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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..... :	230101218SHA-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 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

If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed.

This report is not valid as a CB Test Report unless signed by an approved IECEE Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

General disclaimer:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing NCB. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

Test item description ..... :	Rechargeable Li-ion Battery System
Trademark(s) ..... :	CEEG
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):			
☒	**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)	Sofm Shen Tommy Xia
Approved by (name, function, signature)...:		Susanna Xu (Mandated Reviewer)	Susanna
☐	**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):

No.	Content	Page
1	Photos of product	25 to 30

Summary of testing:

Tests performed (name of test, test clause and date test performed):		**Testing location: (CBTL, SPTL, CTF, Subcontractor)**
Drop test	7.2.3	**Intertek Testing Services Shanghai**
Overcharge control of voltage	8.2.2	Building No.86, 1198 Qinzhou Road (North), 200233 Shanghai, China.
Overcharge control of current	8.2.3	
Overheating control	8.2.4	

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

None

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

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.

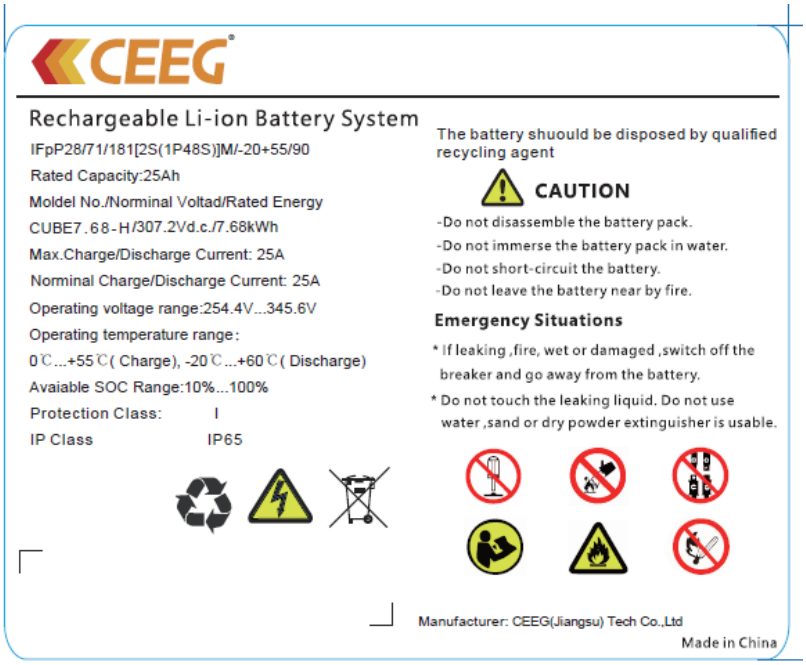
IEC Guide 115 provides guidance on the application of measurement uncertainty principles and applying the decision rule when reporting test results within IECEE scheme, noting that the reporting of the measurement uncertainty for measurements is not necessary unless required by the test standard or customer.

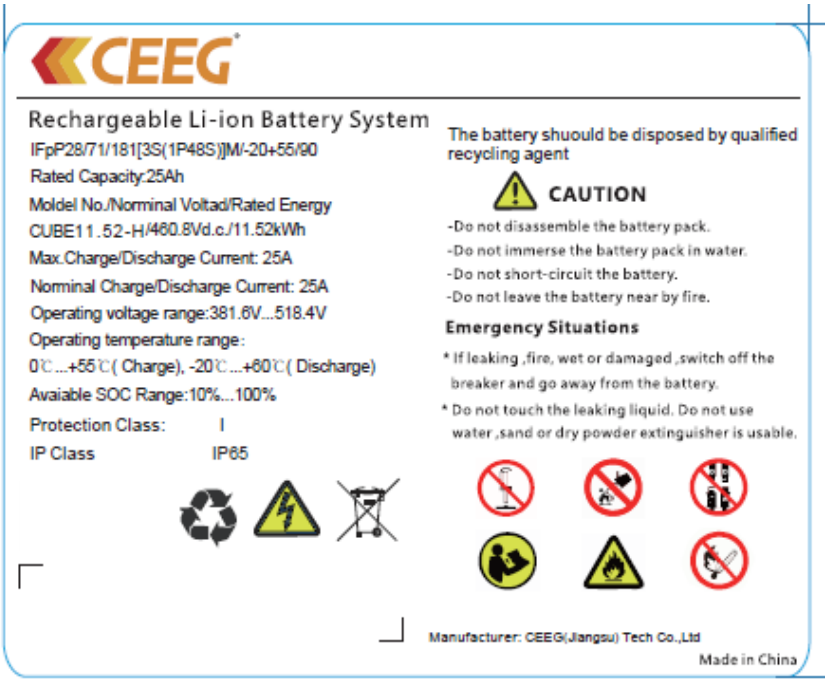
Calculations leading to the reported values are on file with the NCB and testing laboratory that conducted the testing.

