



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**..... : 230100846SHA-001  
**Date of issue** ..... : 2023-03-10  
**Total number of pages** ..... : 26 pages

**Name of Testing Laboratory preparing the Report** ..... : Intertek Testing Services Shanghai  
 Building No.86, 1198 Qinzhou Road (North), 200233 Shanghai, China




**Applicant's name** ..... : Eitai(Xiamen) New Energy Technology Co., Ltd.  
**Address** ..... : #1003 No. 498 XingLinWan Road, JiMei District XiaMen, 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 2022-12-16

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<b>Test item description</b> .....	Secondary Li-ion Battery	
<b>Trademark(s)</b> .....		
<b>Manufacturer</b> .....	Eitai(Xiamen) New Energy Technology Co., Ltd. #1003 No. 498 XingLinWan Road, JiMei District XiaMen, China	
<b>Model/Type reference</b> .....	WALV-10K	
<b>Ratings</b> .....	10240Wh, 51.2V, 200Ah	
<b>Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):</b>		
<input checked="" type="checkbox"/>	<b>CB Testing Laboratory:</b>	Intertek Testing Services Shanghai
<b>Testing location/ address</b> .....		Building No.86, 1198 Qinzhou Road (North), 200233 Shanghai, China
<b>Tested by (name, function, signature)</b> .....		Sofm Shen/ Tommy Xia (Engineer) 
<b>Approved by (name, function, signature)</b> ...		Susanna Xu (Mandated Reviewer) 
<input type="checkbox"/>	<b>Testing procedure: CTF Stage 1:</b>	
<b>Testing location/ address</b> .....		
<b>Tested by (name, function, signature)</b> .....		
<b>Approved by (name, function, signature)</b> ...		
<input type="checkbox"/>	<b>Testing procedure: CTF Stage 2:</b>	
<b>Testing location/ address</b> .....		
<b>Tested by (name + signature)</b> .....		
<b>Witnessed by (name, function, signature) .:</b>		
<b>Approved by (name, function, signature)</b> ...		
<input type="checkbox"/>	<b>Testing procedure: CTF Stage 3:</b>	
<input type="checkbox"/>	<b>Testing procedure: CTF Stage 4:</b>	
<b>Testing location/ address</b> .....		
<b>Tested by (name, function, signature)</b> .....		
<b>Witnessed by (name, function, signature) .:</b>		
<b>Approved by (name, function, signature)</b> ...		

<b>Supervised by (name, function, signature) :</b>		
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**List of Attachments (including a total number of pages in each attachment):**

No.	Content	Page
1	Photos of product	23-26

**Summary of testing:**
**Tests performed (name of test, test clause and date test performed):**

Drop test	7.2.3
Overcharge control of voltage	8.2.2
Overcharge control of current	8.2.3
Overheating control	8.2.4

**Testing location:**

**Intertek Testing Services Shanghai**  
 Building No.86, 1198 Qinzhou Road (North),  
 200233 Shanghai, China.

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

N/A

**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.

Marking

		Secondary Li-ion Battery	<b>Model: WALV-10K</b>	manufacture date: 20230309
Capacity:	10240Wh/51.2V/200Ah			
Voltage range:	46.4~57.9(V)			
Rated voltage:	51.2(V)			
IP Protection:	IP65(Wall hanging)			
Communication Port:	CAN/RS485/RS232			
Dimension:	W:422/ H:635/ D:259(mm)			
Maximum Discharge Current:	100(A)			
Continuous Discharge Current:	100(A)			
Maximum Charge Current:	100(A)			
Continuous Charging Current:	100(A)			
Cycle Times:	>6000Times(70%DOD,25°C)			




Company: Eitai(Xiamen) New Energy Technology Co., Ltd.

**CAUTION!**  
 ·Do not disassemble  
 ·Do not short-circuit  
 ·Do not place in fire or near hot source  
 ·Please read user manual carefully



Operational Address: #1003  
 No. 498 XingLinWan Road,  
 JiMei District XiaMen, China

EC62619,CE-LVD,CE-EMC,  
 UN38.3,MSDS,ROHS,CB

Battery Designation : IFpP/54/174/205/[16S]M/0+60/95

Polarity mark on enclosure



Note: The manufacture date is presented as YYYYMMDD on label, DD denote day, MM denotes month, YYYY denotes year. e.g. 20230309 denotes manufacture date is March 9, 2023.

