# TEST REPORT
## IEC 62619
## Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for secondary lithium cells and batteries, for use in industrial applications

| | |
|---|---|
| **Report Number:** | KS2605S2839B |
| **Date of issue:** | 2026.06.18 |
| **Total number of pages:** | 17 pages |
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| **Supervised by:** | One Lin<br>Project Engineer |
| **Approved by:** | Sam Yang<br>Technical Director |
| **Testing laboratory:** | KSIGN (Guangdong) Testing Co., Ltd. |
| **Address:** | West Side of 1/F., Building CZone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China |
| **Applicant's name:** | Jiangxi Huayang New Energy Co., Ltd |
| **Address:** | West of fushite Avenue and south of photovoltaic Road, Shangrao Economic and Technological Development Zone, Jiangxi Province, China |
| **Test specification:** | |
| **Standard:** | IEC 62619:2022 |
| **Test procedure:** | Safety Test Report |
| **Non-standard test method:** | N/A |

**General disclaimer:**

The test results presented in this report relate only to the object tested.

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| | |
|---|---|
| **Test item description.....:** | Lithium Ion Battery |
| **Trade Mark.....:** | N/A |
| **Manufacturer.....:** | Same as applicant. |
| **Model/Type reference.....:** | 51.2V 200Ah |
| **Ratings.....:** | 51.2V, 206Ah, 10.5kWh |

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

Attachment 1: Photo documentation (3 pages).

**Summary of testing:**

| **Tests performed (name of test and test clause):** | **Testing location:** |
|---|---|
| 7.2.3 Drop test (cell or cell block, and battery system)<br>8.2.2 Overcharge control of voltage (battery system)<br>8.2.3 Overcharge control of current (battery system)<br>8.2.4 Overheating control (battery system)<br><br>The component cell (CBA54173200-206Ah) was evaluated according to IEC 62619: 2022, Ref. Certif. No. JPTUV-150125.<br><br>Tests are made with the number of batteries specified in IEC 62619: 2022. | KSIGN(Guangdong) Testing Co., Ltd.<br>West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China |

**Summary of compliance with National Differences (List of countries addressed):**

N/A

☒ **The product fulfils the requirements of EN IEC 62619:2022**

**Copy of marking plate:**

**The artwork below may be only a draft.**

| Jiangxi Huayang New Energy Co., Ltd.<br>Lithium Ion Battery | |
|---|---|
| Model | 51.2V 200Ah |
| Nominal Voltage | 51.2V |
| Rated Capacity | 206Ah |
| Nominal Energy | 10.5KWh |
| Rated Current | ≤100A |
| Weight | 81.8kg±1 kg |
| Battery designation | IFpP/56/175/206[1P16S]M/-20+50/90 |
| Series-number | |

WARNING

1.Do not disassemble or alter the PACK to avoid heat , explosion or fire .
2.Do not use the PACK beyond specifide conditions . It might cause heat generation , damage , or deterioration of its performance .
3.Do not throw , drop , hit , drive a nail in , stamp on the PACK . It may cause heat generation , explosion , or fire .
4.In case of electrolyte leakage , keep leaked electrolyte away from contact with eyes or skin , immediately clean with water and seek help from a doctor .
5.Do not put the PACK into a fire . Do not use it or leave it on a place near fire , heaters , or high temperature sources , It may cause over temperature , explosion or fire .
6.Do not submerge the PACK in water , or wet the product , It may cause heat generation , explosion , or fire .
7.Do not reversely connect the PACK positive (+) and negative (-)terminal.
8.Do not short circuit by letting the PACK terminals (+ and -) contact a wire or any metal .
9.The unit is heavy enough to cause severe injury .
10.Keep out of reach of children or animals .
11.DISPOSAL OF BATTERIES SHOULD FOLLOWLOCAL REGULATIONS.

**HYENERGY manufactured for KAL Engineering Services Ltd.**

Made in China


Remark:

The Series Number: “HYA02H26040032026031600007”, code rule shows below:

1)The “2026” represent the year,

2)The “03” represent the month,

3)The “16” represent the day.

| | |
|---|---|
| **Test item particulars.....** | : |
| **Classification of installation and use.....** | : To be defined in final product |
| **Supply Connection.....** | : Terminals |
| **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.....** | : May 28, 2026 |
| **Date (s) of performance of tests.....** | : June 09, 2026 to June 16, 2026 |
| | |
| **General remarks:** | |
| "(See Enclosure #)" refers to addssitional information appended to the report.<br>"(See appended table)" refers to a table appended to the report.<br>**Throughout this report a ☐ comma / ☒ point is used as the decimal separator.** | |
| **When differences exist; they shall be identified in the General product information section.** | |
| **Name and address of factory (ies).....** | : Same as applicant. |

**General product information and other remarks:**

51.2V 200Ah is a rechargeable Li-ion battery with a nominal voltage of 51.2V and a Rated capacity of 206Ah which is used in energy storage applications.

