiFu Road, Huangqiao Industrial Park, Taixing City, JiangSu province,P.R. China |
| **Test specification:** | |
| **Standard** ..... : | EN 62133: 2013 (Second Edition) |
| **Test procedure** ..... : | Safety Test Report |
| **Non-standard test method** ..... : | N/A |
| **Test Report Form No.** ..... : | IEC62133B |
| **Test Report Form(s) Originator** .... : | UL(Demko) |
| **Master TRF** ..... : | Dated 2013-03 |



**This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.**

| | |
|---|---|
| **Test item description** ..... : | Li-ion Cell |
| **Trade Mark** ..... : | |
| **Manufacturer** ..... : | Same as applicant |
| **Model/Type reference** ..... : | INR18650-1300, INR18650-1500, INR18650-2000, INCMR18/65 |
| **Ratings** ..... : | INR18650-1300, 3.7Vdc,1300mAh<br>INR18650-1500, 3.7Vdc,1500mAh<br>INR18650-2000, 3.7Vdc,2000mAh |

| | | | |
|---|---|---|---|
| **Testing procedure and testing location:** | | | |
| ☒ | **CB Testing Laboratory:** | Shanghai Truron Testing Technology Co., Ltd. | |
| **Testing location/ address .....:** | | Floor 3, Building 2, No. 135, Handan Road, Shanghai, China | |
| ☐ | **Associated CB Testing Laboratory:** | | |
| **Testing location/ address .....:** | | | |
| **Tested by (name + signature) .....:** | | Tom Song |  |
| **Approved by (name + signature) .....:** | | Shinjie Yang |  |
| | | | |
| ☐ | **Testing procedure: TMP** | | |
| **Testing location/ address .....:** | | | |
| **Tested by (name + signature) .....:** | | | |
| **Approved by (name + signature) .....:** | | | |
| | | | |
| ☐ | **Testing procedure: WMT** | | |
| **Testing location/ address .....:** | | | |
| **Tested by (name + signature) .....:** | | | |
| **Witnessed by (name + signature) ....:** | | | |
| **Approved by (name + signature) .....:** | | | |
| | | | |
| ☐ | **Testing procedure: SMT** | | |
| **Testing location/ address .....:** | | | |
| **Tested by (name + signature) .....:** | | | |
| **Approved by (name + signature) .....:** | | | |
| **Supervised by (name + signature) ..:** | | | |
| | | | |

**List of Attachments (including a total number of pages in each attachment):**

National Differences ( 0 page)
Enclosures ( 8 pages)

**Summary of testing:**

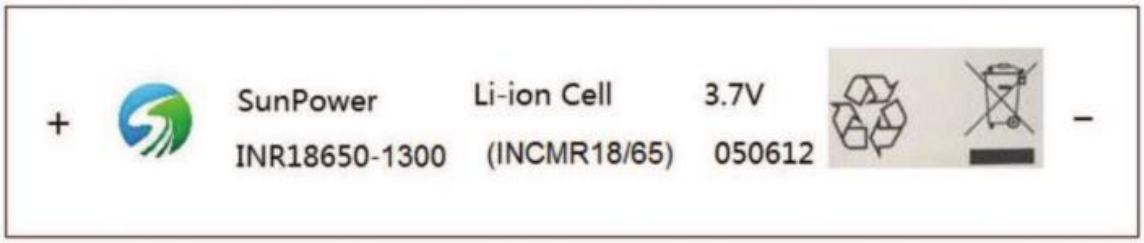
| **Tests performed (name of test and test clause):** | **Testing location:** |
|---|---|
| - 8.2.1 Continuous charging at constant voltage (cells)<br>- 8.3.1 External short circuit (cells)<br>- 8.3.3 Free fall<br>- 8.3.4 Thermal abuse (cells)<br>- 8.3.5 Crush (cells)<br>- 8.3.7 Forced discharge (cells)<br>- 8.3.8 Transport tests (cells)<br>- 8.3.9 Forced internal short circuit (cells) | Shanghai Truron Testing Technology Co., Ltd.<br><br>Floor 3, Building 2, No. 135, Handan Road, Shanghai, China |