<b>Test item particulars</b> .....:	
<b>Classification of installation and use</b> .....:	Used in industrial applications
<b>Supply Connection</b> .....	Supply by connectors
.....:	
<b>Possible test case verdicts:</b>	
- 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)
<b>Testing</b> .....:	
<b>Date of receipt of test item</b> .....	2023-01-10
<b>Date (s) of performance of tests</b> .....	2023-02-20 to 2023-02-27
<b>General remarks:</b>	
<p>"(See Enclosure #)" refers to additional information appended to the report.                  "(See appended table)" refers to a table appended to the report.</p> <p>Throughout this report a <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.</p> <p><input type="checkbox"/> This Test Report Form contains requirements according to IEC/ISO ..... Standard dated ..... and includes Corrigendum dated .....</p> <p>(Note: The above text maybe removed if not applicable)</p>	
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<b>Manufacturer's Declaration per sub-clause 4.2.5 of IECCE 02:</b>	
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 ..... :	<input checked="" type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>Not applicable</b>
<b>When differences exist; they shall be identified in the General product information section.</b>	

**Name and address of factory (ies)** ..... : Liwatt Contemporary Amperex Technology Co., Ltd  
 Floor 2, Building 3, No.33 Gongye South Road,  
 Chengnan Industrial Park, Chengnan Town,  
 Ninghua County, Sanming City, Fujian, P.R.China  
 Fuzhou Battenergy New Energy Technology Co.,  
 LTD No.4 Pearl Road,Mawei,Fuzhou, P.R.China

**General product information and other remarks:**

The product covered by this report is Secondary Li-ion Battery, model No. is WALV-10K. Cell model No. is CBA54173200-206Ah.

Additionally, details information of the battery system and the built-in cell are shown in following table:

Item	Specification	
Product name	LiFePO4 Cell	Secondary Li-ion Battery
Model	CBA54173200-206Ah	WALV-10K
Nominal voltage	3.2Vd.c.	51.2Vd.c.
Rated capacity	200Ah	200Ah
Upper limit charging voltage	3.62V	57.9V
Recommended charging current by manufacturer	100A	100A
Maximum charging current	100A	100A
Charge temperature range	0°C to 60°C	0°C to 60°C
Standard charging method by manufacturer	Charge at constant current 100A until voltage reaches 3.47V, then charge at constant voltage 3.625V till charge current is 10A.	Charge at constant current 100A until voltage reaches 56.0V (3.5V/Cell), then charge at constant voltage 57.9V till charge current is 10A.
Final discharge voltage	2.90V	46.4V (2.9V/Cell)
Dimension	204.83*173.8*54.3 (mm)	W:422/ H:635/ D:259(mm)
Weight	3900g±120g	Approximate 90kg

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
<b>4</b>	<b>PARAMETER MEASUREMENT TOLERANCES</b>		<b>P</b>
	Parameter measurement tolerances		P
<b>5</b>	<b>GENERAL SAFETY CONSIDERATIONS</b>		<b>P</b>
<b>5.1</b>	<b>General</b>		<b>P</b>
	Cells and batteries are safe under conditions of both intended use and reasonably foreseeable misuse... :	Clause 6, Clause 7, 8.1, and 8.2. See also table 5.1 for Critical components information	P
	Reduce the risk of injuries from moving parts		P
<b>5.2</b>	<b>Insulation and wiring</b>		<b>P</b>
	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		P
	The mechanical integrity of internal connections		P
<b>5.3</b>	<b>Venting</b>		<b>P</b>
	Pressure relief function		P
	Encapsulation used to support cells within an outer casing		N/A
<b>5.4</b>	<b>Temperature/voltage/current management</b>		<b>P</b>
	The design prevents abnormal temperature-rise		P
	Voltage, current, and temperature limits of the cells		P
	Specifications and charging instructions for equipment manufacturers		P
<b>5.5</b>	<b>Terminal contacts of the battery pack and/or battery system</b>		<b>P</b>
	Polarity marking(s)	The "+" and "-" polarity explicitly marked on surface of the battery	P
	Polarity marking not provided for keyed external connector		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
<b>5.6</b>	<b>Assembly of cells, modules, or battery packs into battery systems</b>		<b>P</b>

