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**TEST REPORT
IEC 62133-2**

**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 –
Part 2: Lithium systems**

Report Number. : 200708048SZN-001

Date of issue : July 23, 2020

Total number of pages : See page 3 for details

**Name of Testing Laboratory
preparing the Report** : Intertek Testing Services Shenzhen Ltd. Longhua Branch

Applicant's name..... : Anhui Xiangyuan new energy co., LTD

Address : East of Tangshan Road, South of Shanghe Road, New Area of Huaibei Economic Development Zone, Anhui Province, China

Test specification:

Standard : IEC 62133-2:2017

Test procedure..... : CB Scheme

Non-standard test method : N/A

Test Report Form No. : IEC62133_2A

Test Report Form(s) Originator.... : DEKRA

Master TRF : Dated 2017-08-10

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General disclaimer:

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

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Test item description.....	Li-ion Cell	
Trade Mark	N/A	
Manufacturer	Same as applicant	
Model/Type reference.....	1) 18650 2500mAh, 2)18650 2000mAh, 3)18650 1800mAh, 4)18650 1500mAh	
Ratings.....	1) 3.7V, 2500mAh, 9.25Wh, 2) 3.7V, 2000mAh, 7.4Wh, 3) 3.7V, 1800mAh, 6.66Wh, 4) 3.7V, 1500mAh, 5.55Wh	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
☒ CB Testing Laboratory:	Intertek Testing Services Shenzhen Ltd. Longhua Branch	
Testing location/ address	101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community, GuanHu Subdistrict, LongHua District, Shenzhen, P.R. China	
Tested by (name, function, signature)	Jason Zhu/ Project Engineer	
Approved by (name, function, signature) ..	Joseph Li / Reviewer	
Testing procedure: CTF Stage 1:		
Testing location/ address		
Tested by (name, function, signature)		
Approved by (name, function, signature) ..		
Testing procedure: CTF Stage 2:		
Testing location/ address		
Tested by (name + signature)		
Witnessed by (name, function, signature) .		
Approved by (name, function, signature) ..		
Testing procedure: CTF Stage 3:		
Testing procedure: CTF Stage 4:		
Testing location/ address		
Tested by (name, function, signature)		
Witnessed by (name, function, signature) .		
Approved by (name, function, signature) ..		
Supervised by (name, function, signature) :		

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

- Pages 1 to 29 for IEC 62133-2 TRF (main report)
- Appendix 1 (4 pages): Product Photos

Summary of testing:

The product fulfils the requirements of: IEC 62133-2: 2017 and EN 62133-2: 2017.

Tests performed (name of test and test clause):

7.1 Charging procedure for test purposes;
 7.2.1 Continuous charging at constant voltage (cells);
 7.3.1 External short circuit (cell);
 7.3.3 Free fall (cell);
 7.3.4 Thermal abuse (cell);
 7.3.5 Crush (cells);
 7.3.7 Forced discharge (cells);
 7.3.9 Design evaluation - Forced internal short circuit (cells)

Testing location:

Intertek Testing Services Shenzhen Ltd. Longhua Branch
 101, 201, Building B, No. 308 Wuhe Avenue,
 Zhangkengjing Community, GuanHu Subdistrict,
 LongHua District, Shenzhen, P.R. China

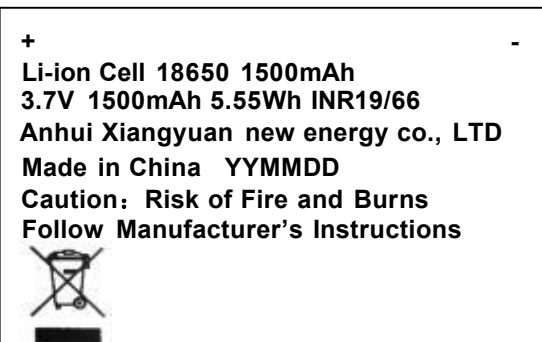
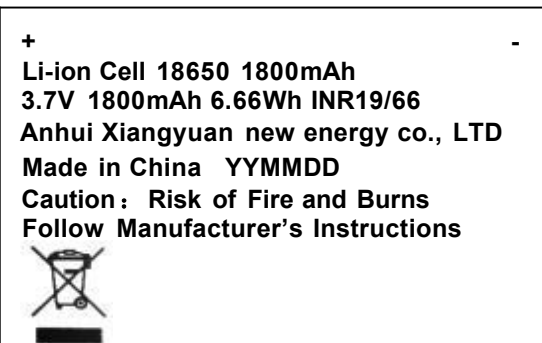
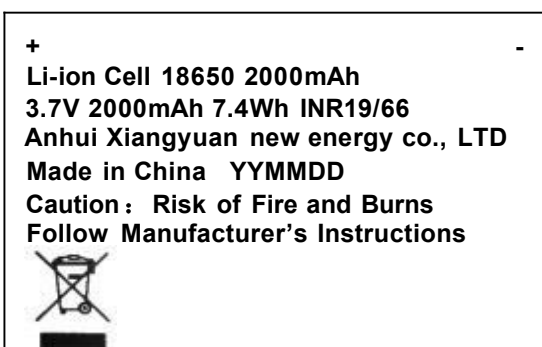
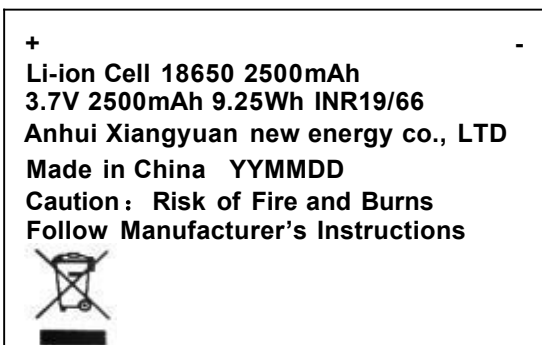
Summary of compliance with National Differences:

NA

☒ The product fulfils the requirements of: IEC 62133-2: 2017 and EN 62133-2: 2017.