**Summary of compliance with National Differences**
**List of countries addressed: N/A.**

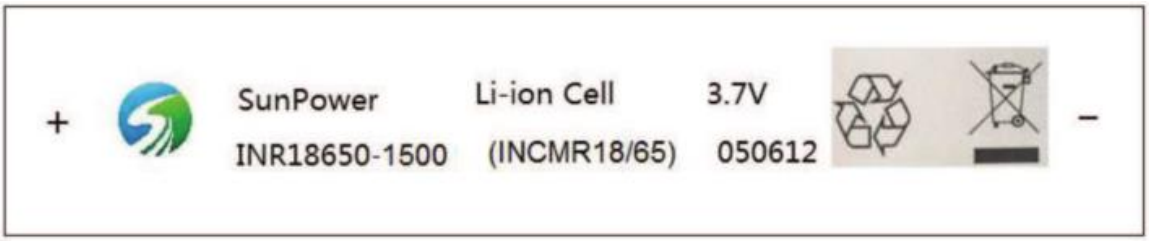
**Copy of marking plate**

**The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.**

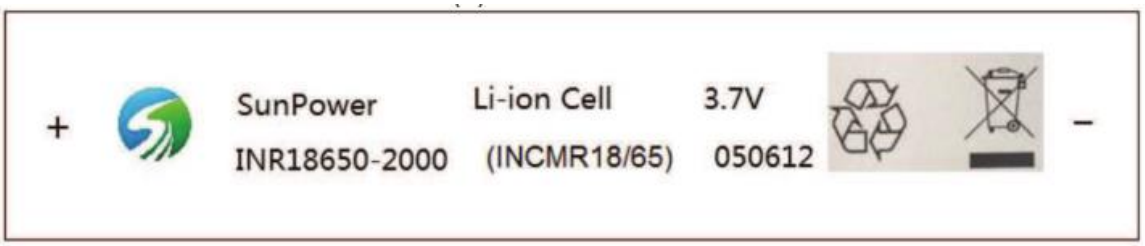
INR18650-1300




INR18650-1500




INR18650-2000



| | |
|---|---|
| **Test item particulars.....:** | See below |
| **Classification of installation and use.....:** | For built-in |
| **Supply connection.....:** | DC terminal |
| **Recommend charging method declared by the manufacturer ..... :** | Charging the cell with 0.2C constant current, then 4.2V constant voltage until current reduces to 0.02C at ambient 20℃±5℃ |
| **Discharge current (0,2 $I_t$ A) ..... :** | 260mA for INR18650-1300;<br>300mA for INR18650-1500;<br>400mA for INR18650-2000; |
| **Specified final voltage ..... :** | 2.75Vdc |
| **Chemistry ..... :** | ☐ nickel systems ..... ☒ lithium systems |
| **Recommend of charging limit for lithium system** | |
| **Upper limit charging voltage per cell.....:** | 4.25Vdc |
| **Maximum charging current.....:** | 1300mA for INR18650-1300;<br>1500mA for INR18650-1500;<br>2000mA for INR18650-2000; |
| **Charging temperature upper limit.....:** | 45℃ |
| **Charging temperature lower limit.....:** | 0℃ |
| **Polymer cell electrolyte type ..... :** | ☐ gel polymer ☐ solid polymer ☒N/A |
| **Possible test case verdicts:** | |
| **- test case does not apply to the test object.....:** | N/A |
| **- test object does meet the requirement.....:** | P (Pass) |
| **- test object does not meet the requirement.....:** | F (Fail) |
| **Testing.....:** | |
| **Date of receipt of test item .....:** | 2015-07-07 |
| **Date (s) of performance of tests.....:** | 2015-07-10 to 2015-08-10 |

**General remarks:**

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.

**Throughout this report a ☐ comma / ☒ point is used as the decimal separator.**

**Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:**

| | |
|---|---|
| The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided ..... : | ☐ **Yes**<br>☒ **Not applicable** |

**When differences exist; they shall be identified in the General product information section.**

| | |
|---|---|
| **Name and address of factory (ies) ..... :** | JIANGSU SUNPOWER CO.,LTD<br>ZhiFu Road, Huangqiao Industrial Park, Taixing City, JiangSu province,P.R. China |

**General product information:**

- The cell consists of the positive electrode plate, negative electrode plate, separator, electrolyte and case. The positive and negative electrode plates are housed in the case in the state being separated by separator.

- The main features of the cell is shown as below(clause 8.1.1):

| Model | Maximum charge current | Maximum charge voltage | Maximum discharge current | end of discharge voltage |
|---|---|---|---|---|
| INR18650-1300 | 1300mA | 4.2V | 19.5A | 2.75V |
| INR18650-1500 | 1500mA | 4.2V | 30.0A | 2.75V |
| INR18650-2000 | 2000mA | 4.2V | 20.0A | 2.75V |

- Operating Temperature: Charge: 0~45℃; Discharge: -10~60℃;

- INCMR18/65 is IEC 62133 model designation and identical to models INR18650-1300, INR18650-1500, INR18650-2000 except for model designation.

| IEC 62133 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| **4** | **Parameter measurement tolerances** | | **P** |
| | Parameter measurement tolerances | Comply with relevant requirements. | P |
| **5** | **General safety considerations** | | P |
| 5.1 | General | See below | P |
| 5.2 | Insulation and wiring | | P |
| | The insulation resistance between the positive terminal and externally exposed metal surfaces of the battery (excluding electrical contact surfaces) is not less than 5 MΩ | | N/A |
| | Insulation resistance (MΩ) ..... : | | — |
| | Internal wiring and insulation are sufficient to withstand maximum anticipated current, voltage and temperature requirements | | P |
| | Orientation of wiring maintains adequate creepage and clearance distances between conductors | | P |
| | Mechanical integrity of internal connections accommodates reasonably foreseeable misuse | | P |
| 5.3 | Venting | | P |
| | Battery cases and cells incorporate a pressure relief mechanism or are constructed so that they relieve excessive internal pressure at a value and rate that will preclude rupture, explosion and self-ignition | Venting mechanism exists on the cylindrical cell. | P |
| | Encapsulation used to support cells within an outer casing does not cause the battery to overheat during normal operation nor inhibit pressure relief | Should be evaluated in end application. | N/A |
| 5.4 | Temperature/voltage/current management | Cell Only | N/A |
| | Batteries are designed such that abnormal temperature rise conditions are prevented | | N/A |
| | Batteries are designed to be within temperature, voltage and current limits specified by the cell manufacturer | | N/A |
| | Batteries are provided with specifications and charging instructions for equipment manufacturers so that associated chargers are designed to maintain charging within the temperature, voltage and current limits specified | | N/A |
| 5.5 | Terminal contacts | | P |
| | Terminals have a clear polarity marking on the external surface of the battery | | P |
| | The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current | Considered | P |