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
5.6.1	General		P
	Independent control and protection method(s)		P
	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		P
5.6.2	Battery system design		P
	The voltage control function		P
	Maximum charging/discharging current of the cell are not exceeded		P
<b>5.7</b>	<b>Operating region of lithium cells and battery systems for safe use</b>		<b>P</b>
	The cell operating region..... :	Charging:100A Discharging:100A	P
	Designation of battery system to comply with the cell operating region	Charging:100A Discharging:100A	P
<b>5.8</b>	<b>System lock (or system lock function)</b>		<b>P</b>
	Non-resettable function to stop battery operation		P
	Manual with procedure for resetting of battery operation		P
	Emergency battery final discharge		P
<b>5.9</b>	<b>Quality plan</b>		<b>P</b>
	Manufacturing quality plan (for example: ISO9001, etc.) prepared and implemented..... :	Declaration provided.	P
	The process capabilities and the process controls		P

<b>6</b>	<b>TYPE TEST CONDITIONS</b>		<b>P</b>
<b>6.1</b>	<b>General</b>		<b>P</b>
<b>6.2</b>	<b>Test items</b>		<b>P</b>
	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

<b>7</b>	<b>SPECIFIC REQUIREMENTS AND TESTS</b>		<b>P</b>
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IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
<b>7.1</b>	<b>Charging procedure for test purposes</b>		<b>P</b>
	The battery discharged to a specified final voltage prior to charging		P
	The cells or batteries charged using the method specified by the manufacturer .....	Batteries charging: Charge at constant current 100A until voltage reaches 56.0V (3.5V/Cell), then charge at constant voltage 57.9V till charge current is 10A.	P
<b>7.2</b>	<b>Reasonably foreseeable misuse</b>		<b>P</b>
7.2.1	External short-circuit test (cell or cell block)	Certified cells used	N/A
	Short circuit with total resistance of 30 m ± 10 m at 25 °C ± 5 °C		N/A
	Results: no fire, no explosion		N/A
7.2.2	Impact test (cell or cell block)	Certified cells 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)		N/A
7.2.3.1	General		P
7.2.3.2	Whole drop test (cell or cell block, and battery system)	The module weighs more than 20Kg.	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..... :	Module (model: WALV-10K)	—
	Mass of the test unit (kg)..... :	89kg	—
	Height of drop (m)..... :	0.05m	—
	Results: no fire, no explosion		P
7.2.4	Thermal abuse test (cell or cell block)	Certified cells used	N/A
	Results: no fire, no explosion		N/A
7.2.5	Overcharge test (cell or cell block)	Certified cells used	N/A
	For those battery systems that are provided with only a single protection for the charging voltage control		—

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	Results: no fire, no explosion .....		N/A
7.2.6	Forced discharge test (cell or cell block)	Certified cells used	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, $1.0 I_t$ .....		N/A
	Discharging time, $t = (1 I_t / I_m) \times 90$ (min.) .....		N/A
	Results: no fire, no explosion .....		N/A
<b>7.3</b>	<b>Considerations for internal short-circuit – Design evaluation</b>		N/A
7.3.1	General		N/A
7.3.2	Internal short-circuit test (cell)	Certified cells used	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 $25\text{ °C} \pm 5\text{ °C}$ .		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 .....		N/A
7.3.3	Propagation test (battery system)		N/A
	Method to create a thermal runaway in one cell .....		N/A
	Results: No external fire from the battery system, no battery case rupture .....		N/A

<b>8</b>	<b>BATTERY SYSTEM SAFETY (CONSIDERING FUNCTIONAL SAFETY)</b>		<b>P</b>
<b>8.1</b>	<b>General requirements</b>		<b>P</b>
	Functional safety analysis for critical controls	According to IEC 60730-1:2020 Annex H.	P
	Conduct of a process hazard analysis for both the cell manufacturing process and the battery system manufacturing process		P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	Conduct of risk assessment and mitigation of the battery system		P
<b>8.2</b>	<b>Battery management system (or battery management unit)</b>		<b>P</b>
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)..... :	The exceeded voltage is applied to a whole battery system	P
	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..... :	65°C	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
<b>9</b>	<b>EMC</b>		<b>N/A</b>
	Battery system fulfil EMC requirements of the end-device application..... :		N/A
<b>10</b>	<b>INFORMATION FOR SAFETY</b>		<b>P</b>
	The cell manufacturer provides information about current, voltage and temperature limits of their products		P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	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		P
	Battery structure formulation		P