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.

**Remark:**

Above plate will be printed on the surface of the cell.

The code "YYMMDD" represents that:

YY for Year.

MM for Month.

DD for Day.

Test item particulars..... :	
Classification of installation and use	: To be defined in final product
Supply Connection	: Electrode tab
Recommend charging method declared by the manufacturer	: Charging the cell with 0.2C constant current and 4.2V constant voltage, until the current reduces to 0.01C.
Discharge current (0,2 It A)	: 500mA for 18650 2500mAh 400mA for 18650 2000mAh 360mA for 18650 1800mAh 300mA for 18650 1500mAh
Specified final voltage.....	: 2.75V
Upper limit charging voltage per cell.....	: 4.20V
Maximum charging current	: 1C
Charging temperature upper limit	: 45°C
Charging temperature lower limit.....	: 0°C
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	: June 24, 2020
Date (s) of performance of tests	: June 24, 2020 to July 22. 2020
General remarks:	
"(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. When determining the test conclusion, the Measurement Uncertainty of test has been considered. This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program. The test report only allows to be revised only within the report defined retention period unless standard or regulation was withdrawn or invalid. The clause which indicated with * is the subcontract test item. (if there is subcontracting test).	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC62133_2A:	

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 ☒ Not applicable
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:

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

Cell model 18650 2500mAh, 18650 2000mAh, 18650 1800mAh and 18650 1500mAh have same voltage, same construction design, same size, same chemical material and different model name and nominal capacity.

All of these cell models were selected for all testing in this report.

Model no.	18650 2500mAh	18650 2000mAh	18650 1800mAh	18650 1500mAh
Recommend charging voltage	4.2V	4.2V	4.2V	4.2V
Recommend charging current	500mA	400mA	360mA	300mA
Max. charging current	2500mA	2000mA	1800mA	1500mA
Recommend discharging voltage	2.75V	2.75V	2.75V	2.75V
Recommend discharging current	500mA	400mA	360mA	300mA
Max. discharging current	12500mA	10000mA	9000mA	7500mA
Operation Temperature	0~45°C	0~45°C	0~45°C	0~45°C

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
4	PARAMETER MEASUREMENT TOLERANCES		P
	Parameter measurement tolerances		P
5	GENERAL SAFETY CONSIDERATIONS		P
5.1	General		P
	Cells and batteries so designed and constructed that they are safe under conditions of both intended use and reasonably foreseeable misuse		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	No externally exposed metal surfaces.	N/A
	Insulation resistance (MΩ) :		—
	Internal wiring and insulation are sufficient to withstand maximum anticipated current, voltage and temperature requirements		N/A
	Orientation of wiring maintains adequate clearance and creepage distances between conductors		N/A
	Mechanical integrity of internal connections accommodates reasonably foreseeable misuse		N/A
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		P
	Encapsulation used to support cells within an outer casing does not cause the battery to overheat during normal operation nor inhibit pressure relief		N/A
5.4	Temperature, voltage and current management	Only cell.	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 specified chargers are designed to maintain charging within the temperature, voltage and current limits specified		N/A
5.5	Terminal contacts		N/A
	The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current		N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	External terminal contact surfaces are formed from conductive materials with good mechanical strength and corrosion resistance		N/A
	Terminal contacts are arranged to minimize the risk of short-circuit		N/A
5.6	Assembly of cells into batteries		N/A
5.6.1	General	Only cell.	N/A
	Each battery have an independent control and protection for current, voltage, temperature and any other parameter required for safety and to maintain the cells within their operating region		N/A
	This protection may be provided external to the battery such as within the charger or the end devices		N/A
	If protection is external to the battery, the manufacturer of the battery provide this safety relevant information to the external device manufacturer for implementation		N/A
	If there is more than one battery housed in a single battery case, each battery have protective circuitry that can maintain the cells within their operating regions		N/A
	Manufacturers of cells specify 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 circuitry to prevent operation of cells outside the limits specified by the cell manufacturer		N/A
	Protective circuit components added as appropriate and consideration given to the end-device application		N/A
	The manufacturer of the battery provide a safety analysis of the battery safety circuitry with a test report including a fault analysis of the protection circuit under both charging and discharging conditions confirming the compliance		N/A
5.6.2	Design recommendation	Only cell.	N/A
	For the battery consisting of a single cell or a single cellblock, it is recommended that the charging voltage of the cell does not exceed the upper limit of the charging voltage specified in Table 2		N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	For the battery consisting of series-connected plural single cells or series-connected plural cellblocks, it is recommended that the voltages of any one of the single cells or single cellblocks does not exceed the upper limit of the charging voltage, specified in Table 2, 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, it is recommended that charging is stopped when the upper limit of the charging voltage 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
	For batteries consisting of series-connected cells or cell blocks, nominal charge voltage not be counted as an overcharge protection		N/A
	For batteries consisting of series-connected cells or cell blocks, cells have closely matched capacities, be of the same design, be of the same chemistry and be from the same manufacturer		N/A
	It is recommended that the cells and cell blocks not discharged beyond the cell manufacturer's specified final voltage		N/A
	For batteries consisting of series-connected cells or cell blocks, cell balancing circuitry incorporated into the battery management system		N/A
5.6.3	Mechanical protection for cells and components of batteries	Only cell.	N/A
	Mechanical protection for cells, cell connections and control circuits within the battery provided to prevent damage as a result of intended use and reasonably foreseeable misuse		N/A
	The mechanical protection can be provided by the battery case or it can be provided by the end product enclosure for those batteries intended for building into an end product		N/A
	The battery case and compartments housing cells designed to accommodate cell dimensional tolerances during charging and discharging as recommended by the cell manufacturer		N/A
	For batteries intended for building into a portable end product, testing with the battery installed within the end product considered when conducting mechanical tests		N/A
5.7	Quality plan		P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	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	ISO 9001: 2015 certificate of factory provided.	P
5.8	Battery safety components		N/A
	According annex F		N/A