| IEC 62133 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | External terminal contact surfaces are formed from conductive materials with good mechanical strength and corrosion resistance | | P |
| | Terminal contacts are arranged to minimize the risk of short circuits | | P |
| 5.6 | Assembly of cells into batteries | Cell only | N/A |
| 5.6.1 | If there is more than one battery housed in a single battery case, cells used in the assembly of each battery have closely matched capacities, be of the same design, be of the same chemistry and be from the same manufacturer | | N/A |
| | Each battery has an independent control and protection | | N/A |
| | Manufacturers of cells make recommendations about current, voltage and temperature limits so that the battery manufacturer/designer may ensure proper design and assembly | | N/A |
| | Batteries that are designed for the selective discharge of a portion of their series connected cells incorporate separate circuitry to prevent the cell reversal caused by uneven discharges | | N/A |
| | Protective circuit components are added as appropriate and consideration given to the end-device application | | N/A |
| | When testing a battery, the manufacturer of the battery provides a test report confirming the compliance according to this standard | | N/A |
| 5.6.2 | Design recommendation for lithium systems only | | N/A |
| | For the battery consisting of a single cell or a single cellblock:<br>- Charging voltage of the cell does not exceed the upper limit of the charging voltage specified in Clause 8.1.2, Table 4; or | | N/A |
| | - Charging voltage of the cell does not exceed the different upper limit of the charging voltage determined through Clause 8.1.2, NOTE 1. | | N/A |
| | For the battery consisting of series-connected plural single cells or series-connected plural cellblocks:<br>- The voltages of any one of the single cells or single cellblocks does not exceed the upper limit of the charging voltage, specified in Clause 8.1.2, Table 4, by monitoring the voltage of every single cell or the single cellblocks; or | | N/A |

