



Test Report issued under the responsibility of:



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	BUTO-ESH-P23101502
Date of issue.....	2024-04-15
Total number of pages	38 Pages
Name of Testing Laboratory preparing the Report.....	LCIE CHINA COMPANY LIMITED Building 4, No. 518, Xin Zhuan Road, CaoHejing Songjiang High-Tech Park, Shanghai P.R.C (201612)
Applicant's name	Zhejiang Benyi New Energy Co., Ltd.
Address	Wenzhou Bridge Industrial Zone, Beibaixiang, Yueqing, Zhejiang 325603, China.
Test specification:	
Standard	IEC 62619:2022
Test procedure	CB Scheme
Non-standard test method	N/A
TRF template used	IECEE OD-2020-F1:2022, Ed.1.5
Test Report Form No.....	IEC62619B
Test Report Form(s) Originator	UL Solutions (Demko)
Master TRF	Dated 2023-02-24
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Test item description..... :	Rechargeable Li-ion Battery	
Trademark(s)..... :		
Manufacturer..... :	Same as applicant	
Model/Type reference..... :	BYEH-5000, BYES-5000, BYER-5000	
Ratings..... :	51,2V, 102Ah, 5222,4Wh	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
☒	CB Testing Laboratory:	LCIE CHINA COMPANY LIMITED
Testing location/ address.....:		Building 4, No. 518, Xin Zhuan Road, CaoHejing Songjiang High-Tech Park, Shanghai P.R.C (201612)
Tested by (name, function, signature).....:		Alter Qiu (Project Manager) 
Approved by (name, function, signature)....:		Amy DONG (Project 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): Attachment 1 (Pictures for product): Page 28 to Page 38	
Summary of testing:	
Tests performed (name of test, test clause and date test performed): - 5.9 Quality plan - 7.2.3 Drop test (battery system) 7.2.3.3 Edge and corner drop test (battery system) (Test model: BYEH-5000, BYES-5000, BYER-5000) - 8.2.2 Overcharge control of voltage (battery system) (Test model: BYEH-5000) - 8.2.3 Overcharge control of current (battery system) (Test model: BYEH-5000) - 8.2.4 Overheating control (battery system) (Test model: BYEH-5000, BYES-5000, BYER-5000)	Testing location: (CBTL, SPTL, CTF, Subcontractor) LCIE CHINA COMPANY LIMITED Building 4, No. 518, Xin Zhuan Road, CaoHejing Songjiang High-Tech Park, Shanghai P.R.C (201612)
Summary of compliance with National Differences (List of countries addressed): N/A	
☒ The product fulfils the requirements of <u>EN IEC 62619:2022</u>.	
Use of uncertainty of measurement for decisions on conformity (decision rule) : ☒ No decision rule is specified by the IEC standard, when comparing the measurement result with the applicable limit according to the specification in that standard. The decisions on conformity are made without applying the measurement uncertainty ("simple acceptance" decision rule, previously known as "accuracy method"). ☐ Other: ... (to be specified, for example when required by the standard or client, or if national accreditation requirements apply)	
Information on uncertainty of measurement: The uncertainties of measurement are calculated by the laboratory based on application of criteria given by OD-5014 for test equipment and application of test methods, decision sheets and operational procedures of IECEE. IEC Guide 115 provides guidance on the application of measurement uncertainty principles and applying the decision rule when reporting test results within IECEE scheme, noting that the reporting of the measurement uncertainty for measurements is not necessary unless required by the test standard or customer. Calculations leading to the reported values are on file with the NCB and testing laboratory that conducted the testing.	

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.

BYEH-5000



BYEH-5000
Rechargeable Li-ion Battery
IFpP51/161/119/[16S]M/-20+55/90

Normal Voltage	51.2V
Rated Capacity	102Ah
Max Charging Current	102A
Charging Voltage	57.6V
Max Discharging Current	102A
Discharging Voltage	44.8V
Rated Output Power	5.22kW
Product Code	BYEGXHSCJ240001
Ingress Protection	IP54
Product Protective Class	Class I
Charge Temperature	0°C~55°C
Discharge Temperature	-20°C~55°C
Overvoltage Category	II
Date of Manufacture	20231024

- Do not place the battery near a fire
- Do not immerse the battery in water
- Do not disassemble the battery pack
- Do not connect the positive and negative terminals of the battery

ZHEJIANG BENYI NEW ENERGY CO.,LTD.
WWW.BENY.COM

BYES-5000



BYES-5000
Rechargeable Li-ion Battery
IFpP51/161/119/[16S]M/-20+55/90

Normal Voltage	51.2V
Rated Capacity	102Ah
Max Charging Current	102A
Charging Voltage	57.6V
Max Discharging Current	102A
Discharging Voltage	44.8V
Rated Output Power	5.22kW
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BYER-5000



**ENERGY
STORAGE**



BYER-5000

Rechargeable Li-ion Battery
IFpP51/161/119/[16S]M/-20+55/90

Normal Voltage	51.2V
Rated Capacity	102Ah
Max Charging Current	102A
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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..... : 2023-10-30	
Date (s) of performance of tests : 2024-01-16 to 2024-02-20	
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. ☐ This Test Report Form contains requirements according to IEC/ISO Standard dated and includes Corrigendum dated (Note: The above text maybe removed if not applicable)	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC60060-2:	
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:

BYEH-5000, BYES-5000 and BYER-5000 is a rechargeable Li-ion battery with a nominal voltage of 51,2V and a Rated capacity of 102Ah which is used in energy storage applications.

All series models BYEH-5000, BYES-5000 and BYER-5000 used the same type of cell (cell model: IFP50160116A-102Ah) and same BMS board.

The battery system consists of 16 Lithium Iron Phosphate cells connected in 16S1P.

The difference between the three battery systems is that the enclosure and the internal structure are different. Therefore, if no specification, battery system type BYEH-5000 chosen as the representative testing unit.

The main features of the battery are shown as below:

Cell and battery	Cell	Battery System
Model Name	IFP50160116A-102Ah	BYEH-5000
Rated capacity (Ah)	52	102
Nominal voltage (V)	3,2	51,2
Standard Charge Current (A)	52	51
Standard Discharge Current (A)	52	51
Maximum continuous charge current (A)	52	51
Maximum continuous discharge current (A)	78	51
Charge temperature Range (°C)	0 to 60	0 to 55
Discharge temperature Range (°C)	-30 to 65	-20 to 55
Standard Charge Voltage (V)	3,65	57,6
Upper limit Charging Voltage (V)	3,9	58,4
End-of-discharge Voltage (V)	2,0V	44,8V
Weight (kg)	0,966±0,030	Approx 48
Recommend charging method declared by the manufacturer	Charging the cell with 20,4A constant current until to 3,65V, then constant voltage 3,65V until charging current reduces to 5,1A.	Charge the battery at constant current 51A until voltage reaches 57,6V, then charge at constant voltage 57,6V till charge current is 5,1A

Cell and battery	Battery System	Battery System
Model Name	BYES-5000	BYER-5000
Rated capacity (Ah)	102	102
Nominal voltage (V)	51,2	51,2
Standard Charge Current (A)	51	51
Standard Discharge Current (A)	51	51
Maximum continuous charge current (A)	51	51
Maximum continuous discharge current (A)	51	51
Charge temperature Range (°C)	0 to 55	0 to 55
Discharge temperature Range (°C)	-20 to 55	-20 to 55
Standard Charge Voltage (V)	57,6	57,6
Upper limit Charging Voltage (V)	58,4	58,4
End-of-discharge Voltage (V)	44,8V	44,8V
Weight (kg)	Approx 64	Approx 48,5
Recommend charging method declared by the manufacturer	Charge the battery at constant current 51A until voltage reaches 57,6V, then charge at constant voltage 57,6V till charge current is 5,1A	Charge the battery at constant current 51A until voltage reaches 57,6V, then charge at constant voltage 57,6V till charge current is 5,1A