The battery system consists of 16 Lithium Iron Phosphate cells connected in 16S1P cell model no. is CBA54173200-206Ah.

The main features of the battery are shown as below:

| Cell and battery | Cell | Battery System |
|---|---|---|
| Model Name | CBA54173200-206Ah | 51.2V 200Ah |
| Rated capacity (Ah) | 206 | 206 |
| Nominal voltage (V) | 3.2 | 51.2 |
| Standard Charge Current (A) | 103 | ≤100 |
| Standard Discharge Current (A) | 103 | ≤100 |
| Maximum continuous charge current (A) | 206 | 200 |
| Maximum continuous discharge current (A) | 206 | 200 |
| Charge temperature Range (°C) | 0~60 | 0~55 |
| Discharge temperature Range (°C) | -20~60 | -20~55 |
| Standard Charge Voltage (V) | 3.65 | 57.6 |
| Upper limit Charging Voltage (V) | 3.65 | 57.6 |
| End-of-discharge Voltage (V) | 2.5V (0°C<T≤60°C)<br>2.0V (-20°C≤T≤0°C) | 43.2V |
| Weight (kg) | 3.9±0.12 | 81.8±1 |
| Recommend charging method declared by the manufacturer | Charge the cell at constant current 103A until voltage reaches 3.65V, then charge at constant voltage 3.65V till charge current is 10.3A | Charge the battery at constant current 100A until voltage reaches 57.6V, then charge at constant voltage 57.6V till charge current is 10.3A |

| | | | |
|---|---|---|---|
| **4** | **PARAMETER MEASUREMENT TOLERANCES** | | P |
| | Parameter measurement tolerances | | P |

| | | | |
|---|---|---|---|
| **5** | **GENERAL SAFETY CONSIDERATIONS** | | P |
| **5.1** | **General** | | P |
| | Cells and batteries are safe under conditions of both intended use and reasonably foreseeable misuse.. : | See also table 5.1 for Critical components information | P |
| **5.2** | **Insulation and wiring** | | P |
| | Voltage, current, altitude, and humidity requirements | | P |
| | Adequate clearances and creepage distances between connectors | | P |
| | The mechanical integrity of internal connections | | P |
| **5.3** | **Venting** | | P |
| | Pressure relief function | | P |
| | Encapsulation used to support cells within an outer casing | | P |
| **5.4** | **Temperature/voltage/current management** | | P |
| | The design prevents abnormal temperature-rise | Overcharge, over discharge, over current and short-circuit proof circuit used in this battery. See tests of clause 8 | P |
| | Voltage, current, and temperature limits of the cells | | P |
| | Specifications and charging instructions for equipment manufacturers | | P |
| **5.5** | **Terminal contacts of the battery pack and/or battery system** | | P |
| | Polarity marking(s) | | P |
| | Capability to carry the maximum anticipated current | | P |
| | External terminal contact surfaces | | P |
| | Terminal contacts are arranged to minimize the risk of short circuits | | P |
| **5.6** | **Assembly of cells, modules, or battery packs into battery systems** | | P |
| 5.6.1 | General | | P |
| | Independent control and protection method(s) | | P |
| | Recommendations of cell operating limits by the cell manufacturer | | P |
| | Batteries designed for the selective discharge of a portion of their series connected cells | | N/A |
| | Protective circuit component(s) and consideration to the end-device application | | P |
| 5.6.2 | Battery system design | | P |
| | The voltage control function | | P |
| | The voltage control for series-connected batteries | | P |

| | | | |
|---|---|---|---|
| **5.7** | **Operating region of lithium cells and battery systems for safe use** | | P |
| | The cell operating region.....: | Listed in the specification of cell. | P |
| | Designation of battery system to comply with the cell operating region | Information mentioned in manufacturer's specifications. | P |
| **5.8** | **System lock (or system lock function)** | | N/A |
| | Non-resettable function to stop battery operation | | N/A |
| | Manual with procedure for resetting of battery operation | | N/A |
| | Emergency battery final discharge | | N/A |
| **5.9** | **Quality plan** | | P |
| | Manufacturing quality plan (for example: ISO9001, etc.) prepared and implemented..... : | ISO 9001 certificate provided. | P |
| | The process capabilities and the process controls | | P |