| IEC 62133 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - The voltages of any one of the single cells or single cellblocks does not exceed the different upper limit of the charging voltage, determined through Clause 8.1.2, NOTE 1, by monitoring the voltage of every single cell or the single cellblocks | | N/A |
| | For the battery consisting of series-connected plural single cells or series-connected plural cellblocks:<br>- Charging is stopped when the upper limit of the charging voltage, specified in Clause 8.1.2, Table 4, is exceeded for any one of the single cells or single cellblocks by measuring the voltage of every single cell or the single cellblocks; or | | N/A |
| | - Charging is stopped when the upper limit of the different charging voltage, determined through Clause 8.1.2, NOTE 1, is exceeded for any one of the single cells or single cellblocks by measuring the voltage of every single cell or the single cellblocks | | N/A |
| 5.7 | Quality plan | | P |
| | The manufacturer prepares and implements a quality plan that defines procedures for the inspection of materials, components, cells and batteries and which covers the whole process of producing each type of cell or battery | Complied. Quality plan provided. | P |
| **6** | **Type test conditions** | | **P** |
| | Tests were made with the number of cells or batteries specified in Table 1 for nickel-cadmium and nickel-metal hydride systems and Table 2 for lithium systems, using cells or batteries that are not more than six months old | Considered. | P |
| | Unless noted otherwise in the test methods, testing was conducted in an ambient of 20°C ± 5°C. | Considered. | P |
| **7** | **Specific requirements and tests (nickel systems)** | | N/A |
| 7.1 | Charging procedure for test purposes | Not applicable for Lithium system. | N/A |
| 7.2 | Intended use | | N/A |
| 7.2.1 | Continuous low-rate charging (cells) | | N/A |
| | Results: No fire. No explosion | | N/A |
| 7.2.2 | Vibration | | N/A |
| | Results: No fire. No explosion. No leakage | | N/A |
| 7.2.3 | Moulded case stress at high ambient temperature | | N/A |
| | Oven temperature (°C) ..... : | | — |
| | Results: No physical distortion of the battery casing resulting in exposure if internal components | | N/A |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 7.2.4 | Temperature cycling | | N/A |
| | Results: No fire. No explosion. No leakage. | | N/A |
| 7.3 | Reasonably foreseeable misuse | | N/A |
| 7.3.1 | Incorrect installation cell | | N/A |
| | The test was carried out using:<br>- Four fully charged cells of the same brand, type, size and age connected in series, with one of them reversed; or | | N/A |
| | - A stabilized dc power supply. | | N/A |
| | Results: No fire. No explosion..... : | | N/A |
| 7.3.2 | External short circuit | | N/A |
| | The cells or batteries were tested until one of the following occurred:<br>- 24 hours elapsed; or | | N/A |
| | - The case temperature declined by 20% of the maximum temperature rise | | N/A |
| | Results: No fire. No explosion..... : | | N/A |
| 7.3.3 | Free fall | | N/A |
| | Results: No fire. No explosion. | | N/A |
| 7.3.4 | Mechanical shock (crash hazard) | | N/A |
| | Results: No fire. No explosion. No leakage. | | N/A |
| 7.3.5 | Thermal abuse | | N/A |
| | Oven temperature (°C)..... : | | — |
| | Results: No fire. No explosion. | | N/A |
| 7.3.6 | Crushing of cells | | N/A |
| | The crushing force was released upon:<br>- The maximum force of 13 kN ± 1 kN has been applied; or | | N/A |
| | - An abrupt voltage drop of one-third of the original voltage has been obtained | | N/A |
| | The cell is prismatic type and a second set of samples was tested, rotated 90° around longitudinal axis compared to the first set | | N/A |
| | Results: No fire. No explosion..... : | | N/A |
| 7.3.7 | Low pressure | | N/A |
| | Chamber pressure (kPa)..... : | | — |
| | Results: No fire. No explosion. No leakage. | | N/A |
| 7.3.8 | Overcharge | | N/A |
| | Results: No fire. No explosion..... : | | N/A |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 7.3.9 | Forced discharge | | N/A |
| | Results: No fire. No explosion..... : | | N/A |
| **8** | **Specific requirements and tests (lithium systems)** | | **P** |
| 8.1 | Charging procedures for test purposes | See below | P |
| 8.1.1 | First procedure:<br>This charging procedure applied to tests other than those specified in 8.1.2 | | P |
| 8.1.2 | Second procedure:<br>This charging procedure applied to the tests of 8.3.1, 8.3.2, 8.3.4, 8.3.5, and 8.3.9 | | P |
| | If a cell's specified upper and/or lower charging temperature exceeds values for the upper and/or lower limit test temperatures of Table 4, the cells were charged at the specified values plus 5 °C for the upper limit and minus 5 °C for the lower limit | | P |
| | A valid rationale was provided to ensure the safety of the cell (see Figure A.1) ..... : | | P |
| | For a different upper limit charging voltage (i.e. other than for lithium cobalt oxide systems at 4,25 V), the applied upper limit charging voltage and upper limit charging temperatures were adjusted accordingly | | N/A |
| | A valid rationale was provided to ensure the safety of the cell (see Figure A.1) ..... : | | N/A |
| 8.2 | Intended use | See below | P |
| 8.2.1 | Continuous charging at constant voltage (cells) | | P |
| | Results: No fire. No explosion..... : | (See Table 8.2.1) | P |
| 8.2.2 | Moulded case stress at high ambient temperature (battery) | Cell only | N/A |
| | Oven temperature (°C) ..... : | | — |
| | Results: No physical distortion of the battery casing resulting in exposure if internal components | | N/A |
| 8.3 | Reasonably foreseeable misuse | | P |
| 8.3.1 | External short circuit (cells) | | P |
| | The cells were tested until one of the following occurred:<br>- 24 hours elapsed; or | | N/A |
| | - The case temperature declined by 20% of the maximum temperature rise | No fire or Explosion | P |
| | Results: No fire. No explosion..... : | (See Table 8.3.1) | P |
| 8.3.2 | External short circuit (battery) | Cell only | N/A |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | The cells were tested until one of the following occurred:<br>- 24 hours elapsed; or | | N/A |
| | - The case temperature declined by 20% of the maximum temperature rise | | N/A |
| | In case of rapid decline in short circuit current, the battery pack remained on test for an additional one hour after the current reached a low end steady state condition | | N/A |
| | Results: No fire. No explosion..... : | (See Table 8.3.2) | P |
| 8.3.3 | Free fall | | P |
| | Results: No fire. No explosion. | No fire. No explosion. | P |
| 8.3.4 | Thermal abuse (cells) | | P |
| | The cells were held at 130°C ± 2°C for:<br>- 10 minutes; or | | P |
| | - 30 minutes for large cells (gross mass of more than 500 g as defined in IEC 62281) | | N/A |
| | Oven temperature (°C)..... : | 130.1 | — |
| | Gross mass of cell (g) ..... : | ＜500g, small cell | — |
| | Results: No fire. No explosion. | No fire. No explosion. | P |
| 8.3.5 | Crush (cells) | | P |
| | The crushing force was released upon:<br>- The maximum force of 13 kN ± 1 kN has been applied; or | | P |
| | - An abrupt voltage drop of one-third of the original voltage has been obtained; or | | N/A |
| | - 10% of deformation has occurred compared to the initial dimension | | N/A |
| | Results: No fire. No explosion..... : | (See Table 8.3.5) | P |
| 8.3.6 | Over-charging of battery | Cell only | N/A |
| | Test was continued until the temperature of the outer casing:<br>- Reached steady state conditions (less than 10°C change in 30-minute period); or | | N/A |
| | - Returned to ambient | | N/A |
| | Results: No fire. No explosion..... : | | N/A |
| 8.3.7 | Forced discharge (cells) | | P |
| | Results: No fire. No explosion..... : | (See Table 8.3.7) | P |
| 8.3.8 | Transport tests | | P |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Manufacturer's documentation provided to show compliance with UN Recommendations on Transport of Dangerous Goods | | P |
| 8.3.9 | Design evaluation – Forced internal short circuit (cells) | Tested complied. | P |
| | The cells complied with national requirement for .....: | | — |
| | The pressing was stopped upon:<br>- A voltage drop of 50 mV has been detected; or | | N/A |
| | - The pressing force of 800 N (cylindrical cells) or 400 N (prismatic cells) has been reached | | P |
| | Results: No fire ..... : | | P |
| **9** | **Information for safety** | | **P** |
| | The manufacturer of secondary cells ensures that information is provided about current, voltage and temperature limits of their products. | Specification provided. | P |
| | The manufacturer of batteries ensures that equipment manufacturers and, in the case of direct sales, end-users are provided with information to minimize and mitigate hazards. | | N/A |
| | Systems analyses performed by device manufacturers to ensure that a particular battery design prevents hazards from occurring during use of a product | | N/A |
| | As appropriate, information relating to hazard avoidance resulting from a system analysis is provided to the end user ..... : | | N/A |
| **10** | **Marking** | | **P** |
| 10.1 | Cell marking | | P |
| | Cells marked as specified in the applicable cell standards: IEC 61951-1, IEC 61951-2 or IEC 61960. | | P |
| 10.2 | Battery marking | | N/A |
| | Batteries marked in accordance with the requirements for the cells from which they are assembled. | | N/A |
| | Batteries marked with an appropriate caution statement. | | N/A |
| 10.3 | Other information | | P |
| | Storage and disposal instructions marked on or supplied with the battery. | | P |
| | Recommended charging instructions marked on or supplied with the battery. | | P |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| **11** | **Packaging** | | **P** |
| | The materials and packaging design are chosen so as to prevent the development of unintentional electrical conduction, corrosion of the terminals and ingress of environmental contaminants. | See enclosure ID05 | P |