IEC 62619			
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 are safe under conditions of both intended use and reasonably foreseeable misuse...	See also table 5.1 for Critical components information	P
	Reduce the risk of injuries from moving parts		N/A
5.2	Insulation and wiring		P
	Voltage, current, altitude, and humidity requirements		P
	Adequate clearances and creepage distances between connectors and live parts at different voltages or between live parts and non-current-carrying accessible parts		P
	Protect from hazardous live parts, including during installation		N/A
	The mechanical integrity of internal connections		P
5.3	Venting		P
	Pressure relief function	Explosion-proof safety valve for venting exists, and vent design in cell.	P
	Encapsulation used to support cells within an outer casing		P
5.4	Temperature/voltage/current management		P
	The design prevents abnormal temperature-rise		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)	Marking near the terminal.	P
	Polarity marking not provided for keyed external connector		N/A
	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

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Clause	Requirement + Test	Result - Remark	Verdict
	Recommendations of cell operating limits, mounting advice, storage conditions and other design recommendations 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		N/A
5.6.2	Battery system design		P
	The voltage control function		P
	Maximum charging/discharging current of the cell are not exceeded		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		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..... :	Quality plan 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 IEC 62619)		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		P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	The cells or batteries charged using the method specified by the manufacturer	51A CC charge to 57,6V, then CV charge till charge current decline to $\leq 5,1A$	P
7.2	Reasonably foreseeable misuse		P
7.2.1	External short-circuit test (cell or cell block)		N/A
	Short circuit with total resistance of $30\text{ m}\Omega \pm 10\text{ m}\Omega$ at $25\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$		N/A
	Results: no fire, no explosion		N/A
7.2.2	Impact test (cell or cell block)		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 System (BYEH-5000, BYES-5000, BYER-5000)	—
	Mass of the test unit (kg).....	BYEH-5000: 48,0kg BYES-5000: 64,0kg BYER-5000: 48,5kg	—
	Height of drop (m).....	BYEH-5000: 0,1m BYER-5000: 0,1m BYES-5000: 0,05m	—
	Results: no fire, no explosion		P
7.2.4	Thermal abuse test (cell or cell block)		N/A
	Results: no fire, no explosion		N/A
7.2.5	Overcharge test (cell or cell block)		N/A
	For those battery systems that are provided with only a single protection for the charging voltage control		—
	Results: no fire, no explosion	See Table 7.2.5	N/A
7.2.6	Forced discharge test (cell or cell block)		N/A
	Cells connected in series in the battery system		N/A

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	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 I_t		N/A
	Discharging time, $t = (1 I_t / I_m) \times 90$ (min.).....		N/A
	Results: no fire, no explosion	See Table 7.2.6.	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)	Refer to cell CB report No.: A2-4790969123-001	N/A
	Samples preparation procedure: In accordance with Clause A.5 and A.6 of IEC 62133-2:2017		N/A
	Tested per 7.3.2 b) in an ambient temperature of $25\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$.		N/A
	The appearance of the short-circuit location recorded by photograph or other means.....		—
	The pressing was stopped - 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	See Table 7.3.2.	N/A
7.3.3	Propagation test (battery system)	Cell level according to 7.3.2 internal short-circuit test	N/A
	Method to create a thermal runaway in one cell ...	See Annex B	N/A
	Results: No external fire from the battery system, no battery case rupture.....	See Table 7.3.3.	N/A

8	BATTERY SYSTEM SAFETY (CONSIDERING FUNCTIONAL SAFETY)		P
8.1	General requirements		P
	Functional safety analysis for critical controls	Evaluated according to IEC 60730-1 Annex H.	P
	Conduct of a process hazard analysis for both the cell manufacturing process and the battery system manufacturing process		P
	Conduct of risk assessment and mitigation of the battery system		P
8.2	Battery management system (or battery management unit)		P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
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		P
8.2.2	Overcharge control of voltage (battery system)		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 Table 8.2.2.	P
	The BMS terminated the charging before exceeding the upper limit charging voltage		P
8.2.3	Overcharge control of current (battery system)		P
	Results: no fire, no explosion	See 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	No cooling system	N/A
	Elevated temperature for charging, 5 °C above maximum operating temperature.....		P
	Results: no fire, no explosion	See Table 8.2.4	P
	The BMS detected the overheat temperature and terminated charging		P
	The battery system operated as designed during test		P

9	EMC		N/A
	Battery system fulfil EMC requirements of the end-device application.....	Intended for to be tested in the end use application	N/A

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

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
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		N/A
	Refer to Annex D		N/A

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

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..... :		—

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	Target cell to be laser irradiated		—
	The irradiation point on the target cell same or similar as that on the cell test		N/A
	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. 1) Heater (Heater, Burner, Laser, Inductive heating) 2) Overcharge 3) Nail penetration of the cell 4) Combination of above methods 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

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

5.1	TABLE: Critical components information					P
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity ¹⁾	
Cell	Hefei Gotion High-tech Power Energy Co., Ltd.	IFP50160116A-102Ah	3,2Vdc, 102Ah, 326,4Wh	IEC 62619: 2022	CB Cert. No. DK-144348-UL	
Enclosure	Wenzhou Sanchuan Electric Technology Co., Ltd	Carbon structural steel	Carbon structural steel, Thickness min.: 1,5mm; Dimensions for BYEH-5000: 640*410*180mm Dimensions for BYES-2500: 660*405*400mm Dimensions for BYER-2500: 600*440*180mm	IEC 62619: 2022	Test with appliance	
Power Input / Output Connector for BYEH-5000 and BYER-5000	Huizhou Futronics Electronic Technology Co., Ltd.	FSPC22160W, FSPC22160Z,	Ie:125A Ue:1500Vdc -40°C ~25°C	2 PFG 2740/04.2020	TUV Rheinland Certificate No. R 50475308 0002	
-Alt. Power Input / Output Connector for BYEH-5000 and BYER-5000	Huizhou Futronics Electronic Technology Co., Ltd.	FSPC80160Z, FSPC80160W	Ie:125A Ue:1500Vdc -40°C ~25°C	2 PFG 2740/04.2020	TUV Rheinland Certificate No. R 50475308 0002	
Power Input / Output Connector for BYES-5000	Huizhou Futronics Electronic Technology Co., Ltd	FHV600260TN-25U01	Rated current: 125A@70°C, IP67, -40°C ~+125°C	EN 61984:2009	TUV SUD Certificate No. B 116776 0002 Rev.00	
Insulation sheet	Antaeus Technology&Industry(Jiangmen) Co.Ltd	PC35V	Min thickness: 0,5mm, V-2	IEC 60695-11-10	UL E318695	
Internal power cable	Jiukai Special Cable (Shanghai) Co., LTD	10269	3AWG, 105°C 1000V	UL 758	UL E342399	