12	PACKAGING AND TRANSPORT		P
	Refer to Annex D		P

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 .....		—

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	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. 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		P
	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		P
	Regulations concerning international transport of secondary lithium batteries		P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

5.1	TABLE: Critical components information				
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity <sup>1)</sup>
Cell	Shandong Dejin New Energy Science and Technology Co., Ltd	CBA541732 00-206Ah	3.2Vdc, 206Ah, 659.2Wh	IEC62619:2017	Ref. Certif. No. JPTUV-133514
PCB material	Kingboard Laminates Holdings Limited	KB-6160A	Flame Class: V-0 Max temperature: 130°C thickness: 0.38mm~1.40mm	IEC62619:2022	UL E123995 and tested with appliance
IC for microcontrollers (UM1)	HUADA SEMICONDUCTOR Co., Ltd	HC32F460P ETB	V <sub>CU</sub> = (3.6±0.08) V; V <sub>DL</sub> = (1.65±0.02) V; T <sub>opr</sub> : -40°C ~ 85°C	IEC62619:2022	Tested with appliance
IC for current and voltage sensing (UA1)	SINO WEALTH ELECTRONIC LTD.	SH367309U /048UR	Supply voltage: V <sub>bat</sub> = 8.5 V~65V T <sub>opr</sub> : -40°C ~ 85°C	IEC62619:2022	Test with appliance
IC (U4)	Shanghai Beiling Co., LTD	BL8078CC3 TR33	Input Voltage Range: 3V~40V Output Voltage Range: 1.2V~5.0V	IEC62619:2022	Test with appliance
IC (U5)	Shanghai Beiling Co., LTD	BL3085(I47)	V <sub>CC</sub> =+5V±5%, T <sub>A</sub> =-40°C~+85°C	IEC62619:2022	Test with appliance
IC for voltage sensor (UA1)	SINO WEALTH ELECTRONIC LTD.	SH367309U /048UR	Supply voltage: V <sub>bat</sub> = 8.5 V~65V T <sub>opr</sub> : -40°C ~ 85°C	IEC62619:2022	Test with appliance
Temp sensing (RT1)	SHENZHEN SUNLORD ELECTRONICS CO LTD	SNGR1103 F3435FB	Resistance at 25°C: 10KΩ T <sub>moa</sub> : 200°C	IEC62619:2022	UL E352242 and tested with appliance
Fuse(FPL1)	Shenzhen Jinrui Electronic Materials Co., LTD	JK-nSMD005	I <sub>max</sub> : 100A I <sub>hold</sub> : 50mA V <sub>max</sub> : 60V	IEC62619:2022	UL E217453 and tested with appliance
MOSFET (QP1~QP40)	China Resources Microelectronics (Chongqing) Limited	CRSS028N 10N	V <sub>DS</sub> =100V, V <sub>GS</sub> =±20V, I <sub>D</sub> =180A, T <sub>J</sub> =-55~150°C	IEC62619:2022	Test with appliance

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Clause	Requirement + Test			Result - Remark	Verdict
Shunt resistor (RS1-RS10)	TA-I TECHNOLOGY CO., LTD.	RLP25FEG MR002	2mΩ±1%, 3W, T <sub>opr.</sub> : -55°C~170°C	IEC 62619:2022	Test with appliance
Wire for main circuit	Shenzhen Shunjia Electrical Technology Co., LTD	3135	AC 600V 16 AWG 200 °C	IEC 62619:2022	UL E490463 and tested 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): \_\_\_\_\_



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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): \_\_\_\_

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Clause	Requirement + Test	Result - Remark	Verdict

<b>7.3.2</b>	<b>TABLE: Internal short-circuit test (cell)</b>			<b>N/A</b>
Sample No.	OCV at start of test, (V dc)	Particle location <sup>1)</sup>	Maximum applied pressure, (N)	Results

**Supplementary information:**  
<sup>1)</sup> 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): \_\_

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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 <sup>1)</sup>		Location of target cell		Area for fire protection (m <sup>2</sup> )		
<b>Supplementary information:</b>						
<p>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</p> <p>2) If the battery system has no outer covering, the manufacturer is required to specify the area for fire protection.</p> <p>Results:</p> <p>A – No fire external to DUT enclosure or area for fire protection or no battery case rupture</p> <p>B – Fire external to DUT enclosure or area for fire protection</p> <p>C – Explosion</p> <p>D – Battery case rupture</p> <p>E – Other (Please explain): ___</p>						