| | | | |
|---|---|---|---|
| **6** | **TYPE TEST CONDITIONS** | | P |
| **6.1** | **General** | | P |
| **6.2** | **Test items** | | P |
| | Cells or batteries that are not more than six months old (See Table 1 of IEC62619) | | P |
| | Capacity confirmation of the cells or batteries | | P |
| | Default ambient temperature of test, 25 °C ± 5 °C | | P |

| | | | |
|---|---|---|---|
| **7** | **SPECIFIC REQUIREMENTS AND TESTS** | | P |
| **7.1** | **Charging procedure for test purposes** | | P |
| | The battery discharged to a specified final voltage prior to charging | Complied. | P |
| | The cells or batteries charged using the method specified by the manufacturer.....: | Information mentioned in Manufacturer's specifications | P |
| **7.2** | **Reasonably foreseeable misuse** | | P |
| 7.2.1 | External short-circuit test (cell or cell block) | CB approved cell used. | N/A |
| | Short circuit with total resistance of 30 mΩ ± 10 mΩ at 25 °C ± 5 °C | | N/A |
| | Results: no fire, no explosion | | N/A |
| 7.2.2 | Impact test (cell or cell block) | CB approved cell used. | N/A |
| | Cylindrical cell, longitudinal axis impact | | N/A |
| | Prismatic cell, longitudinal axis and lateral axis impact | | N/A |
| | Results: no fire, no explosion. | | N/A |
| 7.2.3 | Drop test (cell or cell block, and battery system) | | P |
| 7.2.3.1 | General | | P |

| | | | |
|---|---|---|---|
| 7.2.3.2 | Whole drop test (cell or cell block, and battery system) | | N/A |
| | Description of the Test Unit.....: | | — |
| | Mass of the test unit (kg).....: | | — |
| | Height of drop (m).....: | | — |
| | Results: no fire, no explosion | | N/A |
| 7.2.3.3 | Edge and corner drop test (cell or cell block, and battery system) | | P |
| | Description of the Test Unit.....: | Battery | — |
| | Mass of the test unit (kg).....: | 81.8kg | — |
| | Height of drop (m).....: | 0.05m | — |
| | Results: no fire, no explosion | | P |
| 7.2.4 | Thermal abuse test (cell or cell block) | CB approved cell used. | N/A |
| | Results: no fire, no explosion | | N/A |
| 7.2.5 | Overcharge test (cell or cell block) | CB approved cell used. | N/A |
| | For those battery systems that are provided with only a single protection for the charging voltage control | | — |
| | Results: no fire, no explosion.....: | | N/A |
| 7.2.6 | Forced discharge test (cell or cell block) | CB approved cell used. | N/A |
| | Upper limit charge voltage of the cell.....: | | N/A |
| | Cells connected in series in the battery system..... : | | N/A |
| | Redundant or single protection for discharge voltage control provided in battery system..... : | | N/A |
| | Target Voltage..... : | | N/A |
| | Maximum discharge current of the cell, $I_m$..... : | | N/A |
| | Discharge current for forced discharge, 1.0 It.....: | | N/A |
| | Discharging time, t = (1 It / $I_m$ ) x 90 (min.).....: | | N/A |
| | Results: no fire, no explosion.....: | | N/A |
| **7.3** | **Considerations for internal short-circuit – Design evaluation** | | N/A |
| 7.3.1 | General | | N/A |
| 7.3.2 | Internal short-circuit test (cell) | CB approved cell used. | N/A |
| | Samples preparation procedure:<br>a), in accordance with 8.3.9 of IEC62133:2012; or<br>b), the nickel particle inserted before charging, or<br>c), the nickel particle was inserted before electrolyte filling.....: | | N/A |
| | Tested according to Cl. 8.3.9 of IEC 62133:2012 test method, except all tests were carried out in an ambient temperature of 25 °C ± 5 °C. | | N/A |
| | The appearance of the short-circuit location recorded by photograph or other means..... : | | — |

| | | | |
|---|---|---|---|
| | The pressing was stopped<br>- When a voltage drop of 50 mV was detected; or | | N/A |
| | - The pressing force of 800 N (cylindrical cells) or 400 N (prismatic cells) was reached | | N/A |
| | Results: no fire, no explosion.....: | | N/A |
| **7.3.3** | **Propagation test (battery system)** | CB approved cell used. | N/A |
| | Method to create a thermal runaway in one cell .... : | | N/A |
| | Results: No external fire from the battery system or no battery case rupture.....: | | N/A |