IEC 62619					
Clause	Requirement + Test		Result - Remark		Verdict
Control Switch for BYEH-5000 and BYER-5000	Zhejiang Benyi New Energy Co., Ltd	BB1-63(2P/63A/600V/6KA)	2P, operating ambient temperature: -40°C~80°C Rated working voltage: 600V Rated current: 63A	EN 60947-2:2017+A1	TUV Rheinland Certificate No. R 50563583 0001
Control panel	Hangzhou Huasu Technology Co., LTD	H48-200CL20-S01	60Vdc, Max. 30mA, -20°C ~75°C	IEC 62619: 2022	Test with appliance
Control Switch for BYES-5000	SHENZHEN WOER HEAT-SHRINKABLE MATERIAL CO LTD	RSFR	600V, 125°C	UL 224	UL E203950
Power Switch for BYES-5000	Yijia Industrial Control Electrical Co., Ltd	YJ-GQ16B	Rated operational voltage: 220VAC, 220VDC Rated operational current: 0,5A for 220VAC, 0,1A for 220VDC, IP65	EN60947-5-1:2017	TUV SUD Certificate: No. N8A 121522 0007 Rev.00
Battery Box connector for BYES-5000	Suzhou Zhengbei Connection Technology Co., LTD	F2112MA2A1A06 0-1	120A -40°C ~125°C	IEC 62619: 2022	Test with appliance
Signal wire	Zhejiang Jucheng Electronic Cable Co Ltd	1007	24AWG, 300V, 80°C	UL758	UL E517030
BMS	HUASU Technology	H48-100CL10-S04	Software version: 230911	IEC 62619: 2022	Test with appliance
- PCB	YIYANG MINGZHENGHONG ELECTRONICS CO LTD	BR-DL-01	V-0, 130°C, Min thickness: 2mm	UL 94 UL 796	UL E331251
- IC for MCU (U3)	SHANGHAI FUDAN MICROELECTRONICS GROUP CO LTD	FM33LG048	V _{DD} : 1,65V~5,5V T _A : -40°C~85°C	IEC 62619: 2022	Test with appliance
- IC for AFE (U1)	Sino Wealth Electronic Ltd.	SH367309	TQFP48, V _{BAT} : 8,5V~65V T _A : -40°C~85°C	IEC 62619: 2022	Test with appliance

IEC 62619					
Clause	Requirement + Test		Result - Remark		Verdict
- IC for PWM Controller (U2)	Texas Instruments Incorporated	TL494IDR	SOIC-16, V _{CC} : 7~40V, T _A : -40°C~85°C	IEC 62619: 2022	Test with appliance
- IC for operational amplifier of current (U20)	SG Micro Corp	SGM8740YN5G/TR	SOT-23-5, V _{DD} : 2,7V to 5,5V T _{OP} : -40°C~85°C	IEC 62619: 2022	Test with appliance
- MOSFET (Q46,Q48,QP1, QP2,QP3,QP4, QP5,QP6,QP7, QP8,QP10,QP11,QP12,QP13,QP14,QP15,QP16,QP17,QP18,QP19,QP22,QP23)	Wuxi China Resources MICROELECTRONICS Co., Ltd.	CRSS042N10N	TO-263, V _{DS} : 100V, V _{GS} : ±20V, I _D : 120A@25°C, T _{STG} : -55°C ~150°C	IEC 62619: 2022	Test with appliance
- Relay (K1)	XIAMEN HONGFA ELECTROACOUSTIC CO LTD	HFD23/012-1ZS	Normal voltage: 12V, Max. switching voltage: 125VAC/60VDC, T _A : -40~90°C	IEC 62619: 2022	Test with appliance
- Contactor (J1,J2,J3,J5,J8, J10)	ZHE JIANG DELI CONNECTORS CO., LTD.	TJC3B	SIP17, 2,5mm T _A : -20~85°C	IEC 62619: 2022	Test with appliance
- Inductor for DC-DC circuit (L3)	Huizhou Ciji New Energy Technology Co., Ltd.	MP27H1-1432-L	PEW-H Φ 1,3mm*1P, 17Ts REF	IEC 62619: 2022	Test with appliance
- Capacitor for DC-DC circuit (CAP1,CAP2,CAP6)	SAMXON ELECTRONIC COMPONENTS LIMITED	ESK227M2A120T CSNP-R	220UF, 100Vdc, ±20%	IEC 62619: 2022	Test with appliance
- Current sampling resistor (RS3,RS4,RS5, RS6,RS7,RS8, RS9,RS10,RS11,RS12)	YAGEO CORP	PA2512FKE7W0 R002E	2mΩ, 1%, 50ppm, 2W, 2512	IEC 62619: 2022	Test with appliance
- Y capacitor (C115, C130)	YAGEO CORP	CC1206KKX7RC BB102	1nF/1KV/10%/1206/YAGEO	IEC 62619: 2022	Test with appliance

IEC 62619					
Clause	Requirement + Test			Result - Remark	Verdict
- NTC (RT2)	SHENZHEN SUNLORD ELECTRONICS CO LTD	sdnt1005x103f33 80ftf	1,0*0,5mm, 10KΩ	IEC 62619: 2022	Test with appliance
-PTC (F1)	Dongguan TLC Electronic Technology Co., Ltd.	TRC300D/72	Vmax: 72V, Imax: 40A, R: 0,035~0,075Ω Ttrip: 15,0A@19,8S	IEC 62619: 2022	Test with appliance
- High-frequency transformer (T1)	Huizhou Ciji New Energy Technology Co., Ltd.	MP-E0188	Vmax: AC/DC220V Imax: 0,15A 50°C typ	IEC 62619: 2022	Test with appliance
- Core	TDG HOLDING CO., LTD.	EE8.3 TP4	-	IEC 62619: 2022	Test with appliance
- Alt. Core	Zhejiang Xianfeng Electronic Technology Co., Ltd.	EE8.3 PC40	-	IEC 62619: 2022	Test with appliance
- Bobbin	SUMITOMO BAKELITE CO., LTD.	Phenolic T375J	155°C, V-0	IEC 62619: 2022	Test with appliance
- Wire	PACIFIC ELECTRIC WIRE & CABLE CO LTD	2UEW-F	155°C	IEC 62619: 2022	Test with appliance
- Mylar tape	JINGJING YAHUA PRESSURE SENSITIVE CLUE CO., LTD	CT-280	130°C	IEC 62619: 2022	Test with appliance
- Varnish	GUANGZHOU BATTER NEW MATERIALS CO LTD	BETTER 116 (n)	180°C	IEC 62619: 2022	Test with appliance
- Solder	YUNAN TIN GROUP	99.3%Sn 0.7%Cu	-	IEC 62619: 2022	Test with appliance
Supplementary information:					
1) Provided evidence ensures the agreed level of compliance. See OD-CB2039.					

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

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): ____						

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

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 I_t , (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): ____					

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

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	
--	--	--	--	--	
--	--	--	--	--	
--	--	--	--	--	
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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): __

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

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 (m²)		
--		--		--		
--		--		--		
--		--		--		
Supplementary information:						
1) Cell can be failed through laser exposure, 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): ____						

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

8.2.2	TABLE: Overcharge control of voltage (battery system)					P
Sample No.	OCV at start of test for, (V dc)	Maximum Charging Current, (A)	Max. Charging Voltage, (V dc)	Max. Voltage of Cell/Cell Blocks, (V dc)	Results	
DUT1	2,73~2,89	51	57,42	3,659	A, D, F	
			Charge Voltage Applied Battery System: 1)			
			Whole	Part		
			68,64V	--		
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): ____						

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

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
DUT1	47,30	61,2	49,78	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): ____				

Model: BYEH-5000				
8.2.4	TABLE: Overheating control (battery system)			P
Model No.	OCV at start(SOC 50%) of test, V dc	Maximum Charging Current, A	Measured Maximum Charging Voltage, V dc	
DUT1	52,89	51	52,89	
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): _____				

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

Model: BYES-5000			
8.2.4	TABLE: Overheating control (battery system)		P
Model No.	OCV at start(SOC 50%) of test, V dc	Maximum Charging Current, A	Measured Maximum Charging Voltage, V dc
DUT1	52,84	51	52,84
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): ____			

Model: BYER-5000			
8.2.4	TABLE: Overheating control (battery system)		P
Model No.	OCV at start(SOC 50%) of test, V dc	Maximum Charging Current, A	Measured Maximum Charging Voltage, V dc
DUT1	52,94	51	52,94
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): ____			