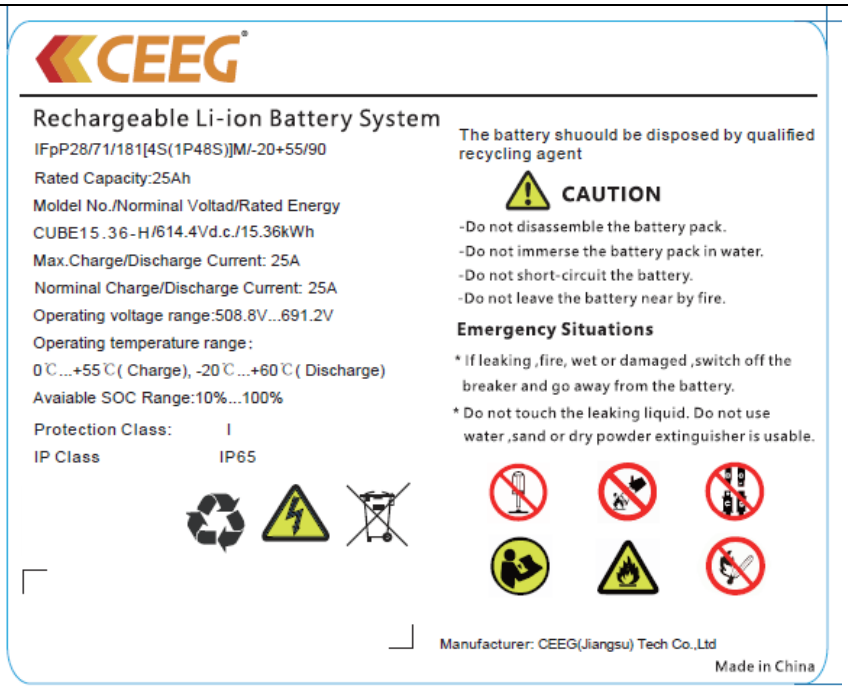
Copy of marking plate:

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.

Markings







Note:
SN code: XXXXXXXXXXXXX. 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 ☐ comma / ☒ point is used as the decimal separator.

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Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided ..... :	☐ **Yes** ☒ **Not applicable**

When differences exist; they shall be identified in the General product information section.

Name and address of factory (ies).....: Same as applicant

General product information and other remarks:

The 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	-	1P48S
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 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... :	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
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		P
	The mechanical integrity of internal connections		P
5.3	**Venting**		**P**
	Pressure relief function		P
	Encapsulation used to support cells within an outer casing		N/A
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)		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
5.6	**Assembly of cells, modules, or battery packs into battery systems**		**P**
5.6.1	General		P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	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
5.7	**Operating region of lithium cells and battery systems for safe use**		**P**
	The cell operating region..... :	Charging: 0°C ~65°C, 50A/[3.65V Max.]; Discharging: -20°C ~65°C, 75A/[2.5V Min.];	P
	Designation of battery system to comply with the cell operating region	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.];	P
5.8	**System lock (or system lock function)**		**P**
	Non-resettable function to stop battery operation		P
	Manual with procedure for resetting of battery operation		P
	Emergency battery final discharge		P
5.9	**Quality plan**		**P**
	Manufacturing quality plan (for example: ISO9001, etc.) prepared and implemented..... :	Reference: ISO 9001 certificate	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