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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 Cell/Cell Blocks, (V dc)	Maximum Charging Current, (A)	Max. Charging Voltage, (V dc)	Max. Voltage of Cell/Cell Blocks, (V dc)	Results
WALV-10K	3.040 to 3.079	100	57.355	3.612	A, D, F
			<b>Charge Voltage Applied Battery System: 1)</b>		
			<b>Whole</b>	<b>Part</b>	
			YES	--	
<b>Supplementary information:</b>					
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): ____					

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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
WALV-10K	49.286	120	53.512	A, D
<b>Supplementary information:</b> 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	Measured Maximum Charging Voltage, V dc	
WALV-10K	52.925	100	55.858	
Maximum Specified Temperature of Battery System, °C		Maximum Measured Cell Case Temperature, °C	Results	
60		60.1	A, D, F	
<b>Supplementary information:</b> 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): <u>Charging temperature range is 0°C to 60°C and the sample is steady at 58°C. Then the temperature sets to 63°C while the charging is continued until the BMS terminates the charging. Finally, the temperature is 60.1°C.</u>				

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Clause	Requirement + Test	Result - Remark	Verdict

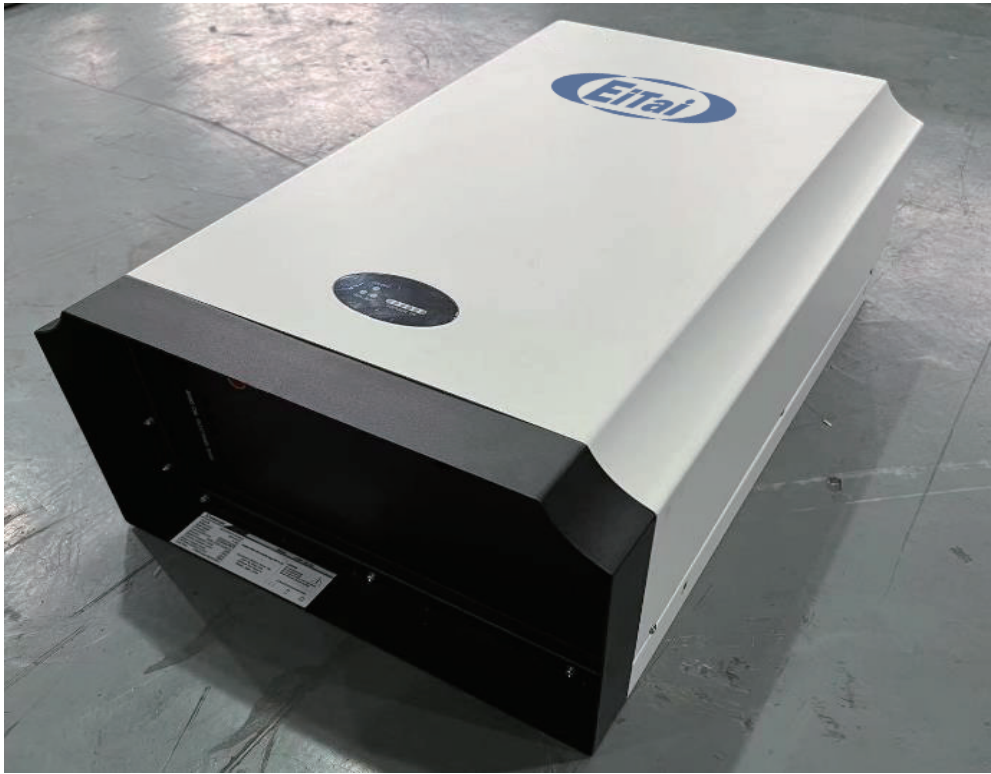
9	TABLE: EMC					N/A
Standard used for EMC test:						
Sample No.	EMC Test Item	Battery Condition	EMC Test Level/ Parameters	Compliance Criteria	Results	
<p><b>Supplementary information:</b></p> <p>Battery Condition During EMC test</p> <p>1 – In Operation Mode, [ ] Supplied at ____, [ ] Load at ____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