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

9	TABLE: EMC				N/A
Standard used for EMC test:					
Sample No.	EMC Test Item	Battery Condition	EMC Test Level/ Parameters	Compliance Criteria	Results
--	--	--	--	--	--
Supplementary information: Battery Condition During EMC test 1 – In Operation Mode, [] Supplied at ____, [] Load at ____ 2 – In non-operation Mode, Battery state of charge (SOC) before test at around ____ Compliance Criteria and Test Results: A – No fire or Explosion B – Fire C – Explosion D – Battery system did operate as intended during the test. E - All function of battery system did operate as intended after the test. F - All function of battery system did not operate as intended during the test, (Please explain): ____ G - Other (Please explain): ____					

Attachment 1(Pictures for product)

Overview of BYEH-5000



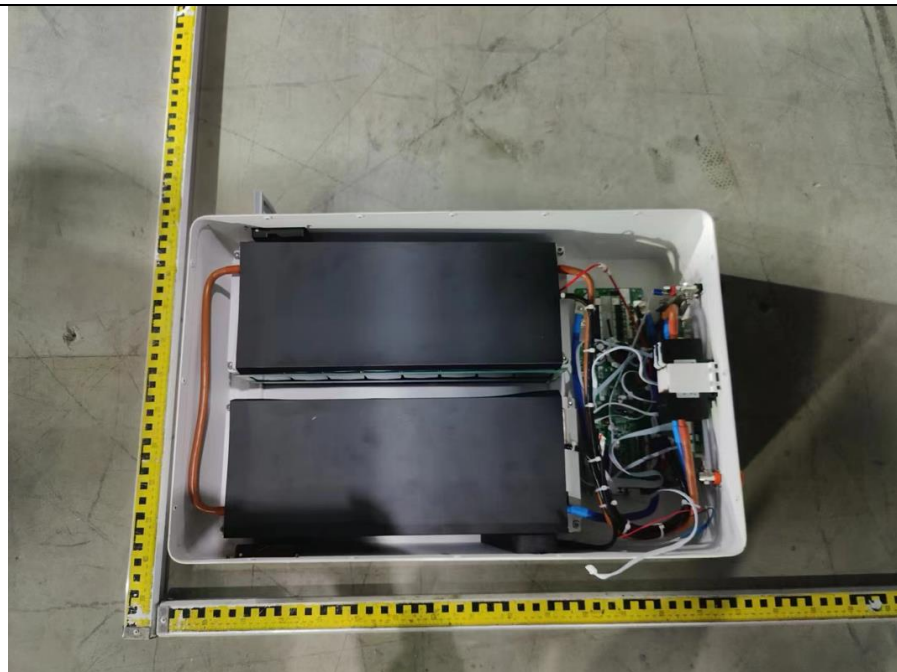
Overview of BYEH-5000



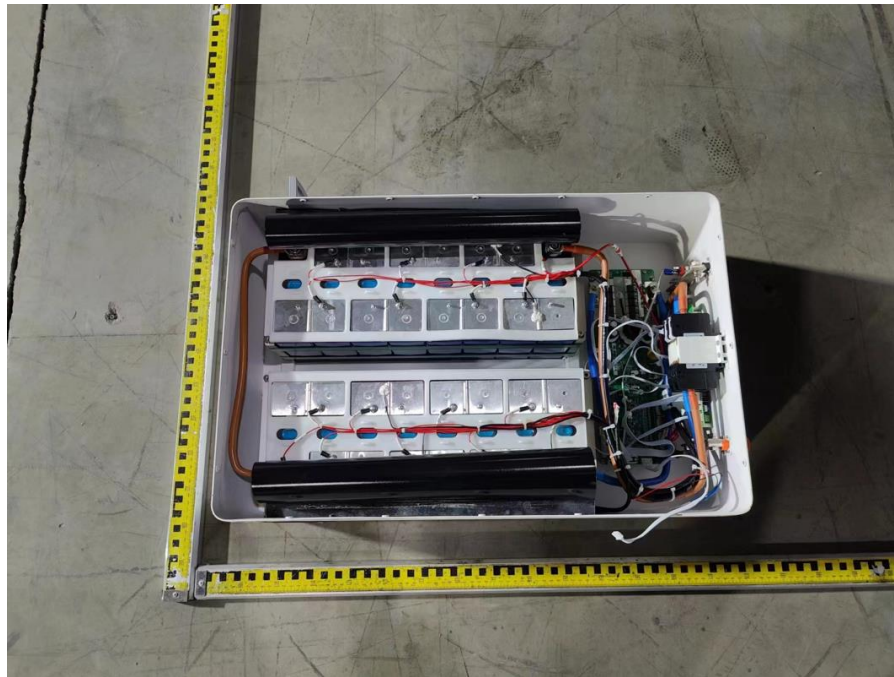
Overview of BYEH-5000



Internal view of BYEH-5000



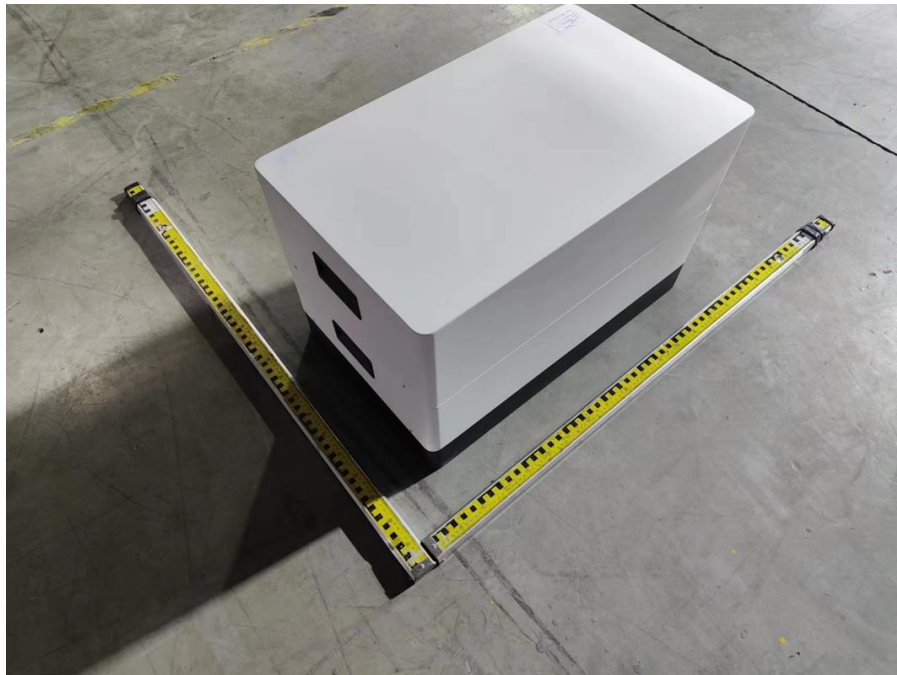
Internal view of BYEH-5000



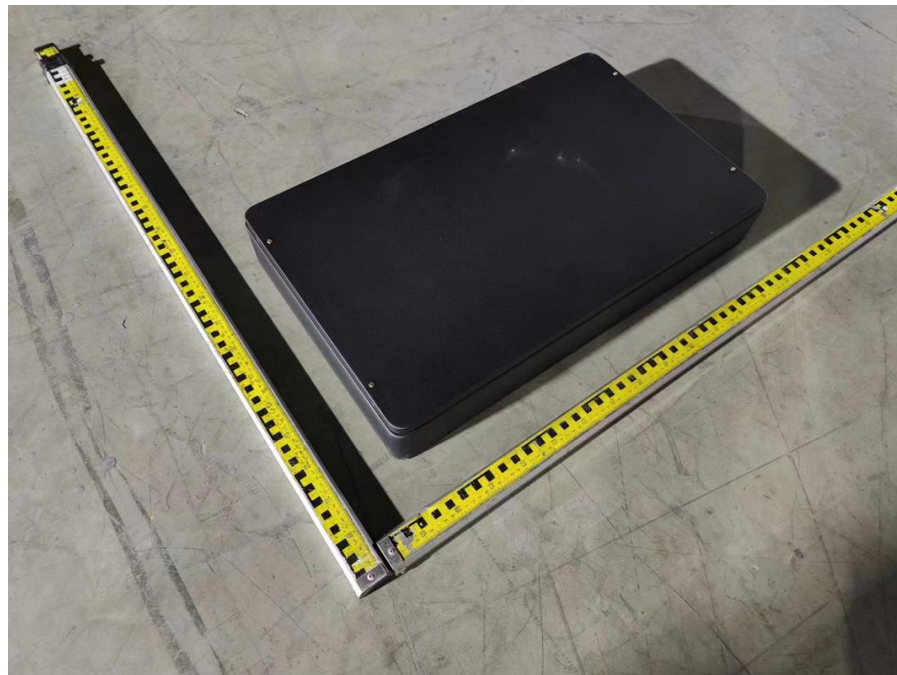
Overview of BYES-5000



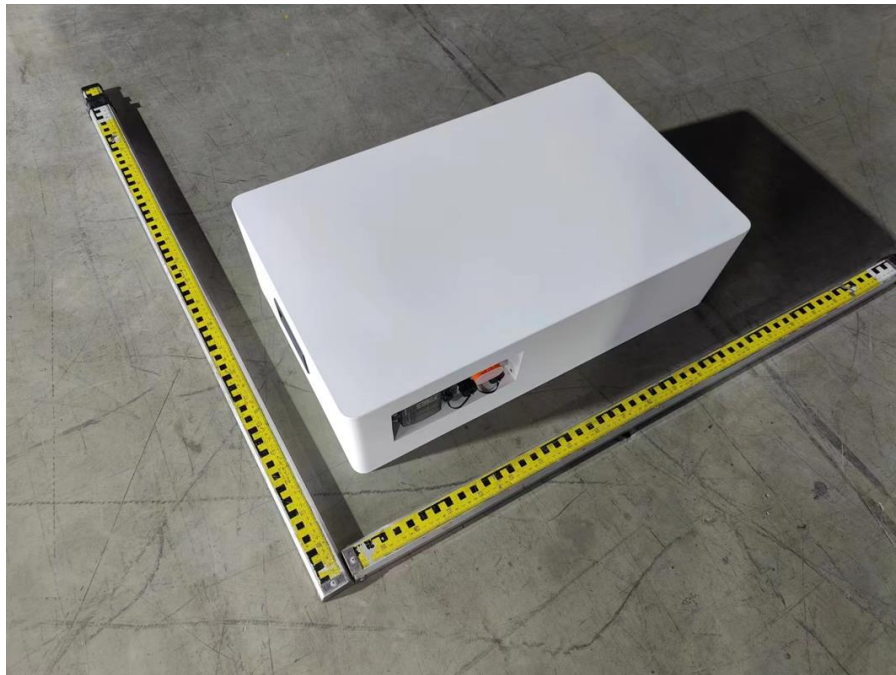
Overview of BYES-2500



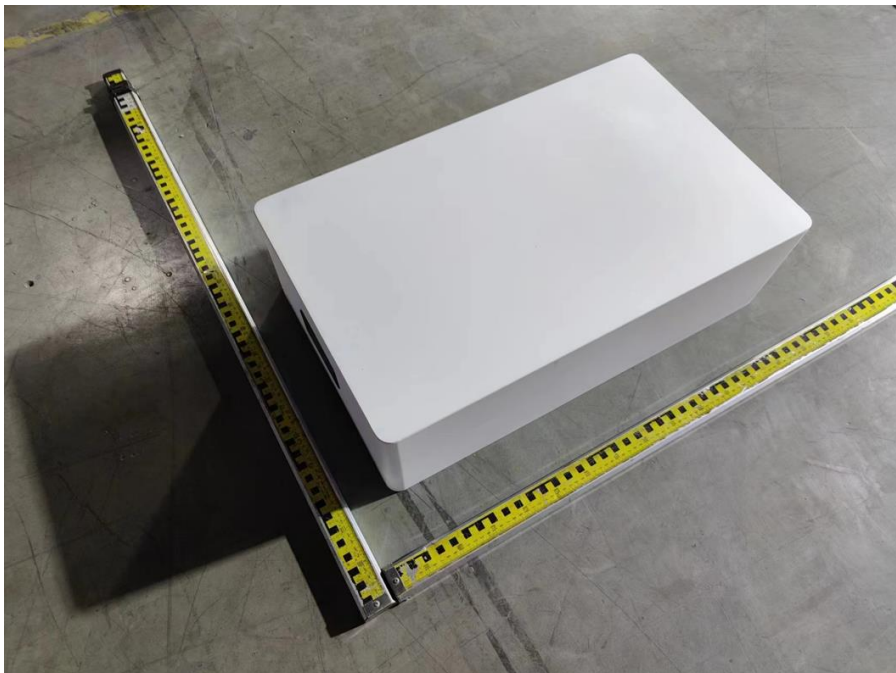
Overview of BYES-5000 pedestal



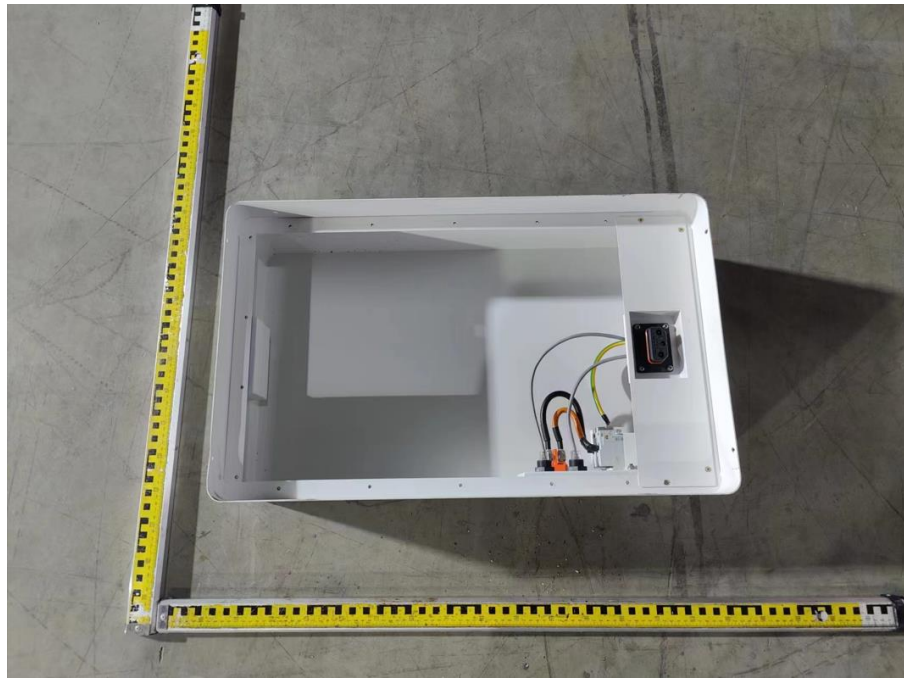
Overview of BYES-5000 control box