| | | | |
|---|---|---|---|
| **8** | **BATTERY SYSTEM SAFETY (CONSIDERING FUNCTIONAL SAFETY)** | | P |
| **8.1** | **General requirements** | | **N/A** |
| | Functional safety analysis for critical controls | Relevant documents provided by the client which indicate analysis for function safety meet the requirement of the IEC 60730-1 Annex H. | N/A |
| | Conduct of a process hazard analysis for both the cell manufacturing process and the<br>battery system manufacturing process | | N/A |
| | Conduct of a process hazard, risk assessment and mitigation of the battery system | | P |
| **8.2** | **Battery management system (or battery management unit)** | | P |
| 8.2.1 | Requirements for the BMS | | P |
| | The safety integrity level (SIL) target of the BMS | | P |
| | The charge control evaluated by tests in clauses 8.2.2 to 8.2.4 | | N/A |
| 8.2.2 | Overcharge control of voltage (battery system) | Tested complied. | P |
| | The exceeded charging voltage applied to the whole battery system | | P |
| | The exceeded charging voltage applied to only a part of the battery system, such as the cell(s)..... : | | N/A |
| | Results: no fire, no explosion.....: | (See appended table 8.2.2) | P |
| | The BMS interrupted the overcharging before reaching 110% of the upper limit charging voltage | | P |
| 8.2.3 | Overcharge control of current (battery system) | Tested complied. | P |
| | Results: no fire, no explosion.....: | (See appended table 8.2.3) | P |
| | The BMS detected the overcharging current and controlled the charging to a level below the maximum charging current | | P |
| 8.2.4 | Overheating control (battery system) | | P |
| | The cooling system, if provided, was disconnected | | N/A |
| | Elevated temperature for charging, 5 °C above maximum operating temperature..... : | | P |
| | Results: no fire, no explosion.....: | (See appended table 8.2.4) | P |

| | | | |
|---|---|---|---|
| | The BMS detected the overheat temperature and terminated charging | Tested complied. | P |
| | The battery system operated as designed during test | | P |

| | | | |
|---|---|---|---|
| **9** | **EMC** | | P |
| | Battery system fulfil EMC requirements of the end-device application.....: | | P |

| | | | |
|---|---|---|---|
| **10** | **INFORMATION FOR SAFETY** | | P |
| | The cell manufacturer provides information about current, voltage and temperature limits of their products | | P |
| | The battery system manufacturer provides information regarding how to mitigate hazards to equipment manufacturers or end-users. | | P |

| | | | |
|---|---|---|---|
| **11** | **MARKING AND DESIGNATION (REFER TO CLAUSE 5 OF IEC 62620)** | | P |
| | The marking items shown in Table 1 in IEC 62620 indicated on the cell, battery system or instruction manual. | | P |
| | Cell or battery system has clear and durable markings | | P |
| | Cell designation | | N/A |
| | Battery designation | See marking. | P |
| | Battery structure formulation | | P |

| | | | |
|---|---|---|---|
| **12** | **PACKAGING AND TRANSPORT** | | P |
| | Refer to Annex D | | P |

| | | | |
|---|---|---|---|
| **ANNEX A** | **OPERATING REGION OF CELLS FOR SAFE USE** | | P |
| A.1 | General | | P |
| A.2 | Charging conditions for safe use | | P |
| A.3 | Consideration on charging voltage | | P |
| A.4 | Consideration on temperature | | P |
| A.5 | High temperature range | | P |
| A.6 | Low temperature range | | P |
| A.7 | Discharging conditions for safe use | | P |
| A.8 | Example of operating region | | P |

| | | | |
|---|---|---|---|
| **ANNEX B** | **PROCEDURE OF 7.3.3 PROPAGATION TEST BY LASER IRRADIATION** | | N/A |
| **B.1** | **General** | | N/A |
| **B.2** | **Test conditions** | | N/A |
| B.2.1 | Cell test (preliminary test) | | N/A |
| | The cell fully charged according to the manufacturer recommended conditions.....: | | — |
| | Laser irradiation point on the cell..... : | | — |
| | Output power of laser irradiation..... : | | — |
| | Tested in an ambient temperature of 25 °C ± 5 °C | | N/A |
| | Repeat of cell test for 3 times | | N/A |
| B.2.2 | Battery system test (main test) | | N/A |
| | The battery system fully charged according to the manufacturer recommended conditions.....: | | — |
| | Target cell to be laser irradiated.....: | | — |
| | The irradiation point on the target cell same or similar as that on the cell test | | |
| | Output power of laser irradiation..... : | | — |
| | Tested in an ambient temperature of 25 °C ± 5 °C | | N/A |