| | | | |
|---|---|---|---|
| **Annex A** | **Charging range of secondary lithium ion cells for safe use** | | **P** |
| A.1 | General | | P |
| A.2 | Safety of lithium-ion secondary battery | Complied | P |
| A.3 | Consideration on charging voltage | Complied | P |
| A.3.1 | General | Charging voltage is 4.2V | P |
| A.3.2 | Upper limit charging voltage | 4.25V | P |
| A.3.2.1 | General | | P |
| A.3.2.2 | Explanation of safety viewpoint | | N/A |
| A.3.2.3 | Safety requirements, when different upper limit charging voltage is applied | 4.25V applied | N/A |
| A.4 | Consideration of temperature and charging current | | P |
| A.4.1 | General | | P |
| A.4.2 | Recommended temperature range | | P |
| A.4.2.1 | General | | P |
| A.4.2.2 | Safety consideration when a different recommended temperature range is applied | | P |
| A.4.3 | High temperature range | | N/A |
| A.4.3.1 | General | | N/A |
| A.4.3.2 | Explanation of safety viewpoint | | N/A |
| A.4.3.3 | Safety considerations when specifying charging conditions in high temperature range | | N/A |
| A.4.3.4 | Safety consideration when specifying new upper limit in high temperature range | | N/A |
| A.4.4 | Low temperature range | | P |
| A.4.4.1 | General | | P |
| A.4.4.2 | Explanation of safety viewpoint | | P |
| A.4.4.3 | Safety considerations, when specifying charging conditions in low temperature range | | P |
| A.4.4.4 | Safety considerations when specifying a new lower limit in the low temperature range | | P |
| A.4.5 | Scope of the application of charging current | | P |
| A.5 | Sample preparation | | P |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| A.5.1 | General | | P |
| A.5.2 | Insertion procedure for nickel particle to generate internal short | | P |
| | The insertion procedure carried out at 20°C±5°C and under -25 °C of dew point | | P |
| A.5.3 | Disassembly of charged cell | | P |
| A.5.4 | Shape of nickel particle | | P |
| A.5.5 | Insertion of nickel particle to cylindrical cell | | P |
| A.5.5.1 | Insertion of nickel particle to winding core | | P |
| A.5.5.2 | Mark the position of nickel particle on the both end of winding core of the separator | | P |
| A.5.6 | Insertion of nickel particle to prismatic cell | | N/A |

| IEC 62133 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | TABLE: Critical components information | | | | P |
|---|---|---|---|---|---|
| **Object/part no.** | **Manufacturer/ trademark** | **Type/model** | **Technical data** | **Standard** | **Mark(s) of conformity [1)]** |
| 1. Cell Case | Wuxi Kaiyue Dianyuan Peijian CO.,LTD. | Ni-Iron | Ni-Iron | -- | -- |
| 2. Positive Electrode | Xinxiang Tili Energy Co., Ltd. | TL510 | Positive material Li(NiCoMn)O2, coated on Al film<br>INR18650-1300mAh: mass: 9.25 g<br>INR18650-1500mAh: mass: 10.68 g<br>INR18650-2000mAh: mass: 13.22 g | -- | -- |
| 3. Negative Electrode | BTR New Energy materials INC | AGP-8 | Negative material C coated on Cu film<br>INR18650-1300mAh: mass: 4.5 g<br>INR18650-1500mAh: mass: 5.09 g<br>INR18650-2000mAh: mass: 6.47 g | -- | -- |
| 4. Separator | Ube Industries, Ltd. | UBE UP3085 | PP/PE<br>0.020*60mm<br>Shutdown temperature: 133°C | -- | |
| 5. Electrolyte | Guangzhou Tinci Materials Technology Co., Ltd. | SJ01 | LiFP6 dissolved in organic solvent (EC+ DMC)<br>INR18650-1300mAh: mass: 5.65 g<br>INR18650-1500mAh: mass: 5.90 g<br>INR18650-2000mAh: mass: 5.66g | -- | -- |
| **Supplementary information: N/A**<br>**[1)] Provided evidence ensures the agreed level of compliance. See OD-CB2039.** | | | | | |

| IEC 62133 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| 7.2.1 | TABLE: Continuous low rate charge (cells) | | | | N/A |
|---|---|---|---|---|---|
| **Model** | **Recommended charging method, (CC, CV, or CC/CV)** | **Recommended charging voltage $V_c$, (Vdc)** | **Recommended charging current $I_{rec}$, (A)** | **OCV at start of test, (Vdc)** | **Results** |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

**Supplementary information:**

- No fire or explosion
- No leakage
- Leakage
- Fire
- Explosion
- Bulge
- Others (please explain)

| 7.2.2 | TABLE: Vibration | | N/A |
|---|---|---|---|
| **Model** | **OCV at start of test, (Vdc)** | **Results** | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**Supplementary information:**

- No fire or explosion
- No leakage
- Leakage
- Fire
- Explosion
- Bulge
- Others (please explain)

| IEC 62133 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| 7.3.1 | TABLE: Incorrect installation (cells) | | N/A |
|---|---|---|---|
| **Model** | | **OCV of reversed cell, (Vdc)** | **Results** |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**Supplementary information:**

- No fire or explosion
- No leakage
- Leakage
- Fire
- Explosion
- Bulge
- Others (please explain)

| 7.3.2 | TABLE: External short circuit | | | | N/A |
|---|---|---|---|---|---|
| **Model** | **Ambient (at 20°C ± 5°C or 55°C ± 5°C)** | **OCV at start of test, (Vdc)** | **Resistance of circuit, (Ω)** | **Maximum case temperature rise ΔT, (°C)** | **Results** |
| | | | | | |
| | | | | | |
| | | | | | |
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| | | | | | |
| | | | | | |