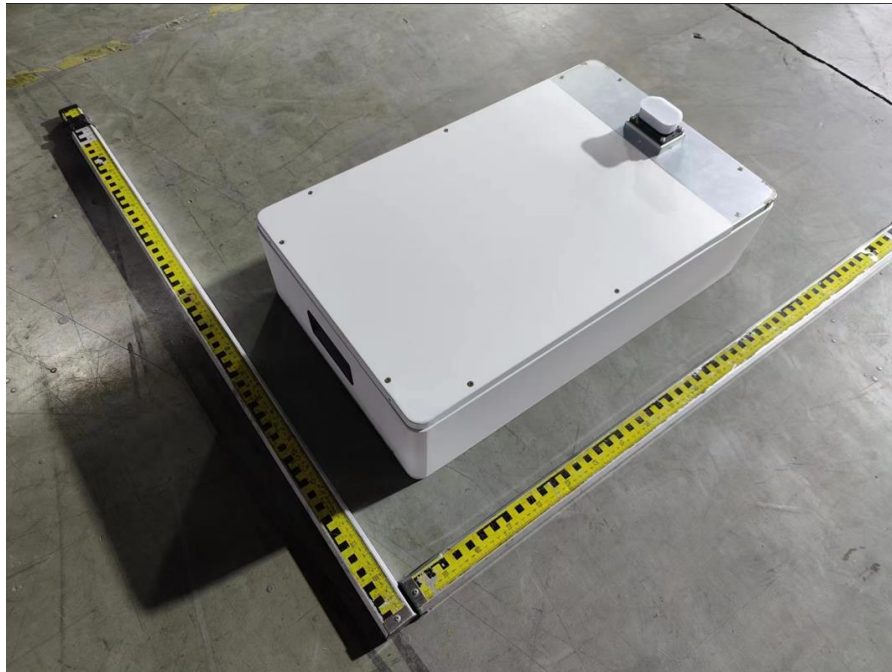
Overview of BYES-5000 control box



Internal view of of BYES-5000 control box



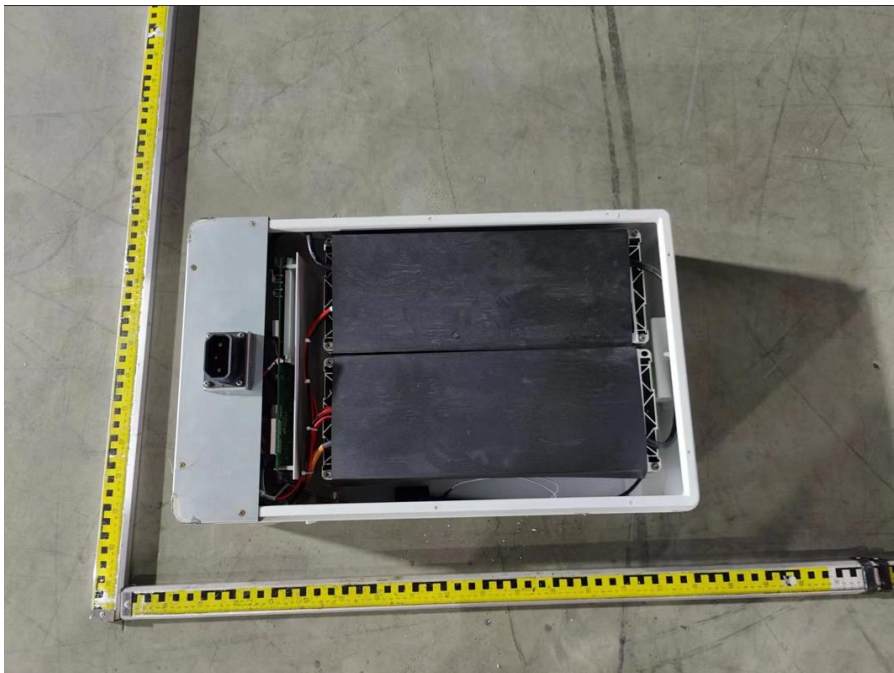
Overview of BYES-5000 battery box



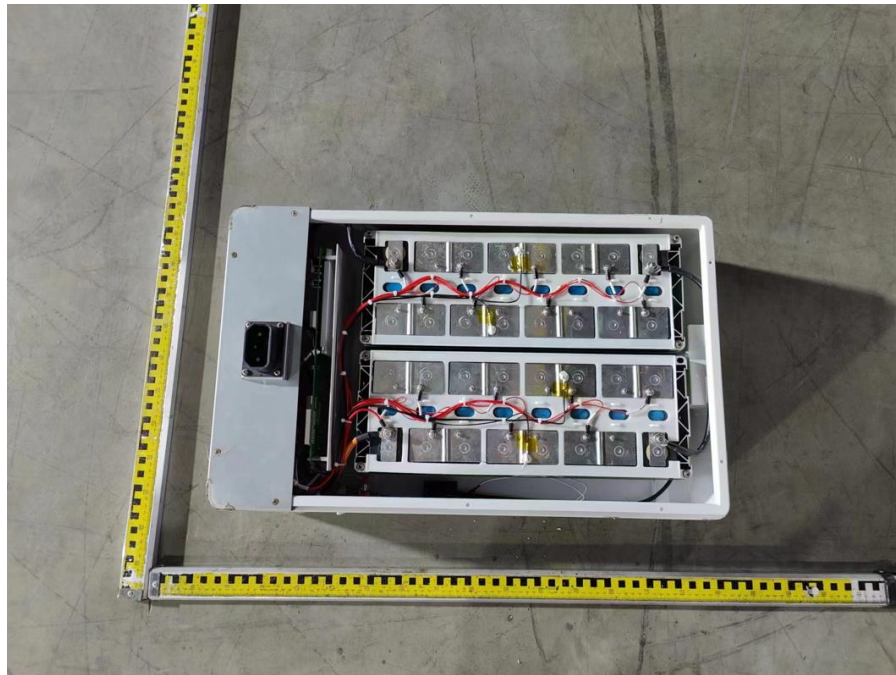
Overview of BYES-5000 battery box



Internal view of BYES-5000 battery box



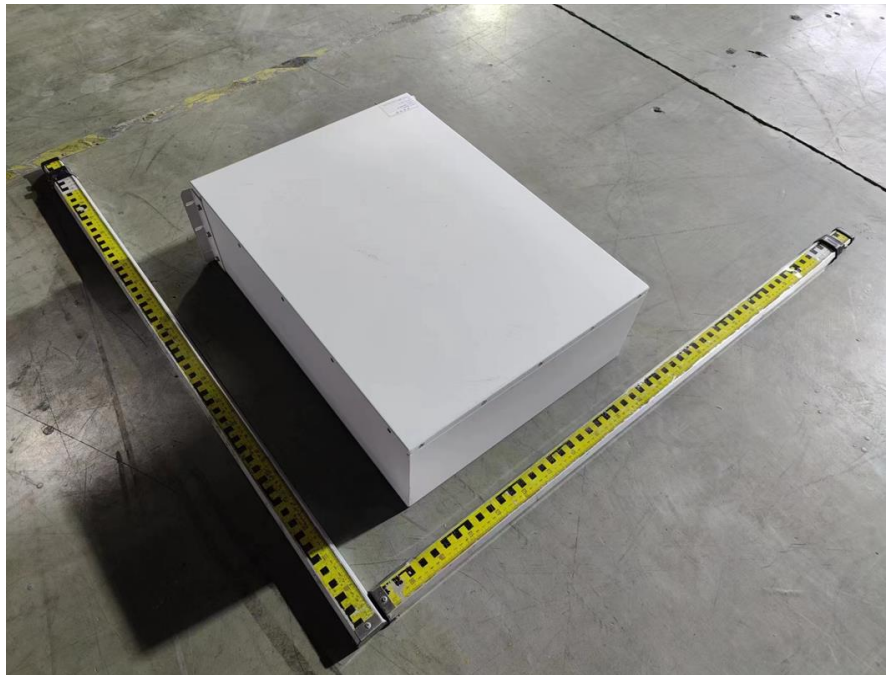
Internal view of BYES-5000 battery box



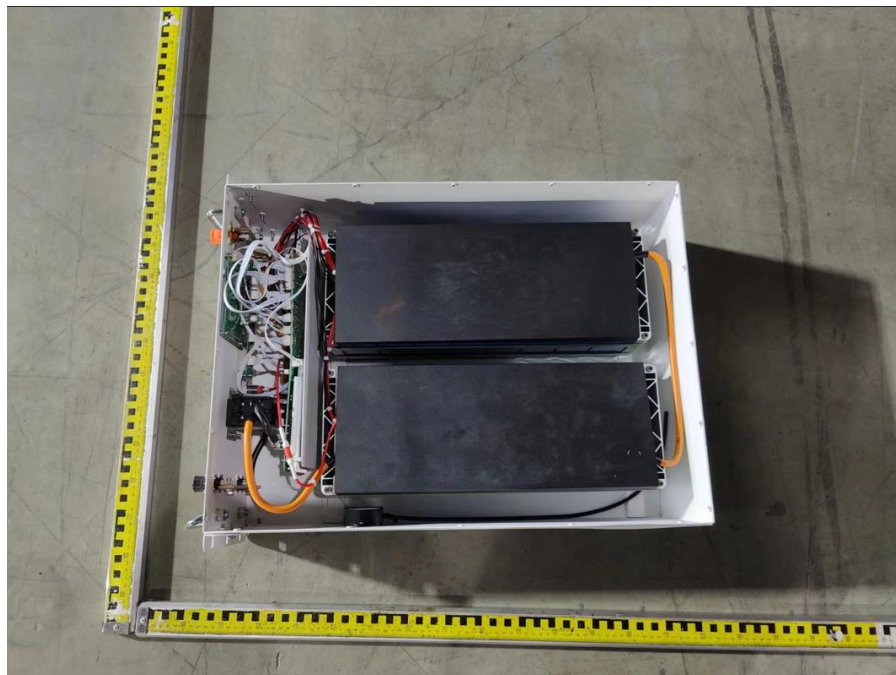
Overview of BYER-2500



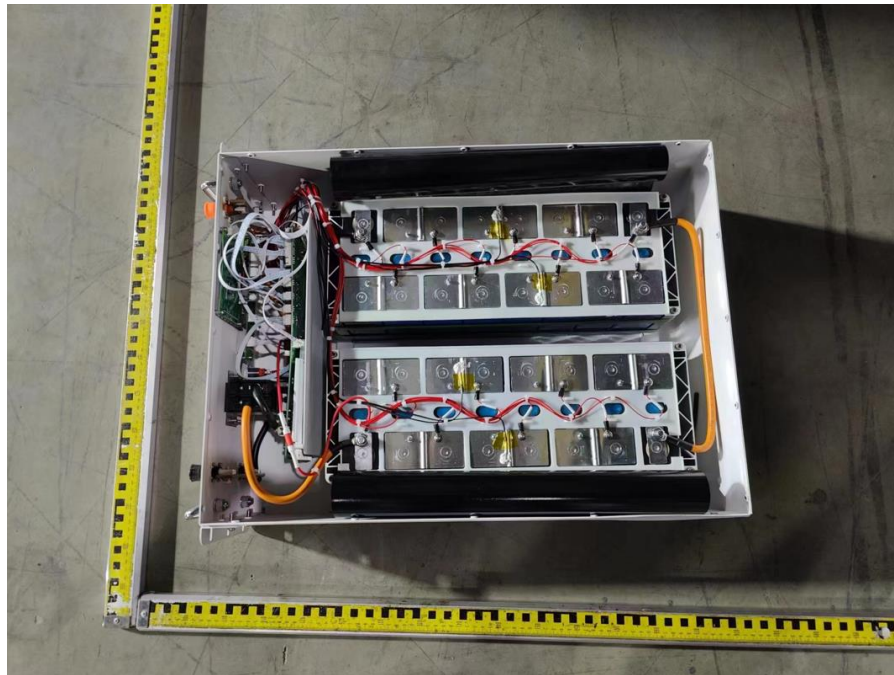
Overview of BYER-5000



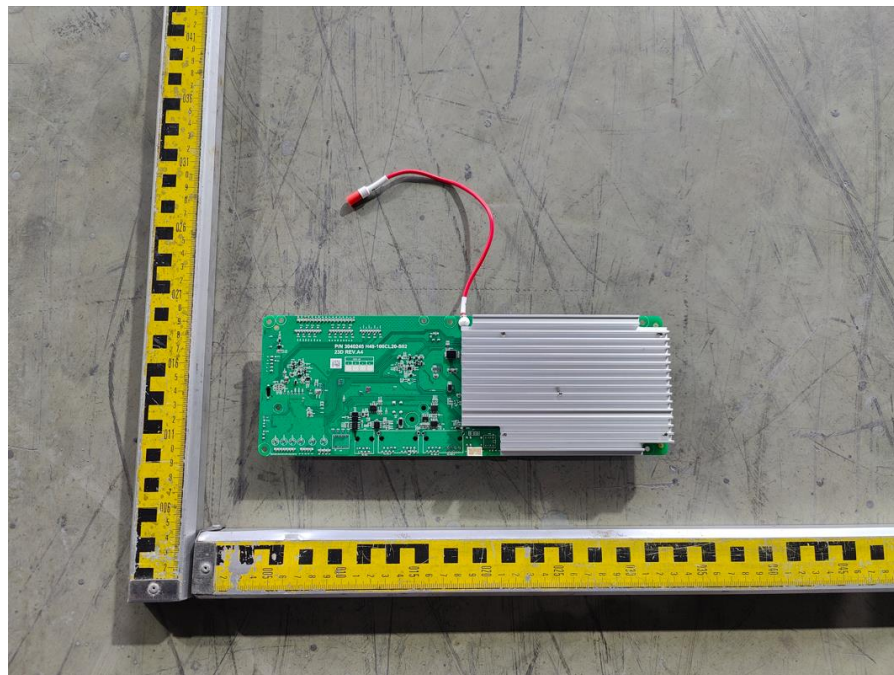
Internal view of BYER-5000



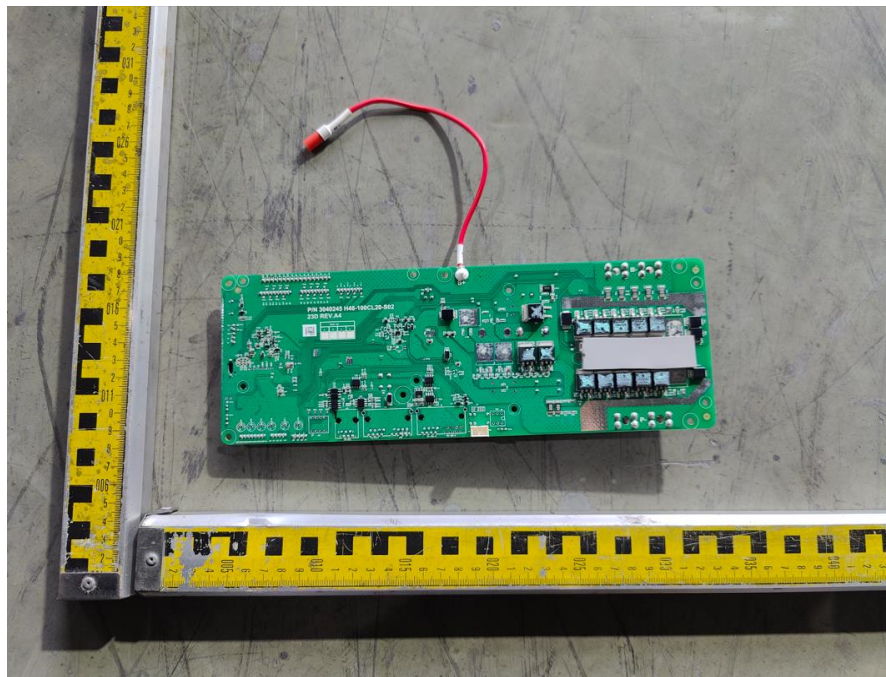
Internal view of BYER-5000



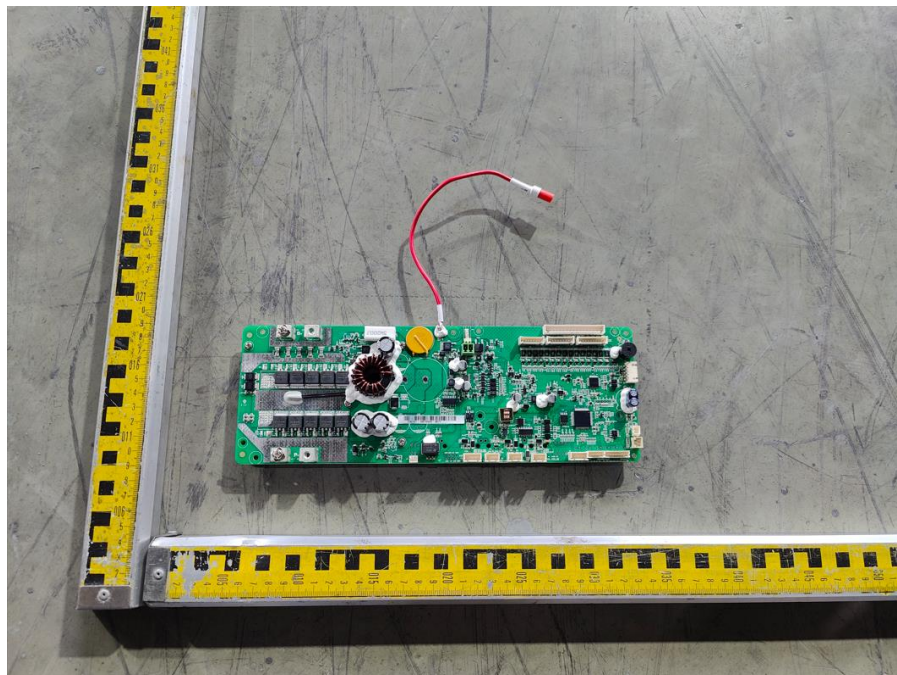
Picture of PCB board



Picture of PCB board



Overview of BYES-2500





ATTESTATION of conformity with European Directives

BV LCIE CHINA Number N°2466AS04IGL54546
Product Rechargeable Li-ion Battery
Reference BYEH-5000, BYES-5000, BYER-5000

Trademark 

Issued to Zhejiang Benyi New Energy Co., Ltd.
Address Wenzhou Bridge Industrial Zone, Beibaixiang, Yueqing, China.
Manufacturer Zhejiang Benyi New Energy Co., Ltd.
Address Wenzhou Bridge Industrial Zone, Beibaixiang, Yueqing, China.
Technical characteristics See below table

The submitted sample of the above equipment has been tested according to following European Directive and following standards:

LVD Directive 2014/35/EU

Standards	Report number	Report date
IEC 62040-1:2017+A1:2021 EN 62040-1:2019+A11:2021	BUTO-ESH-P23101499	2024-04-29

The referred test report(s) show that the product complies with standard(s) recognized as giving presumption of compliance with the essential requirements in the specified European Directive
This verification does not imply assessment of the production of the product

Shanghai (P.R. China), April 30th, 2024.

Product Line Manager
Robin Wu



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Model	BYEH-5000	BYES-5000	BYER-5000
Battery Type	Li-ion	Li-ion	Li-ion
Battery Voltage Range (Vd.c.)	44,8~57,6	44,8~57,6	44,8~57,6
Nominal voltage (V)	51,2	51,2	51,2
Rated capacity (Ah)	102	102	102
Normal current (Ad.c)	51	51	51
Max. Charging/Discharging Current (Ad.c.)	51/51	51/51	51/51
Charging Temperature Range (°C)	0~55	0~55	0~55
Discharging Temperature Range (°C)	-20~55	-20~55	-20~55
Protective class	Class I	Class I	Class I



ATTESTATION of conformity with European Directives

BV LCIE CHINA Number N°2466AS04IGL54548

Product Rechargeable Li-ion Battery

Reference BYEH-5000, BYES-5000, BYER-5000

Trademark



Issued to Zhejiang Benyi New Energy Co., Ltd.

Address Wenzhou Bridge Industrial Zone, Beibaixiang, Yueqing, China.

Manufacturer Zhejiang Benyi New Energy Co., Ltd.