| | | | |
|---|---|---|---|
| **ANNEX C** | **PROCEDURE OF 7.3.3 PROPAGATION TEST BY METHODS OTHER THAN LASER** | | N/A |
| C.1 | General | | N/A |
| C.2 | Test conditions: | | N/A |
| | – The battery fully charged according to the manufacturer recommended conditions.....: | | — |
| | – Target cell forced into thermal runaway.....: | | — |
| | – A specially prepared sample (e.g. a heater or a hole for nail penetration provided) used for ease of testing..... : | | — |
| C.3 | Method used for initiating the thermal runaway.<br>1) Heater (Heater, Burner, Laser, Inductive heating<br>2) Overcharge<br>3) Nail penetration of the cell<br>4) Combination of above methods<br>5) Other methods..... : | | — |

| | | | |
|---|---|---|---|
| **ANNEX D** | **PACKAGING AND TRANSPORT** | | N/A |
| | The materials and pack design chosen in a way as to prevent the development of unintentional electrical conduction, corrosion of the terminals and ingress of environmental contaminants | | N/A |
| | Regulations concerning international transport of secondary lithium batteries | | N/A |

| 5.1 | TABLE: Critical components information | | | | P |
|---|---|---|---|---|---|
| **Object/part no.** | **Manufacturer/ trademark** | **Type/model** | **Technical data** | **Standard** | **Mark(s) of conformity [1)]** |
| Cell | Shandong Dejin New Energy Science and Technology Co., Ltd | CBA54173200-206Ah | 3.2V, 206Ah | IEC 62619: 2022 | TUV Ref. Certif. No: JPTUV-150125 |
| Metal Enclosure | Haipu New Energy Technology (Jiangxi) Co., Ltd. | 51.2V 200Ah | SPCC, Min thickness: 1.5mm 442.5*540*230mm | IEC 62619: 2022 | Test with appliance |
| (Alternative) | Interchangeable | Interchangeable | SPCC, Min thickness: 1.5mm 442.5*540*230mm | IEC 62619: 2022 | Test with appliance |
| Connector | JIANGYIN JIHUA NEW MATERIAL CO LTD | PBT4308G(yy) | V-0, 130℃ | UL 94 | UL E139063 |
| Fuse | Dongguan Selittel Fuses MFG. Co., Ltd | ANL-C-250A | -40˚C to +125˚C 250A, 80V | UL 248 | UL E543339 |
| Insulation sheet | Hunan Dobesty Optical Material Co Ltd | DB9821B | V-0, 80℃ | UL94 | UL E524866 |
| Epoxy board | KINGBOARD LAMINATES HOLDINGS LTD | KB-6160A | V-0, 130℃ | UL 94 | UL E123995 |
| Internal wiring (B+ to Fuse) | Xingda Technology Stock Co Ltd | 3512 | 1AWG, 200°C, 600V | UL758 | UL E187208 |
| (Alternative) | Interchangeable | Interchangeable | 1AWG, 200°C, 600V | UL 758 | UL approve |
| Internal wiring (B- to BMS) | Xingda Technology Stock Co Ltd | 3512 | 4AWG, 200°C, 600V | UL758 | UL E187208 |
| (Alternative) | Interchangeable | Interchangeable | 4AWG, 200°C, 600V | UL 758 | UL approve |
| Internal wiring (BMS to P-） | Xingda Technology Stock Co Ltd | 3512 | 4AWG, 200°C, 600V | UL758 | UL E187208 |
| (Alternative) | Interchangeable | Interchangeable | 4AWG, 200°C, 600V | UL 758 | UL approve |
| Internal wiring (signal) | DONGGUAN ZHONGZHEN NEW ENERGY TECHNOLOGY CO.,LTD | 1015 | 24AWG, 105°C, 600V | UL758 | UL E355578 |
| (Alternative) | Interchangeable | Interchangeable | 4AWG, 200°C, 600V | UL 758 | UL approve |
| PCB | SHENZHEN HOPESEARCH PCB MANUFACTURING CO LTD | F-M | V-0, 130°C | UL 796 | UL E351308 |
| (Alternative) | Interchangeable | Interchangeable | V-0, 130°C | UL 796 | UL approve |
| IC for MCU (U3) | GigaDevice Semiconductor Inc. | GD32F303VCT6 | Supply voltage: 2.6V~3.6V -40°C to 85°C | IEC 62619: 2022 | Test with appliance |
| IC for AFE (U1) | Monolithic Power System Inc. | MP2796DFP | Supply voltage: 3V~28V -40°C to 85°C | IEC 62619: 2022 | Test with appliance |