**Supplementary information:**

- No fire or explosion
- No leakage
- Leakage
- Fire
- Explosion
- Bulge
- Others (please explain)

| IEC 62133 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| 7.3.6 | TABLE: Crush | N/A |
|---|---|---|

| Model | OCV at start of test, (Vdc) | OCV at removal of crushing force, (Vdc) | Results |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**Supplementary information:**

- No fire or explosion
- No leakage
- Leakage
- Fire
- Explosion
- Bulge
- Others (please explain)

| 7.3.8 | TABLE: Overcharge | N/A |
|---|---|---|

| Model | OCV prior to charging, (Vdc) | Maximum charge current, (A) | Time for charging, (hours) | Results |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**Supplementary information:**

- No fire or explosion
- No leakage
- Leakage
- Fire
- Explosion
- Bulge
- Others (please explain)

| IEC 62133 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| 7.3.9 | TABLE: Forced discharge (cells) | | | N/A |
|---|---|---|---|---|
| **Model** | **OCV before application of reverse charge, (Vdc)** | **Measured reverse charge $I_t$, (A)** | **Time for reversed charge, (minutes)** | **Results** |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**Supplementary information:**

- No fire or explosion
- No leakage
- Leakage
- Fire
- Explosion
- Bulge
- Others (please explain)

| IEC 62133 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| 8.2.1 | TABLE: Continuous charging at constant voltage (cells) | | | P |
|---|---|---|---|---|
| **Model** | **Recommended charging voltage $V_c$, (Vdc)** | **Recommended charging current $I_{rec}$, (A)** | **OCV at start of test, (Vdc)** | **Results** |
| For model of INR18650-2000 | | | | |
| No.1 | 4.2 | 0.40 | 4.19 | A,B |
| No.2 | 4.2 | 0.40 | 4.19 | A,B |
| No.3 | 4.2 | 0.40 | 4.19 | A,B |
| No.4 | 4.2 | 0.40 | 4.19 | A,B |
| No.5 | 4.2 | 0.40 | 4.19 | A,B |
| For model of INR18650-1500 | | | | |
| No.1 | 4.2 | 0.30 | 4.19 | A,B |
| No.2 | 4.2 | 0.30 | 4.19 | A,B |
| No.3 | 4.2 | 0.30 | 4.19 | A,B |
| No.4 | 4.2 | 0.30 | 4.19 | A,B |
| No.5 | 4.2 | 0.30 | 4.19 | A,B |
| For model of INR18650-1300 | | | | |
| No.1 | 4.2 | 0.26 | 4.19 | A,B |
| No.2 | 4.2 | 0.26 | 4.19 | A,B |
| No.3 | 4.2 | 0.26 | 4.19 | A,B |
| No.4 | 4.2 | 0.26 | 4.19 | A,B |
| No.5 | 4.2 | 0.26 | 4.19 | A,B |

**Supplementary information:**

A – No fire or explosion
B – No Leakage
C – Leakage
D – Fire
E – Explosion

| IEC 62133 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| 8.3.1 | TABLE: External short circuit (cells) | | | | P |
|---|---|---|---|---|---|
| **Model** | **Ambient, (°C)** | **OCV at start of test, (Vdc)** | **Resistance of circuit, (Ω)** | **Maximum case temperature rise ΔT, (°C)** | **Results** |
| **For model of INR18650-2000** | | | | | |
| **Samples charged at charging temperature upper limit (45℃)** | | | | | |
| No.1 | 17.5 | 4.20 | 0.079 | 118.1 | A,E |
| No.2 | 17.5 | 4.20 | 0.082 | 119.8 | A,E |
| No.3 | 17.5 | 4.20 | 0.083 | 118.8 | A,E |
| No.4 | 17.5 | 4.20 | 0.080 | 114.6 | A,E |
| No.5 | 17.5 | 4.20 | 0.080 | 90.3 | A,E |
| **Samples charged at charging temperature lower limit (−5℃)** | | | | | |
| No.6 | 19.9 | 4.16 | 0.079 | 121.8 | A,E |
| No.7 | 19.9 | 4.16 | 0.082 | 111.9 | A,E |
| No.8 | 19.9 | 4.16 | 0.083 | 123.0 | A,E |
| No.9 | 19.9 | 4.16 | 0.080 | 124.9 | A,E |
| No.10 | 19.9 | 4.16 | 0.080 | 122.6 | A,E |
| **For model of INR18650-1500** | | | | | |
| **Samples charged at charging temperature upper limit (45℃)** | | | | | |
| No.1 | 18.8 | 4.22 | 0.079 | 92.8 | A,E |
| No.2 | 22.2 | 4.22 | 0.082 | 126.4 | A,E |
| No.3 | 22.2 | 4.22 | 0.083 | 119.4 | A,E |
| No.4 | 22.2 | 4.22 | 0.080 | 114.7 | A,E |
| No.5 | 22.2 | 4.22 | 0.080 | 121.2 | A,E |
| **Samples charged at charging temperature lower limit (-5℃)** | | | | | |
| No.6 | 21.7 | 4.16 | 0.079 | 123.1 | A,E |
| No.7 | 21.7 | 4.16 | 0.082 | 122.5 | A,E |
| No.8 | 21.7 | 4.16 | 0.083 | 117.9 | A,E |
| No.9 | 21.7 | 4.16 | 0.080 | 124.5 | A,E |
| No.10 | 21.7 | 4.16 | 0.080 | 119.3 | A,E |
| **For model of INR18650-1300** | | | | | |
| **Samples charged at charging temperature upper limit (45℃)** | | | | | |
| No.1 | 22.3 | 4.21 | 0.079 | 72.6 | A,E |
| No.2 | 20.4 | 4.21 | 0.082 | 124.4 | A,E |
| No.3 | 20.4 | 4.21 | 0.083 | 127.6 | A,E |