Address Wenzhou Bridge Industrial Zone, Beibaixiang, Yueqing, China.

Technical characteristics See below table

The submitted sample of the above equipment has been tested according to following European Directive and following standards:

LVD Directive 2014/35/EU

<i>Standards</i>	<i>Report number</i>	<i>Report date</i>
IEC 62477-1:2022, EN 62477-1:2012+A11:2014+A1:2017+A12:2021	BUTO-ESH-P23101504	2024-04-29

The referred test report(s) show that the product complies with standard(s) recognized as giving presumption of compliance with the essential requirements in the specified European Directive

This verification does not imply assessment of the production of the product

Shanghai (P.R. China), April 30th, 2024.

Product Line Manager

Robin Wu



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Version: 10.1 / Feb.28 2024

Page 1 of 2

Model	BYEH-5000	BYES-5000	BYER-5000
Battery Type	Li-ion	Li-ion	Li-ion
Battery Voltage Range (Vd.c.)	44,8~57,6	44,8~57,6	44,8~57,6
Nominal voltage (V)	51,2	51,2	51,2
Rated capacity (Ah)	102	102	102
Normal current (Ad.c)	51	51	51
Max. Charging/Discharging Current (Ad.c.)	51/51	51/51	51/51
Charging Temperature Range (°C)	0~55	0~55	0~55
Discharging Temperature Range (°C)	-20~55	-20~55	-20~55
Protective class	Class I	Class I	Class I



Ref. Certif. No.

FR_718976

IEC SYSTEM FOR MUTUAL RECOGNITION OF TEST CERTIFICATES FOR ELECTRICAL EQUIPMENT (IECEE) CB SCHEME