6	TYPE TEST AND SAMPLE SIZE		P
	Tests are made with the number of cells or batteries specified in Table 1 using cells or batteries that are not more than six months old	Tests are performed according to specified in Table 1 of this standard. The samples are not more than six months old.	P
	Coin cells with resistance $\leq 3 \Omega$ (measured according annex D) are tested according table 1	Not coin cell.	N/A
	Unless otherwise specified, tests are carried out in an ambient temperature of $20 \text{ }^{\circ}\text{C} \pm 5 \text{ }^{\circ}\text{C}$		P
	The safety analysis of 5.6.1 identify those components of the protection circuit that are critical for short-circuit, overcharge and overdischarge protection		N/A
	When conducting the short-circuit test, consideration given to the simulation of any single fault condition that is likely to occur in the protecting circuit that would affect the short-circuit test		N/A

7	SPECIFIC REQUIREMENTS AND TESTS		P
7.1	Charging procedure for test purposes		P
7.1.1	First procedure		P
	This charging procedure applies to subclauses other than those specified in 7.1.2		P
	Unless otherwise stated in this document, the charging procedure for test purposes is carried out in an ambient temperature of $20 \text{ }^{\circ}\text{C} \pm 5 \text{ }^{\circ}\text{C}$, using the method declared by the manufacturer		P
	Prior to charging, the battery have been discharged at $20 \text{ }^{\circ}\text{C} \pm 5 \text{ }^{\circ}\text{C}$ at a constant current of 0,2 It A down to aspecified final voltage		P
7.1.2	Second procedure		P
	This charging procedure applies only to 7.3.1, 7.3.4, 7.3.5, and 7.3.9		P

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Clause	Requirement + Test	Result - Remark	Verdict
	After stabilization for 1 h and 4 h, respectively, at ambient temperature of highest test temperature and lowest test temperature, as specified in Table 2, cells are charged by using the upper limit charging voltage and maximum charging current, until the charging current is reduced to 0,05 It A, using a constant voltage charging method	Charging temperature specified by client is 0-45°C, 45°C and -5°C were used as highest test temperature and lowest test temperature during tests. The upper limit charging voltage is 4.20V. The maximum charging current is 1C.	P
7.2	Intended use		P
7.2.1	Continuous charging at constant voltage (cells)	Tested complied.	P
	Fully charged cells are subjected for 7 days to a charge using the charging method for current and standard voltage specified by the cell manufacturer		P
	Results: No fire. No explosion. No leakage : (See appended table 7.2.1)		P
7.2.2	Case stress at high ambient temperature (battery)		N/A
	Oven temperature (°C) : —		—
	Results: No physical distortion of the battery case resulting in exposure of internal protective components and cells		N/A
7.3	Reasonably foreseeable misuse		P
7.3.1	External short-circuit (cell)	Tested complied.	P
	The cells were tested until one of the following occurred:		P
	- 24 hours elapsed; or		N/A
	- The case temperature declined by 20 % of the maximum temperature rise		P
	Results: No fire. No explosion : (See appended table 7.3.1)		P
7.3.2	External short-circuit (battery)		N/A
	The batteries were tested until one of the following occurred:		N/A
	- 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
	A single fault in the discharge protection circuit conducted on one to four (depending upon the protection circuit) of the five samples before conducting the short-circuit test		N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	A single fault applies to protective component parts such as MOSFET, fuse, thermostat or positive temperature coefficient (PTC) thermistor		N/A
	Results: No fire. No explosion	(See appended table 7.3.2)	N/A
7.3.3	Free fall	Tested complied.	P
	Results: No fire. No explosion		P
7.3.4	Thermal abuse (cells)	Tested complied.	P
	Oven temperature (°C)	130	—
	Results: No fire. No explosion		P
7.3.5	Crush (cells)	Tested complied.	P
	The crushing force was released upon:		P
	- The maximum force of 13 kN ± 0,78 kN has been applied; or		P
	- An abrupt voltage drop of one-third of the original voltage has been obtained		N/A
	Results: No fire. No explosion	(See appended table 7.3.5)	P
7.3.6	Over-charging of battery		N/A
	The supply voltage which is:		N/A
	- 1,4 times the upper limit charging voltage presented in Table A.1 (but not to exceed 6,0 V) for single cell/cell block batteries or		N/A
	- 1,2 times the upper limit charging voltage presented in Table A.1 per cell for series connected multi-cell batteries, and		N/A
	- Sufficient to maintain a current of 2,0 It A throughout the duration of the test or until the supply voltage is reached		N/A
	Test was continued until the temperature of the outer casing:		N/A
	- 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	(See appended table 7.3.6)	N/A
7.3.7	Forced discharge (cells)	Tested complied.	P
	If the discharge voltage reaches the negative value of upper limit charging voltage within the testing duration, the voltage is maintained at the negative value of the upper limit charging voltage by reducing the current for the remainder of the testing duration		N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	If the discharge voltage does not reach the negative value of upper limit charging voltage within the testing duration, the test is terminated at the end of the testing duration		P
	Results: No fire. No explosion	(See appended table 7.3.7)	P
7.3.8	Mechanical tests (batteries)		N/A
7.3.8.1	Vibration		N/A
	Results: No fire, no explosion, no rupture, no leakage or venting.		N/A
7.3.8.2	Mechanical shock		N/A
	Results: No leakage, no venting, no rupture, no explosion and no fire		N/A
7.3.9	Design evaluation – Forced internal short-circuit (cells)	Tested complied.	P
	The cells complied with national requirement for ____:	France, Japan, Republic of Korea, Switzerland	—
	The pressing was stopped upon:		P
	- 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	800 N for cylindrical cells.	P
	Results: No fire	(See appended table 7.3.9)	P