| | | | | | |
|---|---|---|---|---|---|
| MOSFET for charge &discharge (M13, M14, M15, M16, M17, M19, M20, M1, M2, M3, M4, M5, M6, M7) | Lonten Semiconductor Co., Ltd. | LSGT10R018HC | VDS: 100V<br>VGS: ±20V<br>ID: 340A<br>-55°C to 150°C | IEC 62619: 2022 | Test with appliance |
| MOSFET for charge &discharge (Alternative) | Jiangsu JieJie Microelectronics Co., Ltd. | JBL101N | VDS: 100V<br>VGS: ±20V<br>ID: 340A<br>-55°C to 150°C | IEC 62619: 2022 | Test with appliance |
| Current sampling resistor (RS1RS3 RS4 RS5RS6 RS8 RS11R12 R13RS14) | NANJING SATETECHNOLOGYDEVELOPMENTCO.. LTD | SMR25M3FR003T00 | 3mΩ，3W | IEC 62619: 2022 | Test with appliance |
| Current sampling resistor (Alternative) | YEZHAN ELECTRONICS Co., Ltd. | YLRY12-3-3F-K | 3mΩ，3W | IEC 62619: 2022 | Test with appliance |
| NTC (NTC1, NTC2, NTC3, NTC4) | NANJING SHIHENG ELECTRONICS CO LTD | MF52C 103Y3435 | Resistance at 25°C: 10KΩ<br>Tmoa: 125°C | UL 1434 | UL E240991 |
| (Alternative) | Interchangeable | Interchangeable | Resistance at 25°C: 10KΩ<br>Tmoa: 125°C | UL 1434 | UL approve |

**Supplementary information:**

**[1] Provided evidence ensures the agreed level of compliance. See OD-CB2039.**

Remark: Due to the product confidential, the details components was not provided by client.

| 7.2.1 | TABLE: External short-circuit test (cell or cell block) | | | | N/A |
|---|---|---|---|---|---|
| **Sample No.** | **Ambient (at 25°C ± 5°C)** | **OCV at start of test (V dc)** | **Resistance of Circuit (mΩ)** | **Maximum Case Temperature ~~Rise ΔT~~ (°C)** | **Results** |
| -- | -- | -- | -- | -- | -- |
| -- | -- | -- | -- | -- | -- |
| -- | -- | -- | -- | -- | -- |

**Supplementary information:**

A - No fire or Explosion
B - Fire
C - Explosion
D - The test was completed after 6 h
E - The test was completed after the cell casing cooled to 20% of the maximum temperature rise
F - Other (Please explain): ___

| 7.2.5 | TABLE: Overcharge test (cell or cell block) | | | | | N/A |
|---|---|---|---|---|---|---|
| **Sample No.** | **OCV at start of test (V dc)** | **OCV at end of test (V dc)** | **Measured Maximum Charging Current (A)** | **Measured Maximum Charging Voltage (V dc)** | **Max. Cell Case Temperature, (°C)** | **Results** |
| -- | -- | -- | -- | -- | -- | -- |
| -- | -- | -- | -- | -- | -- | -- |
| -- | -- | -- | -- | -- | -- | -- |

**Supplementary information:**

Results:
A - No fire or Explosion
B - Fire
C - Explosion
D - Test concluded when temperature reached a steady state condition
E - Test concluded when temperature returned to ambient
F - Other (Please explain): _____

| 7.2.6 | TABLE: Forced discharge test (cell or cell block) | | | | N/A |
|---|---|---|---|---|---|
| **Sample No.** | **OCV before applying reverse charge, (V dc)** | **Target Voltage (V dc)** | **Measured Reverse Charge Current It, (A)** | **Total Time for Reversed Charge Application (min)** | **Results** |
| -- | -- | -- | -- | -- | -- |
| -- | -- | -- | -- | -- | -- |
| -- | -- | -- | -- | -- | -- |

**Supplementary information:**

Results:
A - No fire or Explosion
B - Fire
C - Explosion
D - Other (Please explain): ___

| 7.3.2 | TABLE: Internal short-circuit test (cell) | | | N/A |
|---|---|---|---|---|
| **Sample No.** | **OCV at start of test, (V dc)** | **Particle location [1)]** | **Maximum applied pressure, (N)** | **Results** |
| -- | -- | -- | -- | -- |
| -- | -- | -- | -- | -- |
| -- | -- | -- | -- | -- |
| -- | -- | -- | -- | -- |
| -- | -- | -- | -- | -- |
| -- | -- | -- | -- | -- |
| -- | -- | -- | -- | -- |
| -- | -- | -- | -- | -- |
| -- | -- | -- | -- | -- |
| -- | -- | -- | -- | -- |