CB TEST CERTIFICATE

Product

Li-ion battery Pack
Rechargeable Li-ion Battery

Name and address of the applicant

ZHEJIANG BENYI NEW ENERGY CO., LTD.
Wenzhou Bridge Industrial Zone, Beibaixiang
Yueqing, 325603 - CHINA

Name and address of the manufacturer

ZHEJIANG BENYI NEW ENERGY CO., LTD.
Wenzhou Bridge Industrial Zone, Beibaixiang
Yueqing, 325603 - CHINA

Name and address of the factory

ZHEJIANG BENYI NEW ENERGY CO., LTD.
Wenzhou Bridge Industrial Zone, Beibaixiang
Yueqing, 325603 - CHINA

Note: When more than one factory, please report on page 2

☐ Additional Information on page 2

Ratings and principal characteristics

51,2V, 102Ah, 5222, 4Wh

Trademark / Brand (if any)



Customer's Testing Facility (CTF) Stage used

/

Model / Type Ref.

BYEH-5000, BYES-5000, BYER-5000

Additional information (if necessary may also be reported on page 2)

☐ Additional Information on page 2

A sample of the product was tested and found to be in conformity with

IEC 62619:2022

As shown in the Test Report Ref. No. which forms part of this Certificate

BUTO-ESH-P23101502

This CB Test Certificate is issued by the National Certification Body



LABORATOIRE CENTRAL DES INDUSTRIES ELECTRIQUES - LCIE
33 avenue du Général Leclerc
92260 Fontenay-aux-Roses, FRANCE
www.lcie.fr

Date: 22/04/2024

Signature: 
Certification Officer

