





Test Report issued under the responsibility of:



TEST REPORT IEC 63056 Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium cells and batteries, for use in electrical energy storage systems	
Report Number :	230101219SHA-001
Date of issue :	2023-06-15
Total number of pages	30
Name of Testing Laboratory preparing the Report	Intertek Testing Services Shanghai Building No.86, 1198 Qinzhou Road (North), 200233 Shanghai, China
Applicant's name	CEEG (Jiangsu) Tech Co., Ltd
Address :	No. 69, Feitian Avenue, Jiangning Airport Economic Development Zone, Nanjing, Jiangsu Province, P.R.China
Test specification:	
Standard	IEC 63056:2020
Test procedure	CB Scheme
Non-standard test method	N/A
TRF template used :	IECEE OD-2020-F1:2020, Ed.1.4
Test Report Form No.	IEC63056A
Test Report Form(s) Originator :	UL(Demko)
Master TRF	Dated 2020-10-15
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Test item description :	Rechargeable Li-ion Battery System	
Trade Mark(s)		
Manufacturer	Same as applicant	
Model/Type reference	CUBE7.68-H; CUBE11.52-H; CUBE15.36-H	
Ratings	CUBE7.68-H: 25A/307.2V; CUBE11.52-H: 25A/460.8V; CUBE15.36-H: 25A/614.4V	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
<input checked="" type="checkbox"/>	CB Testing Laboratory:	Intertek Testing Services Shanghai
Testing location/ address :	Building No.86, 1198 Qinzhou Road (North), 200233 Shanghai, China	
Tested by (name, function, signature)	Sofm Shen/ Tommy Xia (Engineer)	
Approved by (name, function, signature) ...	Susanna Xu (Mandated Reviewer)	
<input type="checkbox"/>	Testing procedure: CTF Stage 1:	
Testing location/ address :		
Tested by (name, function, signature)		
Approved by (name, function, signature) ...		
<input type="checkbox"/>	Testing procedure: CTF Stage 2:	
Testing location/ address :		
Tested by (name + signature)		
Witnessed by (name, function, signature) .:		
Approved by (name, function, signature) ...		
<input type="checkbox"/>	Testing procedure: CTF Stage 3:	
<input type="checkbox"/>	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):		
No.	Content	Page
1	Photos of product	25 to 30

Summary of testing:

Tests performed (name of test and test clause):		Testing location:
Resistance to abnormal heat	7.2	Intertek Testing Services Shanghai Building No.86, 1198 Qinzhou Road (North), 200233 Shanghai, China.
Electric insulation check during transport and installation	7.4	
Charging procedures for test purposes	7.5	
Protection against short circuit during transport and installation	7.6	
Protection for reverse connection	7.7	
Overdischarge control of voltage (battery system)	7.8	
Drop test	7.9	

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

None

The product fulfils the requirements of EN IEC 63056:2020

Statement concerning the uncertainty of the measurement systems used for the tests
(may be required by the product standard or client)

Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:
Procedure number, issue date and title:

Calculations leading to the reported values are on file with the NCB and testing laboratory that conducted the testing.

Statement not required by the standard used for type testing

(Note: When IEC or ISO standard requires a statement concerning the uncertainty of the measurement systems used for tests, this should be reported above. The informative text in parenthesis should be delete in both cases after selecting the applicable option)

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.

Markings

CEEG

Rechargeable Li-ion Battery System
 IFpP28/71/181[2S(1P48S)]M-20+55/90
 Rated Capacity:25Ah
 Model No./Nominal Voltad/Rated Energy
 CUBE7 .68 -H/307.2Vd.c./7.68kWh
 Max.Charge/Discharge Current: 25A
 Nominal Charge/Discharge Current: 25A
 Operating voltage range:254.4V...345.6V
 Operating temperature range:
 0°C...+55°C (Charge), -20°C...+60°C (Discharge)
 Available SOC Range:10%...100%
 Protection Class: I
 IP Class IP65

The battery shuould be disposed by qualified recycling agent

CAUTION

- Do not disassemble the battery pack.
- Do not immerse the battery pack in water.
- Do not short-circuit the battery.
- Do not leave the battery near by fire.

Emergency Situations

- * If leaking ,fire, wet or damaged ,switch off the breaker and go away from the battery.
- * Do not touch the leaking liquid. Do not use water ,sand or dry powder extinguisher is usable.