**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.

**Results:**

A - No fire or explosion
B – Fire
C - Explosion
D – Test concluded when 50 mV voltage drop occurred prior to reaching force limit
E – Test concluded when 800/400 N pressure was reached and 50 mV voltage drop was not achieved
F – Test was concluded when fire or explosion occurred
G - Other (Please explain): __

| 7.3.3 | TABLE: Propagation test (battery system) | | | | N/A |
|---|---|---|---|---|---|
| **Sample No.** | **OCV of Battery System Before Test, (V dc)** | **OCV of Target Cell Before Test, (V dc)** | **Maximum Cell Case Temperature, (°C)** | **Maximum DUT Enclosure Temperature, (°C)** | **Results** |
| | | | | | |
| | | | | | |
| | | | | | |

| **Method of cell failure 1)** | **Location of target cell** | **Area for fire protection ($m^2$)** |
|---|---|---|
| | | |
| | | |
| | | |

**Supplementary information:**

**1)** Cell can be failed through applied heat, overcharge, nail penetration or combinations of these failures or other acceptable methods. See supporting documentation for details on cell failure method

**2)** If the battery system has no outer covering, the manufacturer is required to specify the area for fire protection.

Results:
A – No fire external to DUT enclosure or area for fire protection or no battery case rupture
B – Fire external to DUT enclosure or area for fire protection
C – Explosion
D – Battery case rupture
E - Other (Please explain): __

| 8.2.2 | TABLE: Overcharge control of voltage (battery system) | | | | P |
|---|---|---|---|---|---|
| **Sample No.** | **OCV at start of test for Cell/Cell Blocks, (V dc)** | **Maximum Charging Current, (A)** | **Max. Charging Voltage, (V dc)** | **Max. Voltage of Cell/Cell Blocks, (V dc)** | **Results** |
| B001 | 2.768~2.828 | 200 | 58.187 | 3.599 | A, D, F |

| | **Charge Voltage Applied Battery System: 1)** | |
|---|---|---|
| | **Whole** | **Part** |
| | 58.4Vdc | -- |

**Supplementary information:**

1. The exceeded voltage can be applied to only a part of the system such as the cell(s) in the battery system per Figure 6 of IEC 62619, if it is difficult to do it in using the whole battery system.

Results:
A - No Fire or Explosion
B – Fire
C - Explosion
D - The voltage of the measured cells or cell blocks did not exceed the upper limit charging voltage
E - The voltage of the measured cells or cell blocks did exceed the upper limit charging voltage
F - All function of battery system did operate as intended during the test.
G - All function of battery system did not operate as intended during the test.
H - Other (Please explain): ___

| 8.2.3 | TABLE: Overcharge control of current (battery system) | | | P |
|---|---|---|---|---|
| **Sample No.** | **OCV at start of test, (V dc)** | **Max. Charging Current, (A)** | **Max. Charging Voltage, (V dc)** | **Results** |
| B001 | 45.869 | 240 | 48.908 | A, D, F |

**Supplementary information:**

Results:
A – No fire or Explosion
B – Fire
C – Explosion
D - Overcurrent sensing function of BMU did operate and then charging stopped
E - Overcurrent sensing function of BMU did not operate and then charging stopped
F - All function of battery system did operate as intended during the test.
G - All function of battery system did not operate as intended during the test.
H - Other (Please explain):

| 8.2.4 | TABLE: Overheating control (battery system) | | P |
|---|---|---|---|
| **Model No.** | **OCV at start (SOC 50%) of test, V dc** | **Maximum Charging Current, A** | **Maximum Charging Voltage, V dc** |
| B001 | 52.569 | 200 | 56.114 |
| **Maximum Specified Temperature of Battery System, °C** | | **Maximum Measured Cell Case Temperature, °C** | **Results** |
| 55 | | 60 | A, D, F |

**Supplementary information:**

Results:
A – No fire or Explosion
B – Fire
C – Explosion
D - Temperature sensing function of BMU did operate and then charging stopped
E - Temperature sensing function of BMU did not operate and then charging stopped
F - All function of battery system did operate as intended during the test.
G - All function of battery system did not operate as intended during the test.
H - Other (Please explain): ___