**Attachment 1: Photos of product**

**Overall view 1**



Overall view 2

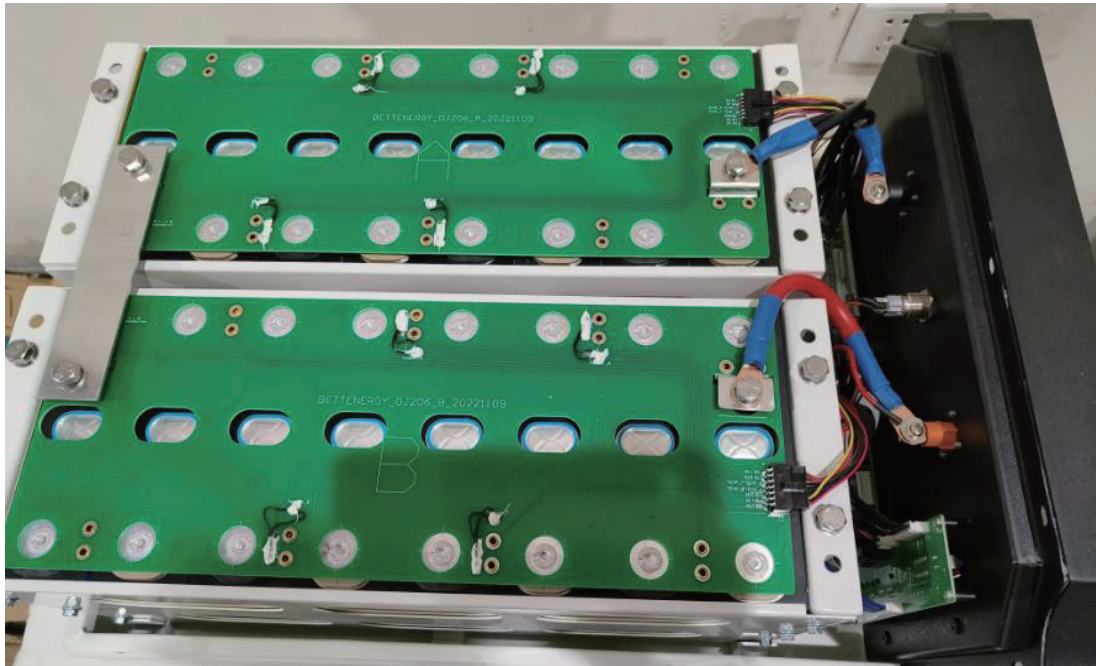


Overall view 3

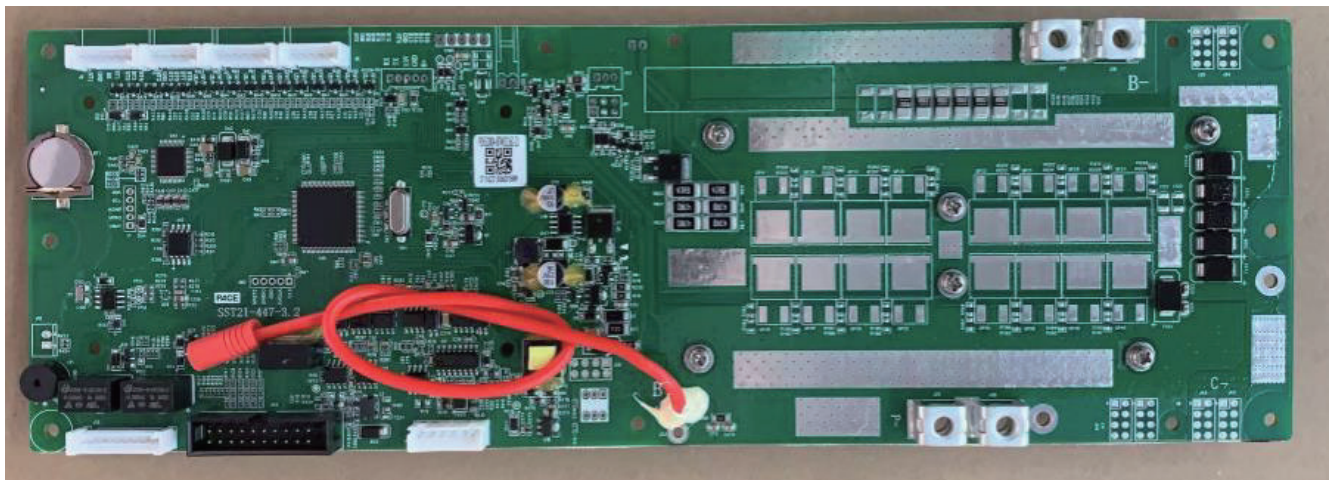




Internal View



BMS



Back of BMS