Manufacturer: CEEG(Jiangsu) Tech Co.,Ltd
 Made in China

CEEG

Rechargeable Li-ion Battery System
 IFpP28/71/181[3S(1P48S)]M-20+55/90
 Rated Capacity:25Ah
 Model No./Nominal Voltad/Rated Energy
 CUBE11 .52 -H/480.8Vd.c./11.52kWh
 Max.Charge/Discharge Current: 25A
 Nominal Charge/Discharge Current: 25A
 Operating voltage range:381.6V...518.4V
 Operating temperature range:
 0°C...+55°C (Charge), -20°C...+60°C (Discharge)
 Available SOC Range:10%...100%
 Protection Class: I
 IP Class IP65

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CAUTION

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- Do not immerse the battery pack in water.
- Do not short-circuit the battery.
- Do not leave the battery near by fire.

Emergency Situations

- * If leaking ,fire, wet or damaged ,switch off the breaker and go away from the battery.
- * Do not touch the leaking liquid. Do not use water ,sand or dry powder extinguisher is usable.

Manufacturer: CEEG(Jiangsu) Tech Co.,Ltd
 Made in China



Rechargeable Li-ion Battery System

IFpP28/71/181[4S(1P48S)]M/-20+55/90

Rated Capacity:25Ah

Model No./Nominal Voltad/Rated Energy

CUBE15.36-H/614.4Vd.c./15.36kWh

Max.Charge/Discharge Current: 25A

Nominal Charge/Discharge Current: 25A

Operating voltage range:508.8V...691.2V

Operating temperature range:

0℃...+55℃(Charge), -20℃...+60℃(Discharge)

Available SOC Range:10%...100%

Protection Class: I

IP Class IP65










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CAUTION

- Do not disassemble the battery pack.
- Do not immerse the battery pack in water.
- Do not short-circuit the battery.
- Do not leave the battery near by fire.


Emergency Situations

- * If leaking ,fire, wet or damaged ,switch off the breaker and go away from the battery.
- * Do not touch the leaking liquid. Do not use water ,sand or dry powder extinguisher is usable.

Manufacturer: CEEG(Jiangsu) Tech Co.,Ltd

Made in China



Note:

SN code: XXXXXXXXXXXX. For example: C23F10H00001A

1. "C" ----- Company logo: The uppercase letter C stands for CEEG
2. "23" ----- Year of manufacture: consists of two Arabic numerals, such as 23 representing 2023
3. "F" ----- Manufacturing month: represented by A capital English letter, such as A for January, F for June
4. "10" ----- Date of manufacture: consists of two Arabic numerals, such as 10 representing the number 10
5. "H" ----- Product nature: H stands for high voltage battery box
6. 00001 ----- Product number: consists of five digits starting from 00001 and ending with 99999
7. Press A to ----- Factory information: factory code. The default value is A

Test item particulars:	
Classification of installation and use: Battery system	
Supply Connection: -	
.....: -	
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: 2023-01-16	
Date (s) of performance of tests: 2023-05-19 to 2023-06-14	
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 <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.	
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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	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> 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 product covered by this report is Rechargeable Li-ion Battery System, model No. is CUBE7.68-H, CUBE11.52-H and CUBE15.36-H. Cell model No. is TB-027070180-Fe-25AH-X.

The product has two parts of DC side and AC side which are provided with redundant active protection of relay through MCU on the DC side and IGBT and relay through MCU on the AC side. And for short circuit protection, there is additional fuse protection.

In section 7, Cl. 7.2.3, was carried out on battery module and control box. It is more rigorous to use the battery module and control box for drop test. In section 8, Cl. 8.2.2, Cl. 8.2.3 and Cl. 8.2.4 were carried out on the max. system.