| IEC 62133 | | | | | |
|---|---|---|---|---|---|
| Clause | Requirement + Test | | | Result - Remark | Verdict |
| No.4 | 20.4 | 4.21 | 0.080 | 120.8 | A,E |
| No.5 | 20.4 | 4.21 | 0.080 | 120.8 | A,E |
| **Samples charged at charging temperature lower limit (-5℃)** | | | | | |
| No.6 | 19.6 | 4.18 | 0.079 | 105.6 | A,E |
| No.7 | 19.6 | 4.18 | 0.082 | 118.8 | A,E |
| No.8 | 19.6 | 4.18 | 0.083 | 121.0 | A,E |
| No.9 | 19.6 | 4.18 | 0.080 | 120.4 | A,E |
| No.10 | 19.6 | 4.18 | 0.080 | 122.5 | A,E |

**Supplementary information:**

A – No fire or Explosion

B – Fire

C – Explosion

D – The test was completed after 24 h

E – The test was completed after the cell casing cooled to 20% of the maximum temperature rise.

| 8.3.2 | TABLE: External short circuit (battery) | | | | N/A |
|---|---|---|---|---|---|
| **Model** | **Ambient, (°C)** | **OCV at start of test, (Vdc)** | **Resistance of circuit, (Ω)** | **Maximum case temperature rise ΔT, (°C)** | **Results** |
| **Samples charged at charging temperature upper limit** | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| **Samples charged at charging temperature lower limit** | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Supplementary information:

A – No fire or Explosion

B – Fire

C – Explosion

D – The test was completed after 24 h

E – The test was completed after the pack casing cooled to 20% of the maximum temperature rise

| IEC 62133 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| 8.3.5 | TABLE: Crush(cells) | | | | P |
|---|---|---|---|---|---|
| **Model** | **OCV at start of test, (Vdc)** | **OCV at removal of crushing force, (Vdc)** | **Width/ diameter of cell before crush, (mm)** | **Required deformation for crush, (mm)** | **Results** |
| **For model of INR18650-2000** | | | | | |
| **Samples charged at charging temperature upper limit （45℃）** | | | | | |
| No.1 | 4.20 | -- | -- | -- | A,D,G |
| No.2 | 4.20 | -- | -- | -- | A,D,G |
| No.3 | 4.20 | -- | -- | -- | A,D,G |
| No.4 | 4.20 | -- | -- | -- | A,D,G |
| No.5 | 4.20 | -- | -- | -- | A,D,G |
| **For model of INR18650-1500** | | | | | |
| **Samples charged at charging temperature upper limit （45℃）** | | | | | |
| No.1 | 4.22 | -- | -- | -- | A,D,G |
| No.2 | 4.22 | -- | -- | -- | A,D,G |
| No.3 | 4.22 | -- | -- | -- | A,D,G |
| No.4 | 4.22 | -- | -- | -- | A,D,G |
| No.5 | 4.22 | -- | -- | -- | A,D,G |
| **For model of INR18650-1300** | | | | | |
| **Samples charged at charging temperature upper limit （45℃）** | | | | | |
| No.1 | 4.21 | -- | -- | -- | A,D,G |
| No.2 | 4.21 | -- | -- | -- | A,D,G |
| No.3 | 4.21 | -- | -- | -- | A,D,G |
| No.4 | 4.21 | -- | -- | -- | A,D,G |
| No.5 | 4.21 | -- | -- | -- | A,D,G |

**Supplementary information:**

A – No fire or explosion

B – Fire

C – Explosion

D – Force released after maximum level reached

E – Force released after abrupt voltage drop of one-third the original

F - Force released after 10 % of deformation has occurred

G – Crush Direction: Longitudinal axis was parallel to the flat surface

H – Crush Direction: 90° from the longitudinal axis (nickel prismatic only)

| IEC 62133 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| 8.3.6 | TABLE: Over-charging of battery | | | | N/A |
|---|---|---|---|---|---|
| Constant charging current (A)..... : | | | | | — |
| Supply voltage (Vdc)..... : | | | | | — |
| **Model** | **OCV before charging, (Vdc)** | **Resistance of circuit, (Ω)** | **Maximum outer casing temperature, (°C)** | **Results** | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

**Supplementary information:**

A- No fire or explosion
B- Fire
C- Explosion

| IEC 62133 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| 8.3.7 | TABLE: Forced discharge (cells) | | | P |
|---|---|---|---|---|
| **Model** | **OCV before application of reverse charge, (Vdc)** | **Measured Reverse charge $I_t$, (A)** | **Time for reversed charge, (minutes)** | **Results** |
| **For model of INR18650-2000** | | | | |
| No.1 | 3.20 | 2.0 | 90 | A |
| No.2 | 3.20 | 2.0 | 90 | A |
| No.3 | 3.20 | 2.0 | 90 | A |
| No.4 | 3.20 | 2.0 | 90 | A |
| No.5 | 3.20 | 2.0 | 90 | A |
| **For model of INR18650-1500** | | | | |
| No.1 | 3.24 | 1.5 | 90 | A |
| No.2 | 3.24 | 1.5 | 90 | A |
| No.3 | 3.23 | 1.5 | 90 | A |
| No.4 | 3.24 | 1.5 | 90 | A |
| No.5 | 3.25 | 1.5 | 90 | A |
| **For model of INR18650-1300** | | | | |
| No.1 | 3.18 | 1.30 | 90 | A |
| No.2 | 3.18 | 1.30 | 90 | A |
| No.3 | 3.18 | 1.30 | 90 | A |
| No.4 | 3.18 | 1.30 | 90 | A |
| No.5 | 3.18 | 1.30 | 90 | A |