8	INFORMATION FOR SAFETY		P
8.1	General		P
	Manufacturers of secondary cells ensure that information is provided about current, voltage and temperature limits of their products	Information for safety mentioned in manufacturer's specifications	P
	Manufacturers of batteries ensure that equipment manufacturers and, in the case of direct sales, end-users are provided with information to minimize and mitigate hazards	Information for safety mentioned in manufacturer's specifications	P
	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, any information relating to hazard avoidance resulting from a system analysis provided to the end user		N/A
	Do not allow children to replace batteries without adult supervision		N/A
8.2	Small cell and battery safety information	Not small battery.	N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	The following warning language is to be provided with the information packaged with the small cells and batteries or equipment using them:		N/A
	- Keep small cells and batteries which are considered swallowable out of the reach of children		N/A
	- Swallowing may lead to burns, perforation of soft tissue, and death. Severe burns can occur within 2 h of ingestion		N/A
	- In case of ingestion of a cell or battery, seek medical assistance promptly		N/A

9	MARKING		P
9.1	Cell marking		P
	Cells marked as specified in IEC 61960, except coin cells		P
	Coin cells whose external surface area is too small to accommodate the markings on the cells show the designation and polarity		N/A
	By agreement between the cell manufacturer and the battery and/or end product manufacturer, component cells used in the manufacture of a battery need not be marked		N/A
9.2	Battery marking		N/A
	Batteries marked as specified in IEC 61960, except for coin batteries		N/A
	Coin batteries whose external surface area is too small to accommodate the markings on the batteries show the designation and polarity. Batteries also marked with an appropriate caution statement		N/A
	Terminals have clear polarity marking on the external surface of the battery		N/A
	Batteries with keyed external connectors designed for connection to specific end products need not be marked with polarity markings if the design of the external connector prevents reverse polarity connections		N/A
9.3	Caution for ingestion of small cells and batteries	Not small cell	N/A
	Coin cells and batteries identified as small batteries according to 8.2 include a caution statement regarding the hazards of ingestion in accordance with 8.2		N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	When small cells and batteries are intended for direct sale in consumer-replaceable applications, caution for ingestion given on the immediate package		N/A
9.4	Other information		P
	Storage and disposal instructions	Information is given in manufacturer's specifications.	P
	Recommended charging instructions	Information is given in manufacturer's specifications.	P

10	PACKAGING AND TRANSPORT		N/A
	Packaging for coin cells not small enough to fit within the limits of the ingestion gauge of Figure 3	Not coin cells	N/A
	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		N/A