Item	Specification	
	Configuration	-
Product name	Rechargeable Li-ion Cell	Rechargeable Li-ion Battery
Type/model	TB-027070180-Fe-25AH-X	CUBE3.84-H
Nominal voltage	3.2Vd.c.	153.6V (3.2V/cell)
Rated capacity	25Ah	25Ah
Charging voltage declared by manufacturer	3.65V	172.8V
Upper limit charging voltage	3.65V	172.8V (3.6V/cell)
Charging current declared by manufacturer	25 A	25A
Maximum Continuous Charging Current	50A	25A
Discharging current declared by manufacturer	25A	25A
Maximum Continuous Discharging Current	75A	25A
Discharge Cut-Off Voltage	2.5V	127.2V (2.65V/cell)
Standard temperature range for charging	0°C ~ 65°C	0°C ~ 55°C
Standard temperature range for discharging	-20°C ~ 65°C	-20°C ~ 60°C
Standard charging procedure (20°C ± 5°C)	Charge at constant current 25A until voltage reaches 3.65V, then charge at constant voltage 3.65V till charge current is 1.25A.	Charge at constant current 25A until voltage reaches 172.8V(3.6V/cell), then charge at constant voltage 172.8V(3.6V/cell) till charge current is 1.25A.
Charging procedure for internal short-circuit test	Charge at constant current 25A until voltage reaches 3.65V, then charge at constant voltage 3.65V till charge current is 1.25A.	-
Dimension	(180±1.0)mm×(70±0.5)mm×(27±0.5)mm	724*300*244mm (±2mm)
Weight	(640±20) g	Appro. 48 kg

Item	Specification	
Configuration	1P96S	1P144S
Product name	Rechargeable Li-ion Battery System	Rechargeable Li-ion Battery System
Type/model	CUBE7.68-H	CUBE11.52-H
Nominal voltage	307.2V (3.2V/cell)	460.8V (3.2V/cell)
Rated capacity	25Ah	25Ah
Charging voltage declared by manufacturer	345.6V	518.4V
Upper limit charging voltage	345.6V (3.6V/cell)	518.4V (3.6V/cell)
Charging current declared by manufacturer	25A	25A
Maximum Continuous Charging Current	25A	25A
Discharging current declared by manufacturer	25A	25A
Maximum Continuous Discharging Current	25A	25A
Discharge Cut-Off Voltage	254.4V (2.65V/cell)	381.6V (2.65V/cell)
Standard temperature range for charging	0°C ~ 55°C	0°C ~ 55°C
Standard temperature range for discharging	-20°C ~ 60°C	-20°C ~ 60°C
Standard charging procedure (20°C ± 5°C)	Charge at constant current 25A until voltage reaches 345.6V (3.6V/cell), then charge at constant voltage 345.6V (3.6V/cell) till charge current is 1.25A.	Charge at constant current 25A until voltage reaches 518.4V (3.6V/cell), then charge at constant voltage 518.4V (3.6V/cell) till charge current is 1.25A.
Charging procedure for internal short-circuit test	-	-
Dimension	724*300*488mm (±2mm)	724*300*732mm (±2mm)
Weight	Appro. 96 kg	Appro. 144 kg

Item	Specification
Configuration	1P192S
Product name	Rechargeable Li-ion Battery
Type/model	CUBE15.36-H
Nominal voltage	614.4V (3.2V/cell)
Rated capacity	25Ah
Charging voltage declared by manufacturer	691.2V
Upper limit charging voltage	691.2V (3.6V/cell)
Charging current declared by manufacturer	25A

Maximum Continuous Charging Current	25A
Discharging current declared by manufacturer	25A
Maximum Continuous Discharging Current	25A
Discharge Cut-Off Voltage	508.8V (2.65V/cell)
Standard temperature range for charging	0°C ~ 55°C
Standard temperature range for discharging	-20°C ~ 60°C
Standard charging procedure (20°C ± 5°C)	Charge at constant current 25A until voltage reaches 691.2V (3.6V/cell), then charge at constant voltage 691.2V (3.6V/cell) till charge current is 1.25A.
Charging procedure for internal short-circuit test	-
Dimension	724*300*976mm (±2mm)
Weight	Appro. 192kg

The battery system shall be charged per specification provided by the manufacturer as mentioned above.