**Supplementary information:**

A – No fire or explosion

B – Fire

C – Explosion

| IEC 62133 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| 8.3.9 | TABLE: Forced internal short circuit (cells) | | | | P |
|---|---|---|---|---|---|
| **Model** | **Chamber ambient, (°C)** | **OCV at start of test, (Vdc)** | **Particle location [1)]** | **Maximum applied pressure, (N)** | **Results** |
| **For model of INR18650-2000** | | | | | |
| No.1 | 45 | 4.197 | 1 | 800 | A |
| No.2 | 45 | 4.165 | 1 | 800 | A |
| No.3 | 45 | 4.190 | 1 | 800 | A |
| No.4 | 45 | 4.185 | 2 | 800 | A |
| No.5 | 45 | 4.197 | 2 | 800 | A |
| No.6 | 10 | 4.130 | 1 | 800 | A |
| No.7 | 10 | 4.135 | 1 | 800 | A |
| No.8 | 10 | 4.132 | 1 | 800 | A |
| No.9 | 10 | 4.130 | 2 | 800 | A |
| No.10 | 10 | 4.135 | 2 | 800 | A |
| **For model of INR18650-1500** | | | | | |
| No.1 | 45 | 4.192 | 1 | 800 | A |
| No.2 | 45 | 4.190 | 1 | 800 | A |
| No.3 | 45 | 4.192 | 1 | 800 | A |
| No.4 | 45 | 4.197 | 2 | 800 | A |
| No.5 | 45 | 4.197 | 2 | 800 | A |
| No.6 | 10 | 4.137 | 1 | 800 | A |
| No.7 | 10 | 4.140 | 1 | 800 | A |
| No.8 | 10 | 4.145 | 1 | 800 | A |
| No.9 | 10 | 4.145 | 2 | 800 | A |
| No.10 | 10 | 4.140 | 2 | 800 | A |
| **For model of INR18650-1300** | | | | | |
| No.1 | 45 | 4.107 | 1 | 800 | A |
| No.2 | 45 | 4.140 | 1 | 800 | A |
| No.3 | 45 | 4.142 | 1 | 800 | A |
| No.4 | 45 | 4.135 | 2 | 800 | A |
| No.5 | 45 | 4.142 | 2 | 800 | A |
| No.6 | 10 | 4.163 | 1 | 800 | A |
| No.7 | 10 | 4.150 | 1 | 800 | A |

| IEC 62133 | | | | | |
|---|---|---|---|---|---|
| Clause | Requirement + Test | | Result - Remark | | Verdict |
| No.8 | 10 | 4.183 | 1 | 800 | A |
| No.9 | 10 | 4.179 | 2 | 800 | A |
| No.10 | 10 | 4.168 | 2 | 800 | A |

**Supplementary information:**

[1)] Identify one of the following**:**

1: Nickel particle inserted between positive and negative (active material) coated area.

2: Nickel particle inserted between positive aluminium foil and negative active material coated area.

A - No fire or explosion
B - Fire
C – Explosion
D - Others (please explain)

# Enclosure

| Supplement ID | Description |
|---|---|
| 01-01 | Overall view of Li-Ion Cell, Model INR18650-2000 |
| 01-02 | Overall view of Li-Ion Cell, Model INR18650-1500 |
| 01-03 | Overall view of Li-Ion Cell, Model INR18650-1300 |
| 02 | Specification of Li-Ion Cell |
| 03 | Outline Dimension of Li-Ion Cell |
| 04 | Manufacturer date code of Li-Ion Cell |
| 05 | Packaging Illustration of Li-Ion Cell |

ID 01-01

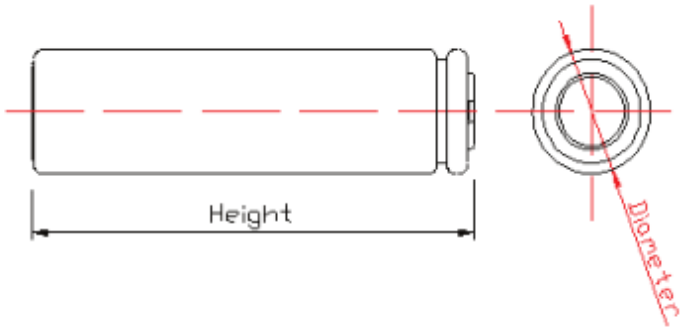

ID 01-02


ID 01-03

ID 02

| ***CELL:*** | |
|---|---|
| Cell Model | INR18650-1300/INR18650-1500/INR18650-2000 |
| Capacity | 1300/1500/2000mAh |
| Standard Charging Current | 0.2C5A |
| Standard Full Charging Voltage | 4.20V |
| End of Charging Current | 0.02C5A |
| Maximum Charging Current | 1C5A |
| Maximum Charging Voltage | 4.20V |
| Standard Discharging Current | 0.5C5A |
| End Point Voltage | 2.75V |
| Maximum Discharge Current | 10C5A |
| Upper Limit Charging Voltage | 4.25V |
| Upper charging Temp limit(T3) | 45℃ |
| Lower charging Temp limit(T2) | 0℃ |

ID 03




| | | | |
|---|---|---|---|
| Height | Max:65.0mm | Diameter | Max:18.0mm |

ID 04

Manufacture Date:

MMDDYY:

MM: Mouth, 2digits, 01~12, 01represent January, and so on

DD: Day, 2digits, 01~30

YY: Year, 2digits, 12 represent 2015, and so on

ID 05