ANNEX A	CHARGING AND DISCHARGING RANGE OF SECONDARY LITHIUM ION CELLS FOR SAFE USE		P
A.1	General		P
A.2	Safety of lithium ion secondary battery		P
A.3	Consideration on charging voltage		P
A.3.1	General		P
A.3.2	Upper limit charging voltage	Upper limit charging voltage of cell is 4.20V.	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		N/A
A.4	Consideration of temperature and charging current		P
A.4.1	General		P
A.4.2	Recommended temperature range	Charging temperature range declared by client is 0-45°C	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	45°C applied.	N/A
A.4.3.1	General		N/A
A.4.3.2	Explanation of safety viewpoint		N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
A.4.3.3	Safety considerations when specifying charging conditions in the high temperature range		N/A
A.4.3.4	Safety considerations when specifying a new upper limit in the high temperature range		N/A
A.4.4	Low temperature range	-5°C applied	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 the 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.4.6	Consideration of discharge		P
A.4.6.1	General		P
A.4.6.2	Final discharge voltage and explanation of safety viewpoint		P
A.4.6.3	Discharge current and temperature range		P
A.4.6.4	Scope of application of the discharging current		P
A.5	Sample preparation		P
A.5.1	General		P
A.5.2	Insertion procedure for nickel particle to generate internal short		P
A.5.3	Disassembly of charged cell		P
A.5.4	Shape of nickel particle		P
A.5.5	Insertion of nickel particle in cylindrical cell		P
A.5.5.1	Insertion of nickel particle in winding core		P
A.5.5.2	Marking the position of the nickel particle on both ends of the winding core of the separator		P
A.5.6	Insertion of nickel particle in prismatic cell		N/A
A.6	Experimental procedure of the forced internal short-circuit test		P
A.6.1	Material and tools for preparation of nickel particle		P
A.6.2	Example of a nickel particle preparation procedure		P
A.6.3	Positioning (or placement) of a nickel particle		P
A.6.4	Damaged separator precaution		P
A.6.5	Caution for rewinding separator and electrode		P
A.6.6	Insulation film for preventing short-circuit		P
A.6.7	Caution when disassembling a cell		P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
A.6.8	Protective equipment for safety		P
A.6.9	Caution in the case of fire during disassembling		P
A.6.10	Caution for the disassembling process and pressing the electrode core		P
A.6.11	Recommended specifications for the pressing device		P

ANNEX B	RECOMMENDATIONS TO EQUIPMENT MANUFACTURERS AND BATTERY ASSEMBLERS	P
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ANNEX C	RECOMMENDATIONS TO THE END-USERS	P
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ANNEX D	MEASUREMENT OF THE INTERNAL AC RESISTANCE FOR COIN CELLS		N/A
D.1	General	Not coin cells	N/A
D.2	Method		N/A
	A sample size of three coin cells is required for this measurement :		N/A
	Coin cells with an internal resistance of less than or equal to 3 Ω are subjected to the testing according to Clause 6 and Table 1		N/A
	Coin cells with an internal resistance greater than 3 Ω require no further testing		N/A

ANNEX E	PACKAGING AND TRANSPORT	N/A
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ANNEX F	COMPONENT STANDARDS REFERENCES	N/A
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IEC 62133-2						
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	
Cell	Anhui Xiangyuan New Energy Co.CTD	1)18650 2500mAh, 2)18650 2000mAh, 3)18650 1800mAh, 4)18650 1500mAh	1)3.7V, 2500mAh, 9.25Wh, 2)3.7V, 2000mAh, 7.4Wh, 3)3.7V, 1800mAh, 6.66Wh, 4)3.7V, 1500mAh, 5.55Wh,	IEC 62133-2: 2017	Test with appliance	
- Electrolyte	Shandong Hairong Power Supply Material Co. LTD	HR-8272E	EC+EMC+DEC+LiPF6	--	--	
- Separator	Jiangxi Star Molecular Materials Technology Co. LTD	SMG-22P	PE, single layer, 22μm×60.3mm×1950mm, shut down temp.130°C	--	--	
-Negative electrode	Dalian Hongguang Lithium Co., LTD	HG-6A	Graphite, Particle size D50: 13-16μm	--	--	
-Positive electrode	Xinxiang Tianli Lithium Energy Co. LTD	TLM550	D50: 10~13μm, Li(NiCoMn)O ₂	--	--	
-Positive electrode tap	Shenzhen Kangheng Electronics Co. LTD	Aluminum belt	0.1 mm(Thickness)x5mm(Width)x55mm(Length)	--	--	
-Negative electrode tap	Shenzhen Kangheng Electronics Co. LTD	Nickel belt	0.1 mm(Thickness)x4mm(Width)x59mm(Length)	--	--	
Supplementary information:						
1) Provided evidence ensures the agreed level of compliance. See OD-CB2039.						

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict

7.2.1	TABLE: Continuous charging at constant voltage (cells)				P
Sample no.	Recommended charging voltage Vc (Vdc)	Recommended charging current I _{rec} (A)	OCV before test (Vdc)	Results	
For model 18650 2500mAh					
C1#	4.2	0.5	4.193	P	
C2#	4.2	0.5	4.193	P	
C3#	4.2	0.5	4.193	P	
C4#	4.2	0.5	4.193	P	
C5#	4.2	0.5	4.193	P	
For model 18650 2000mAh					
C1#	4.2	0.4	4.195	P	
C2#	4.2	0.4	4.196	P	
C3#	4.2	0.4	4.196	P	
C4#	4.2	0.4	4.196	P	
C5#	4.2	0.4	4.196	P	
For model 18650 1800mAh					
C1#	4.2	0.36	4.195	P	
C2#	4.2	0.36	4.194	P	
C3#	4.2	0.36	4.192	P	
C4#	4.2	0.36	4.194	P	
C5#	4.2	0.36	4.193	P	
For model 18650 1500mAh					
C1#	4.2	0.3	4.187	P	
C2#	4.2	0.3	4.186	P	
C3#	4.2	0.3	4.187	P	
C4#	4.2	0.3	4.187	P	
C5#	4.2	0.3	4.187	P	
Supplementary information:					
- No fire or explosion					
- No leakage					
- The ambient temperature is 23.3°C					