IEC 63056			
Clause	Requirement + Test	Result - Remark	Verdict
4	PARAMETER MEASUREMENT TOLERANCES		P
	Parameter measurement tolerances		P
5	GENERAL SAFETY CONSIDERATIONS		P
5.1	General		P
	Battery systems and the cells they contain comply with the applicable general safety considerations of IEC 62619		P
	Within the standard temperature range, secondary cells are charged at the maximum charge current		P
	Lithium-ion cells are operated within the operating region and the storage conditions		P
	Cells and battery systems are safe under conditions of both intended use and reasonably foreseeable misuse..... :	See also Table 5.1 for Critical Components information	P
	Moving parts apply appropriate design to reduce the risk of injuries		P
5.2	Insulation and Wiring		P
	Sufficient for maximum voltage, current, temperature, altitude, and humidity requirements.. :	See also Table 5.1 for Critical Components information	P
	Adequate clearances and creepage distances between connectors according to IEC 60950-1:2005, 3.1 and 3.2		P
	Hazardous live parts are protected to avoid the risk of electric shock		P
	The mechanical integrity of whole battery system and internal connections follow end use equipment manufacturer's requirements or Annex A :	See also Annex A	P
	Maximum allowed number of series connections of a module or a battery system is provided in the specifications or instruction manual		P
5.3	The peak voltage of charging		P
	Battery system manufacturer ensures the peak voltage of charging current is under the upper limit charging voltage by monitoring the voltage of every single cell or cell block.		P
6	TYPE TEST CONDITIONS		P
6.1	General		P
6.2	Test items		P

IEC 63056			
Clause	Requirement + Test	Result - Remark	Verdict
	DUT (device under test) is stored under conditions specified by cell manufacturer and is not more than six months old		P
	Capacity confirmation of the DUT	Performed by factory.	P
	Default ambient temperature of test, 25 °C ± 5 °C		P
	See Table 1 of IEC 63056 for the type tests and the sample quantity for each tests		P
7	SPECIFIC REQUIREMENTS AND TESTS		P
7.1	Basic requirement		P
	Cells and batteries used in battery systems evaluated to this standard comply with the test requirements of IEC62619 and this standard		P
7.2	Resistance of abnormal heat		P
	Non-metallic materials, on which parts at hazardous voltage are directly mounted, are resistant to abnormal heat and comply with ball pressure test in IEC 60695-10-2	See Table 7.2	P
	Results: The dimension <i>d</i> of indentation does not exceed 2 mm		P
	Dimension <i>d</i> is the largest distance that can be measured across the indentation from one clearly defined edge of the indentation to another		—
7.3	Casing material of a battery system which can be transported for installation or maintenance		P
	The class of thermoplastic casing (V-2 or higher)	Flexible heat shrinkable Polyolefin tubing and Flame Retardant Sleeving are all VW-1.	—
	Where components cannot be protected against overheating under fault conditions, the following additional requirements are met:		—
	(1) Mounted on V-1 or higher class material, and		—
	(2) Separated from the V-2 class case material by min. 13 mm of air, or by a solid barrier of V-1 or higher class material.....		—
	Materials are tested at a thickness equal to the smallest thickness used in the application and classified according to IEC 60695-11-10 (mm)		N/A
7.4	Electric insulation check during transport and installation		P
	The hazardous live parts of battery or cell are covered or insulated from personnel		P

IEC 63056			
Clause	Requirement + Test	Result - Remark	Verdict
	Unless the end use equipment has specific requirements, the test method is in accordance with the insulation resistance test of IEC 62133:2017, Clause 5.2		P
	The insulation resistance between the positive terminal and externally exposed metal surfaces of the battery is not less than 5 MΩ at 500 Vdc when measured 60 s after applying the voltage		P
	Results: The insulation resistance is equal to or higher than 5 MΩ..... :	800.45 MΩ	P
7.5	Charging procedures for test purposes		P
	The battery is discharged at a constant current of 0,2 It A to a specified final voltage prior to charging		P
	Discharge current, 0,2 It A..... :	5A	—
	The cells or batteries are charged using the method specified by the manufacturer..... :	CUBE7.68-H, CUBE11.52-H and CUBE15.36-H: Charging: 0°C ~55°C 25A/[3.6V/cell Max]. Discharging: -20°C ~60°C 25A/[2.65V/cell Min.];	—
7.6	Protection for short circuit during transport and installation		P
	A safeguard is provided to prevent the risk of short circuit for personnel during transport and installation		P
	Safeguards are provided for battery system and for each part when the battery system is divided into parts for transportation		P
	Fully charged DUT is discharged to SOC (state of charge) for installation or maintenance, which is specified by the manufacturer		P
	Unless otherwise specified by the manufacturer, tests are carried out without discharging after charging in accordance with 7.2.		P
	DUT is stored in an ambient temperature until its temperature is stabilized at 25 °C ± 5 °C. Then, DUT is short-circuited by connecting the positive and negative terminals.		P
	The external resistance to short circuits is (30 mΩ ± 10 mΩ) × module configuration (= number of series connections / number of parallel connections) or less than 5 mΩ, whichever is higher; total external resistance less than 100 mΩ.		P