Product: Lithium Ion Battery

Type Designation: 51.2V 200Ah

Figure 1 Overview of battery

Figure 2 Overview of battery

Product: Lithium Ion Battery

Type Designation: 51.2V 200Ah

Figure 3 Internal view of battery


Figure 4 Polarity view of battery

Product: Lithium Ion Battery

Type Designation: 51.2V 200Ah

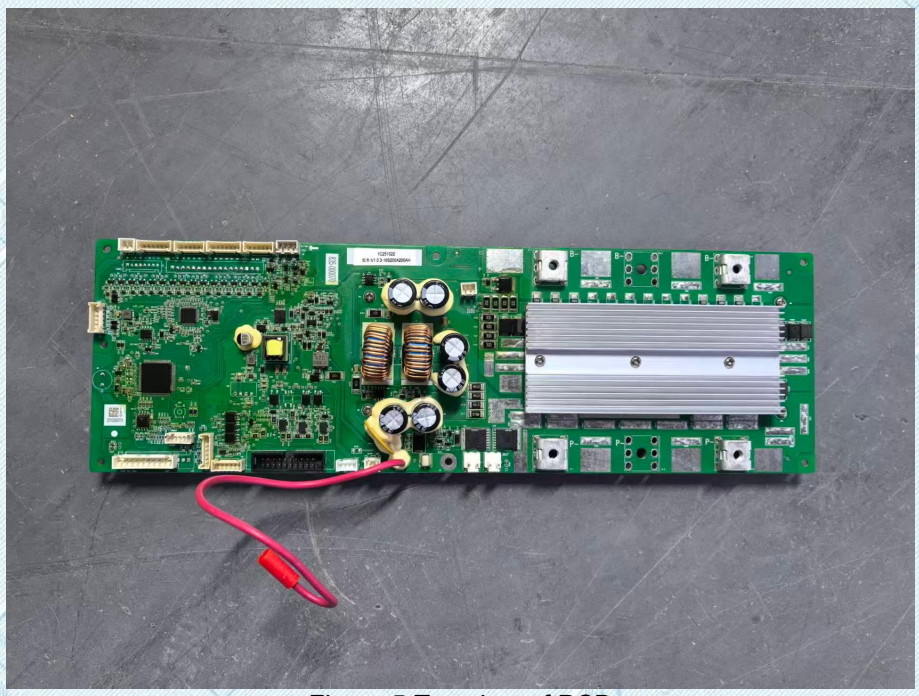

Figure 5 Top view of PCB

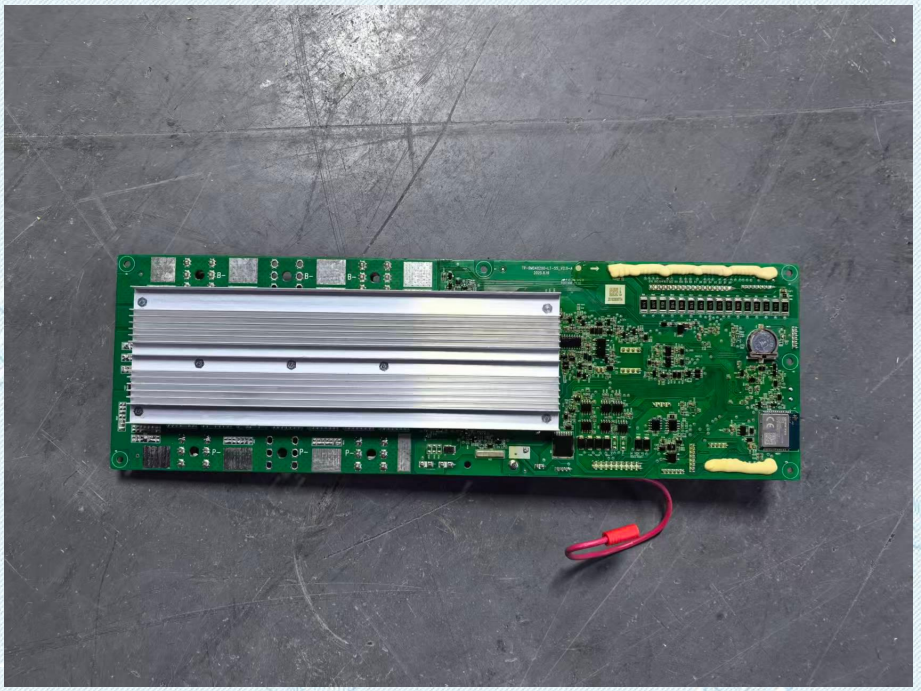

Figure 6 Back view of PCB

--End of Report--