7.3.1	TABLE: External short-circuit (cell)				P
Sample no.	Ambient T (°C)	OCV before test (Vdc)	Resistance of circuit (mΩ)	Maximum case temperature rise ΔT (K)	Results
For model 18650 2500mAh					

IEC 62133-2					
Clause	Requirement + Test			Result - Remark	Verdict
Samples charged at charging temperature upper limit(45°C)					
C6#	55.1	4.166	85.1	41.9	P
C7#	54.7	4.168	85.6	60.2	P
C8#	54.9	4.170	84.9	58.3	P
C9#	55.6	4.165	85.2	47.5	P
C10#	56.1	4.167	85.5	61.6	P
Samples charged at charging temperature lower limit(-5°C)					
C11#	55.8	4.108	85.3	49.8	P
C12#	55.5	4.111	84.7	41.1	P
C13#	55.2	4.112	85.1	67.6	P
C14#	54.8	4.106	84.9	49.3	P
C15#	55.4	4.109	85.5	45.3	P
For model 18650 2000mAh					
Samples charged at charging temperature upper limit(45°C)					
C6#	55.1	4.161	84.7	51.1	P
C7#	54.6	4.158	85.1	58.5	P
C8#	54.8	4.156	86.3	90.0	P
C9#	55.5	4.159	85.6	54.0	P
C10#	55.3	4.160	85.4	62.4	P
Samples charged at charging temperature lower limit(-5°C)					
C11#	55.0	4.072	85.8	48.4	P
C12#	54.5	4.068	86.1	64.3	P
C13#	54.7	4.069	85.5	75.0	P
C14#	54.2	4.075	84.8	42.3	P
C15#	54.6	4.073	85.2	70.6	P
For model 18650 1800mAh					
Samples charged at charging temperature upper limit(45°C)					
C6#	55.1	4.163	86.1	41.0	P
C7#	55.6	4.161	85.7	52.8	P
C8#	56.2	4.164	85.4	28.6	P
C9#	56.6	4.167	84.9	51.2	P
C10#	55.9	4.165	85.2	25.5	P
Samples charged at charging temperature lower limit(-5°C)					
C11#	55.5	4.082	85.5	42.1	P
C12#	55.3	4.085	84.8	47.1	P
C13#	55.7	4.083	84.6	68.0	P

IEC 62133-2					
Clause	Requirement + Test			Result - Remark	Verdict
C14#	56.1	4.086	85.1	47.6	P
C15#	56.4	4.083	85.3	81.7	P
For model 18650 1500mAh					
Samples charged at charging temperature upper limit(45°C)					
C6#	54.8	4.162	84.5	38.8	P
C7#	55.2	4.161	84.8	53.6	P
C8#	55.5	4.158	85.1	75.1	P
C9#	54.6	4.161	85.3	46.3	P
C10#	55.1	4.157	84.9	58.0	P
Samples charged at charging temperature lower limit(-5°C)					
C11#	55.7	4.072	85.6	41.1	P
C12#	55.4	4.073	85.2	49.1	P
C13#	56.2	4.069	84.7	65.8	P
C14#	56.5	4.072	84.2	41.0	P
C15#	55.9	4.075	84.4	55.3	P
Supplementary information: - No fire or explosion					

7.3.2	TABLE: External short-circuit (battery)					N/A
Sample no.	Ambient T (°C)	OCV before test (Vdc)	Resistance of circuit (mΩ)	Maximum case temperature rise ΔT (K)	Component single fault condition	Results
Supplementary information: - No fire or explosion						

IEC 62133-2				
Clause	Requirement + Test		Result - Remark	Verdict
7.3.5	TABLE: Crush (cells)			P
Sample no.	OCV before test (Vdc)	OCV at removal of crushing force (Vdc)	Maximum force applied to the cell during crush (kN)	Results
For model 18650 2500mAh				
Samples charged at charging temperature upper limit(45°C)				
C29#	4.165	4.165	13.01	P
C30#	4.162	4.162	13.07	P
C31#	4.159	4.159	13.13	P
C32#	4.161	4.161	13.05	P
C33#	4.163	4.163	13.01	P
Samples charged at charging temperature lower limit(-5°C)				
C34#	4.084	4.084	12.98	P
C35#	4.086	4.086	13.03	P
C36#	4.083	4.083	13.09	P
C37#	4.081	4.081	13.11	P
C38#	4.088	4.088	13.07	P
For model 18650 2000mAh				
Samples charged at charging temperature upper limit(45°C)				
C29#	4.161	4.161	12.98	P
C30#	4.163	4.163	13.05	P
C31#	4.160	4.159	13.02	P
C32#	4.159	4.159	13.11	P
C33#	4.163	4.163	13.15	P
Samples charged at charging temperature lower limit(-5°C)				
C34#	4.075	4.075	13.07	P
C35#	4.073	4.073	13.01	P
C36#	4.072	4.072	13.05	P
C37#	4.069	4.069	12.96	P
C38#	4.072	4.072	12.92	P
For model 18650 1800mAh				
Samples charged at charging temperature upper limit(45°C)				
C29#	4.164	4.164	12.96	P
C30#	4.166	4.166	13.01	P
C31#	4.168	4.168	13.05	P
C32#	4.165	4.165	13.03	P
C33#	4.162	4.162	13.11	P