IEC 63056			
Clause	Requirement + Test	Result - Remark	Verdict
	Test is continued for 6 hours or the case temperature declined by 80 % of maximum temperature rise, whichever is sooner		P
	Results: No rupture, no fire, no explosion :	See Table 7.6	P
7.7	Protection for reverse connection		P
	Battery systems consisting of multiple battery packs or modules - that are not designed to prevent a reverse polarity connection or - that are not connected into the battery system with the BMS at the factory	A DUT which has a feature that prevents a reverse connection.	N/A
	Fully charged DUT is discharged to SOC (state of charge) for installation or maintenance, which is specified by the manufacturer		N/A
	One of the DUTs of battery system is connected with opposite polarity		N/A
	The battery system is fully charged or stopped by a safety protection, and then rested for one hour		N/A
	If the battery system can be discharged, - with the maximum discharge current until it stops discharging, and it's rested for one hour.		N/A
	If the battery system cannot be discharged, it is rested for one hour.		N/A
	Results: No rupture, no fire, no explosion :	See Table 7.7	P
7.8	Overdischarge control of voltage test (battery system)		P
	The BMS controls the cell voltage during discharging above the lower limit discharging voltage of the cells		P
	The cooling system remains functional during the test and the main contactors are closed with the battery system controlled by the BMS		P
	The battery system is discharged at a constant current of 0,2 It A to 30 % of the rated capacity, and then is discharged at the specified maximum discharging current		P
	The discharge is continued until the BMS terminates the discharging before exceeding the lower limit discharging voltage of the cells		P
	If difficult to overdischarge the whole system, the exceeded voltage applied to the cell(s) in the battery system		N/A
	Data acquisition/monitoring was continued for 1 h after discharging is stopped		P

IEC 63056			
Clause	Requirement + Test	Result - Remark	Verdict
	Results: No fire, no explosion	See Table 7.8	P
	The BMS interrupts the discharging before exceeding the lower limit discharging voltage of the cells		P
	All functions of the battery system are fully operational as designed during the test		P
7.9	Drop test		P
7.9.1	General		P
	For the simulation of a drop during installation and maintenance		P
	The DUT is (Cell, Module or Battery System).....:	Battery system	—
7.9.2	Whole drop test		N/A
	For DUT's mass less than 50 kg		N/A
	Fully charged DUT is discharged to SOC (state of charge) for installation or maintenance, which is specified by the manufacturer.		N/A
	Where SOC for installation or maintenance is not specified by the manufacturer, tests carried out without discharging after charging per clause 7.2.		N/A
	Description of the DUT		—
	The DUT is dropped one time from a height shown in Table 2 of IEC63056		N/A
	For DUT's mass less than 7 kg, it drops so as to obtain impact in random orientation		N/A
	For DUT's mass between 7 kg and 50 kg, it drops in the bottom down direction. The bottom surface of the DUT is specified by the manufacturer		N/A
	After the test, the DUT is put on rest for 1 h, and a visual inspection is performed		N/A
	Results: No fire, no explosion		N/A
7.9.3	Edge and corner drop test		P
	For DUT's mass equal to or more than 50 kg		P
	Fully charged DUT is discharged to SOC (state of charge) for installation or maintenance, which is specified by the manufacturer.		P
	Unless otherwise specified by the manufacturer, tests are carried out without discharging after charging in accordance with 7.2.		P
	Description of the DUT	Module with control box and weighs 83.5kg	—

IEC 63056			
Clause	Requirement + Test	Result - Remark	Verdict
	The DUT is dropped two times from a height shown in Table 2 of IEC63056	Height of drop: 50mm	P
	Test is arranged for reproducible impact points for the shortest edge drop impact and the corner impacted		P
	The two impacts, per impact type, are on the same corner and on the same shortest edge		P
	After the test, the DUT is put on rest for 1 h, and a visual inspection is performed		P
	Results: No fire, no explosion	No fire, no explosion	P
8	INFORMATION FOR SAFETY		P
	Information for safety in accordance with IEC 62619 was provided		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
9	MARKING AND DESIGNATION		P
	The marking items shown in Table 1 of 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
ANNEX A	WIRING, CONNETIONS AND SUPPLY		P
Table A.1	Wiring, connections and supply requirement, as addressed in IEC 60950-1:2005		P
Table A.2	Wiring, connections and supply requirement, as addressed in IEC 62368-1		P