IEC 62133-2				
Clause	Requirement + Test		Result - Remark	Verdict
Samples charged at charging temperature lower limit(-5°C)				
C34#	4.085	4.085	13.17	P
C35#	4.088	4.088	13.09	P
C36#	4.091	4.091	13.06	P
C37#	4.089	4.089	12.98	P
C38#	4.084	4.084	13.03	P
For model 18650 1500mAh				
Samples charged at charging temperature upper limit(45°C)				
C29#	4.158	4.158	13.03	P
C30#	4.159	4.159	13.01	P
C31#	4.161	4.161	13.07	P
C32#	4.157	4.157	13.11	P
C33#	4.159	4.159	13.05	P
Samples charged at charging temperature lower limit(-5°C)				
C34#	4.074	4.074	13.01	P
C35#	4.078	4.078	12.98	P
C36#	4.075	4.075	13.03	P
C37#	4.076	4.076	12.96	P
C38#	4.075	4.075	13.04	P
Supplementary information:				
- No fire or explosion				

IEC 62133-2				
Clause	Requirement + Test		Result - Remark	Verdict
7.3.6	TABLE: Over-charging of battery			N/A
Constant charging current (A)				—
Supply voltage (Vdc)				—
Sample no.	OCV before charging (Vdc)	Total charging time (minute)	Maximum outer case temperature (, C)	Results
Supplementary information: - No fire or explosion				

7.3.7	TABLE: Forced discharge (cells)				P
Sample no.	OCV before application of reverse charge (Vdc)	Measured reverse charge I _r (A)	Lower limit discharge voltage (Vdc)	Results	
For model 18650 2500mAh					
C39#	3.155	2.5	2.75	P	
C40#	3.143	2.5	2.75	P	
C41#	3.148	2.5	2.75	P	
C42#	3.181	2.5	2.75	P	
C43#	3.173	2.5	2.75	P	
For model 18650 2000mAh					
C39#	3.253	2.0	2.75	P	
C40#	3.223	2.0	2.75	P	
C41#	3.221	2.0	2.75	P	
C42#	3.346	2.0	2.75	P	
C43#	3.250	2.0	2.75	P	
For model 18650 1800mAh					
C39#	3.208	1.8	2.75	P	
C40#	3.148	1.8	2.75	P	
C41#	3.142	1.8	2.75	P	
C42#	3.133	1.8	2.75	P	
C43#	3.199	1.8	2.75	P	
For model 18650 1500mAh					

IEC 62133-2				
Clause	Requirement + Test		Result - Remark	Verdict
C39#	3.188	1.5	2.75	P
C40#	3.207	1.5	2.75	P
C41#	3.199	1.5	2.75	P
C42#	3.216	1.5	2.75	P
C43#	3.208	1.5	2.75	P
Supplementary information: - No fire or explosion - The ambient temperature is 22.4°C				

7.3.8.1	TABLE: Vibration					N/A
Sample no.	OCV before test (Vdc)	OCV after test (Vdc)	Mass before test (g)	Mass after test (g)	Results	
Supplementary information: - No fire or explosion - No rupture - No leakage - No venting						

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict

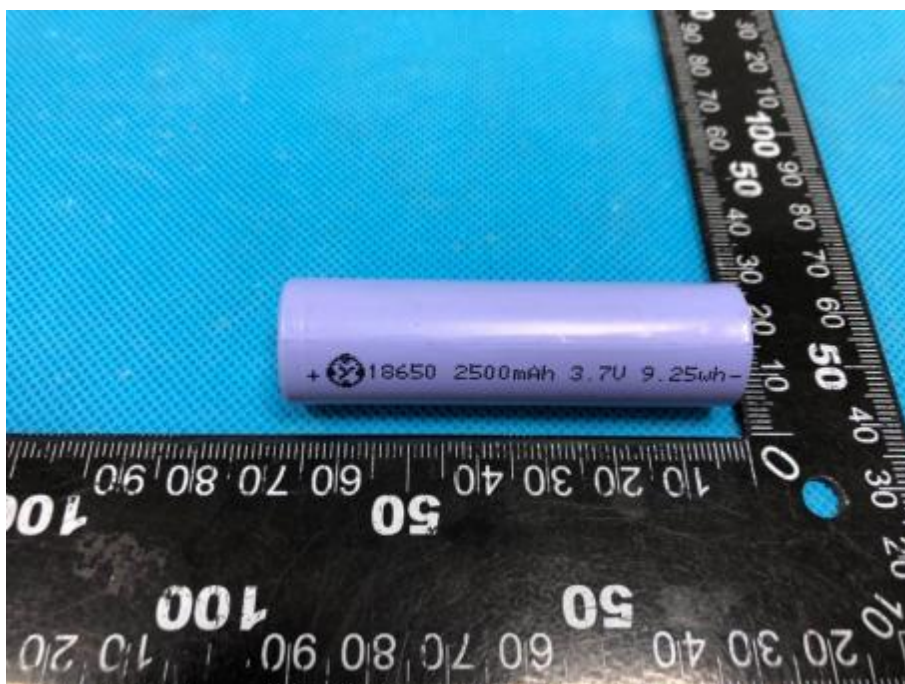
7.3.8.2	TABLE: Mechanical shock					N/A
Sample no.	OCV before test (Vdc)	OCV after test (Vdc)	Mass before test (g)	Mass after test (g)	Results	
Supplementary information: - No fire or explosion - No rupture - No leakage - No venting						