IEC 63056			
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	Shenzhen Topband Co Ltd TOPBAND	TB-027070180-Fe-25AH-X	3.2Vd.c., 25Ah	IEC 62619	Ref. TUV Certif. No. SG PSB-BT-03830	
PCB material	SUNTAK MULTILAYER PCB CO LTD	BMS-48-25V1.0	130°C, V-0 Min. thickness: 1.6 mm (E207844)	IEC 63056	Tested with appliance	
IC for current and voltage sensing	ADI	LTC6804IG-1#TRPBF	Supply voltage: 11V-55V Topr: -40°C to 85°C	IEC 63056	Tested with appliance	
IC for Temp sensing	ADI	LTC6804IG-1#TRPBF	Supply voltage: 11V-55V Topr: -40°C to 85°C	IEC 63056	Tested with appliance	
Temp sensing	Kepengda	MS_343F_103 F	R ₂₅ =10kΩ±1%, B _{25/50} =3435K±1%, Topr: -40°C to 105°C	IEC 63056	Tested with appliance	
Relay	HONGFA	HF170F	35A, 277VAC	IEC 63056	Ref. TUV Certif. No. R50384178	
Fuse	Zhejiang Galaxy fuse Co., Ltd.	YRPV-30	20A, 1000VDC	IEC 63056	Ref. TUV Certif. No. R50276247	
Circuit Breaker	Projoy	PEDS150-HM-32-2	600VDC, 32A, 2P, -40°C to 85°C	IEC 63056	Ref. TUV Certif. No. R50494197	
Connector for D+, D-	Shenzhen Grid Power Connectors Co., Ltd.	MPC50	50A, 600VDC (E357218)	IEC 63056	Tested with appliance	
Connector between controller and module	WCON	3210-H20PB01	1000VDC, 3A/20pin (20 pins used) (E248993)	IEC 63056	Tested with appliance	
Connector between controller and module	WCON	3210-50SG0BLA1	1000VDC, 3A/20pin (20 pins used) (E248993)	IEC 63056	Tested with appliance	

IEC 63056					
Clause	Requirement + Test			Result - Remark	Verdict
Wire for main circuit	JIUKAI	10269	10AWG, 105°C 1000V, VW-1 (E342399)	IEC 63056	Tested with appliance
Rechargeable Li-ion Battery System	CEEG (jiangsu) Tech Co., Ltd	CUBE7.68-H	25A/307.2V	IEC 62619	Ref. Intertek Certif. No. SE-111485
	CEEG (jiangsu) Tech Co., Ltd	CUBE11.52-H	25A/460.8V	IEC 62619	Ref. Intertek Certif. No. SE-111485
	CEEG (jiangsu) Tech Co., Ltd	CUBE15.36-H	25A/614.4V	IEC 62619	Ref. Intertek Certif. No. SE-111485
Supplementary information: 1) Provided evidence ensures the agreed level of compliance. See OD-CB2039.					

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):____						

IEC 63056			
Clause	Requirement + Test	Result - Remark	Verdict

7.2	TABLE: Resistance of abnormal heat			P
Allowed impression diameter (mm)		≤2mm	—	
Object/ Part No./ Material	Manufacturer/ trademark	Test temperature (°C)	Impression diameter (mm)	
None				
Supplementary information: The test is made in a heating cabinet at a temperature of $(\Delta T + T_{max} + 15 \text{ °C}) \pm 2 \text{ °C}$. <ul style="list-style-type: none"> • ΔT means the maximum temperature rise of thermoplastic parts during the most adverse operation specified by the battery system manufacturer at $25 \text{ °C} \pm 5 \text{ °C}$. • T_{max} means upper limit ambient temperature specified by the battery system manufacturer. 				

7.4	TABLE: Electric insulation check during transport and installation		P
Sample No.	Insulation resistance (MΩ)(1)	Results	
CUBE15.36-H with control box	800.45	A	
Supplementary information: 1. The insulation resistance is measured between the positive terminal and externally exposed metal surfaces of the battery at 500 Vdc when measured 60 s after applying the voltage Results: A – The insulation resistance is equal to or higher than 5 MΩ B – The insulation resistance is less than 5 MΩ C – Other (Please explain): ____			

IEC 63056			
Clause	Requirement + Test	Result - Remark	Verdict
7.6	TABLE: Protection for short circuit during transport and installation		P
Constant discharging current, 0,2 It (A).....:		5A	—
SOC for installation or maintenance (Ah or Wh).....:		25Ah	—
Battery configuration (XS/YP).....:		1P192S	—
Sample No.	DUT's temperature at start of test (°C)(1)	External resistance (mΩ)(2)	Results
CUBE15.36-H with control box	26.5	7.06	A, F
Supplementary information:			
1. Prior to test, the DUT is stored in an ambient temperature until its temperature is stabilized at 25 °C ± 5 °C.			
2. The external resistance to short circuits is (30 mΩ ± 10 mΩ) × battery configuration (= number of series connections / number of parallel connections) or less than 5 mΩ, whichever is higher. Total external resistance is less than 100 mΩ.			
Results:			
A – No rupture or fire or explosion			
B – Rupture			
C – Fire			
D – Explosion			
E – The test is completed after 6 h			
F – The test is completed after the casing cooled to 20% of the maximum temperature rise			
G – Other (Please explain): <u>The fuse immediately blew when the short circuit test began.</u>			

IEC 63056			
Clause	Requirement + Test	Result - Remark	Verdict

7.7	TABLE: Protection for reverse connection			P
Constant discharging current, 0,2 It (A)	5A			—
SOC for installation or maintenance (Ah or Wh).....	25Ah			—
Sample No.	Charging voltage (Vdc)	Charging current (A)	Maximum discharging current (A)	Results
CUBE15.36-H with control box	-	-	-	-
Supplementary information:				
Results:				
A – No fire or explosion				
B – Fire				
C – Explosion				
D – The DUT is fully charged and then is rested for one hour				
E – The charging is stopped by a safety protection and then is rested for one hour				
F – The DUT can be discharged with maximum discharge current until stopped by itself and then is rested for one hour				
G – The DUT can't be discharged and then is rested for one hour				
H – Other (Please explain): <u>A DUT which has a feature that prevents a reverse connection.</u>				

IEC 63056						
Clause	Requirement + Test			Result - Remark		Verdict
7.8	TABLE: Overdischarge control of voltage test (battery system)					P
Constant discharging current, 0,2 It (A).....:			25A		—	
30% of rated capacity (Ah).....:			7.5Ah		—	
Sample No.	Maximum discharging current applying to battery (A)(1)		OCV at end of the test (Vdc)		Lower limit discharging voltage of the cell (Vdc)	Results
	Whole system	Cell(s)	Whole system	Cell(s)		
CUBE15.36 -H with control box	25A	-	498.55V	2.501V to 2.596V	2.50V	A, D
Supplementary information:						
1. If it is difficult to overdischarge the whole system, the exceeded voltage can be applied to a part of the system such as the cell(s) in the 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 lower limit discharging voltage						
E - The voltage of the measured cells or cell blocks did exceed the lower limit discharging voltage						
F – Other (Please explain): <u>The voltage of a single cell reaches the protection value, triggering the undervoltage protection of the battery system.</u>						

IEC 63056			
Clause	Requirement + Test	Result - Remark	Verdict

7.9.2	TABLE: Whole drop test					N/A
Constant discharging current, 0,2 It (A).....:						—
SOC for installation or maintenance (Ah or Wh).....:						—
Sample No.	Mass of DUT (kg)	Height of drop (m)(1)	OCV at start of the test (Vdc)	Impacted points (2)	Results	
Supplementary information:						
Mass of the DUT, m		Test method	Orientation		Height of drop	
$m < 7$ kg		Whole	Random		100,0 cm	
$7 \text{ kg} \leq m < 20$ kg		Whole	Bottom down direction (Note)		100,0 cm	
$20 \text{ kg} \leq m < 50$ kg		Whole	Bottom down direction (Note)		50,0 cm	
$50 \text{ kg} \leq m < 100$ kg		Edge and corner	--		5,0 cm	
$m \geq 100$ kg		Edge and corner	--		2,5 cm	
Note – The bottom surface of the DUT is specified by the manufacturer						
Results:						
A – No fire or explosion						
B – Fire						
C – Explosion						
D – Other (Please explain): ____						