7.3.9	TABLE: Forced internal short circuit (cells)					P
Sample no.	Chamber ambient T (° C)	OCV before test (Vdc)	Particle location ¹⁾	Maximum applied pressure (N)	Results	
For model 18650 2500mAh						
Samples charged at charging temperature upper limit(45°C)						
C44#	45.0	4.165	1	803.6	P	
C45#	45.0	4.162	1	801.9	P	
C46#	45.0	4.163	1	807.2	P	
C47#	45.0	4.166	1	810.5	P	
C48#	45.0	4.163	1	811.7	P	
Samples charged at charging temperature lower limit(-5°C)						
C49#	-5.0	4.087	1	805.1	P	
C50#	-5.0	4.091	1	803.6	P	
C51#	-5.0	4.089	1	817.4	P	
C52#	-5.0	4.085	1	809.3	P	
C53#	-5.0	4.088	1	807.2	P	
For model 18650 2000mAh						
Samples charged at charging temperature upper limit(45°C)						
C44#	45.0	4.156	1	803.6	P	
C45#	45.0	4.158	1	809.5	P	
C46#	45.0	4.161	1	811.2	P	
C47#	45.0	4.159	1	815.8	P	
C48#	45.0	4.162	1	806.1	P	
Samples charged at charging temperature lower limit(-5°C)						

IEC 62133-2					
Clause	Requirement + Test			Result - Remark	Verdict
C49#	-5.0	4.071	1	801.7	P
C50#	-5.0	4.068	1	807.9	P
C51#	-5.0	4.074	1	810.8	P
C52#	-5.0	4.071	1	821.4	P
C53#	-5.0	4.073	1	813.4	P
For model 18650 1800mAh					
Samples charged at charging temperature upper limit(45°C)					
C44#	45.0	4.163	1	808.1	P
C45#	45.0	4.165	1	810.5	P
C46#	45.0	4.161	1	804.9	P
C47#	45.0	4.162	1	803.7	P
C48#	45.0	4.166	1	805.2	P
Samples charged at charging temperature lower limit(-5°C)					
C49#	-5.0	4.082	1	811.6	P
C50#	-5.0	4.079	1	817.8	P
C51#	-5.0	4.085	1	810.5	P
C52#	-5.0	4.083	1	808.1	P
C53#	-5.0	4.084	1	809.4	P
For model 18650 1500mAh					
Samples charged at charging temperature upper limit(45°C)					
C44#	45.0	4.161	1	805.7	P
C45#	45.0	4.158	1	810.2	P
C46#	45.0	4.162	1	808.5	P
C47#	45.0	4.156	1	804.1	P
C48#	45.0	4.159	1	810.2	P
Samples charged at charging temperature lower limit(-5°C)					
C49#	-5.0	4.075	1	817.4	P
C50#	-5.0	4.077	1	813.8	P
C51#	-5.0	4.074	1	809.2	P
C52#	-5.0	4.072	1	801.6	P
C53#	-5.0	4.073	1	803.9	P
Supplementary information: - No fire or explosion 1) Identify one of the following: 1: Nickel particle inserted between positive and negative (active material) coated area.					

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict

D.2	TABLE: Internal AC resistance for coin cells				N/A
Sample no.	Ambient T (°C)	Store time (h)	Resistance Rac (Ω)	Results	
Supplementary information:					



Front view of cell (18650 2500mAh)



Top view of cell (18650 2500mAh)



Front view of cell (18650 2000mAh)



Top view of cell (18650 2000mAh)



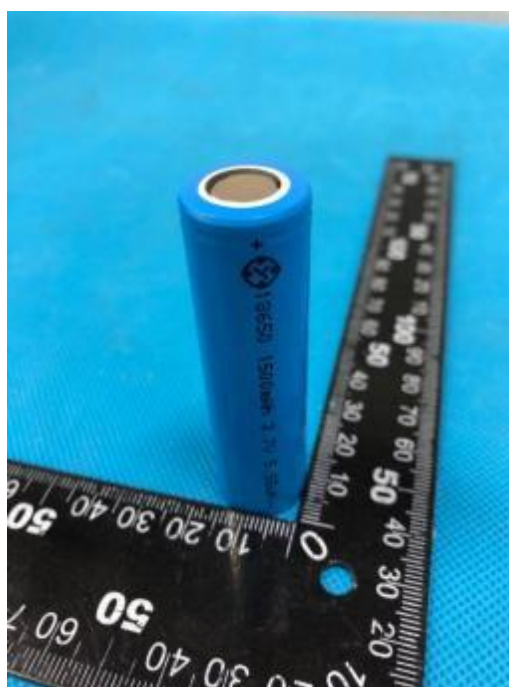
Front view of cell (18650 1800mAh)



Top view of cell (18650 1800mAh)



Front view of cell (18650 1500mAh)



Top view of cell (18650 1500mAh)

*****End of report*****