IEC 63056			
Clause	Requirement + Test	Result - Remark	Verdict

7.9.3	TABLE: Edge and corner drop test					P
Constant discharging current, 0,2 It (A)..... :					5A	—
SOC for installation or maintenance (Ah or Wh)..... :					25Ah	—
Sample No.	Mass of DUT (kg)	Height of drop (m)(1)	OCV at start of the test (Vdc)	Impacted points (2)	Results	
CUBE3.84-H with control box	83.5	0.05	640.57	Edge and corner	A	
CUBE3.84-H with control box	83.5	0.05	640.57	Edge and corner	A	
Supplementary information:						
Mass of the DUT, m		Test method	Orientation	Height of drop		
$m < 7$ kg		Whole	Random	100,0 cm		
$7 \text{ kg} \leq m < 20$ kg		Whole	Bottom down direction (Note)	100,0 cm		
$20 \text{ kg} \leq m < 50$ kg		Whole	Bottom down direction (Note)	50,0 cm		
$50 \text{ kg} \leq m < 100$ kg		Edge and corner	--	5,0 cm		
$m \geq 100$ kg		Edge and corner	--	2,5 cm		
Note – The bottom surface of the DUT is specified by the manufacturer						
Results:						
A – No fire or explosion			C – Explosion			
B – Fire			D – Other (Please explain): ____			

Attachment 1: Photos of product

Battery system overall view (CUBE7.68-H)



Battery system overall view (CUBE11.52-H)



Battery system overall view (CUBE11.52-H)



Overall view 1 of battery pack



Overall view 2 of battery pack



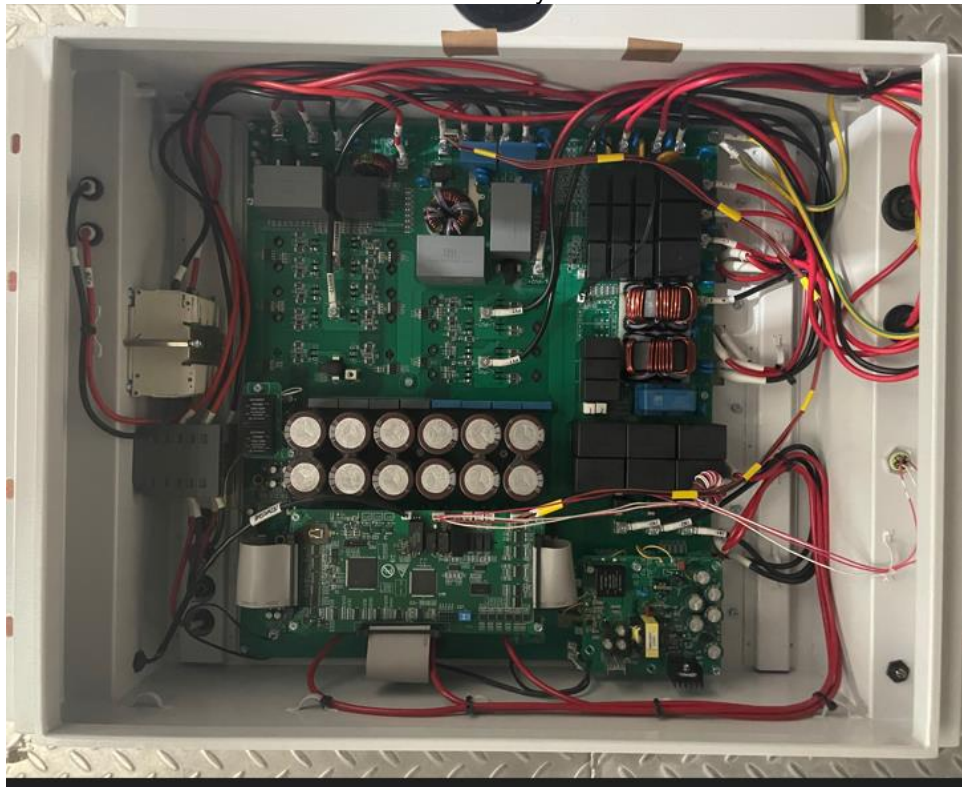
Internal View of battery pack



Overall view of Battery Control Box



Internal view of Battery Control Box



Front view of PCB for Slave Board