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	Capacity confirmation of the cells or batteries	Performed by factory.	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
	The cells or batteries charged using the method specified by the manufacturer..... :	Cell: 25A CC to 3.65V, CV to 1.25A; CUBE7.68-H, CUBE11.52-H and CUBE15.36-H: 25A CC to 3.6V/cell, CV to 1.25A;	P
7.2	**Reasonably foreseeable misuse**		**N/A**
7.2.1	External short-circuit test (cell or cell block)		N/A
	Short circuit with total resistance of 30 mΩ ± 10 mΩ at 25 °C ± 5 °C		N/A
	Results: no fire, no explosion		N/A
7.2.2	Impact test (cell or cell block)		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..... :	Module with control box	—
	Mass of the test unit (kg)..... :	83.5	—
	Height of drop (m)..... :	0.05	—

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	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
	Redundant or single protection for discharge voltage control provided in battery system ..... :		N/A
	Target Voltage ..... :		N/A
	Maximum discharge current of the cell, Im..... :		N/A
	Discharge current for forced discharge, 1.0 It ..... :		N/A
	Discharging time, t = (1 It / Im) x 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)		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 °C ± 5 °C.		N/A
	The appearance of the short-circuit location recorded by photograph or other means .....:	See Attachment # __	—
	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)		N/A
	Method to create a thermal runaway in one cell ... :	See Annex B and C	N/A
	Results: No external fire from the battery system, no battery case rupture ..... :	See results in Table 7.3.3	N/A

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
8	**BATTERY SYSTEM SAFETY (CONSIDERING FUNCTIONAL SAFETY)**		**P**
8.1	**General requirements**		**P**
	Functional safety analysis for critical controls		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**
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	Disconnected	P
	Elevated temperature for charging, 5 °C above maximum operating temperature ..... :		P
	Results: no fire, no explosion ..... :	See Table 9.2.5	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 ..... :		N/A

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
10	**INFORMATION FOR SAFETY**		**P**
	The cell manufacturer provides information about current, voltage and temperature limits of their products		P
	The battery system manufacturer provides information regarding how to mitigate hazards to equipment manufacturers or end-users.		P
11	**MARKING AND DESIGNATION (REFER TO CLAUSE 5 OF IEC 62620)**		**P**
	The marking items shown in Table 1 in IEC 62620 indicated on the cell, battery system or instruction manual.		P
	Cell or battery system has clear and durable markings		P
	Cell designation		N/A
	Battery designation		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

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Clause	Requirement + Test	Result - Remark	Verdict
	The cell fully charged according to the manufacturer recommended conditions ..... :		—
	Laser irradiation point on the cell ..... :		—
	Output power of laser irradiation..... :		—
	Tested in an ambient temperature of 25 °C ± 5 °C		N/A
	Repeat of cell test for 3 times		N/A
B.2.2	Battery system test (main test)		N/A
	The battery system fully charged according to the manufacturer recommended conditions ..... :		—
	Target cell to be laser irradiated ..... :		—
	The irradiation point on the target cell same or similar as that on the cell test		
	Output power of laser irradiation..... :		—
	Tested in an ambient temperature of 25 °C ± 5 °C		N/A

ANNEX C	**PROCEDURE OF 7.3.3 PROPAGATION TEST BY METHODS OTHER THAN LASER**		**N/A**
C.1	General		N/A
C.2	Test conditions:		N/A
	– The battery fully charged according to the manufacturer recommended conditions ..... :		—
	– Target cell forced into thermal runaway ..... :		—
	– A specially prepared sample (e.g. a heater or a hole for nail penetration provided) used for ease of testing..... :		—
C.3	Method used for initiating the thermal runaway. 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	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 62619	Tested with appliance
IC for current and voltage sensing	ADI	LTC6804IG-1#TRPBF	Supply voltage: 11V-55V Topr: -40°C to 85°C	IEC 62619	Tested with appliance
IC for Temp sensing	ADI	LTC6804IG-1#TRPBF	Supply voltage: 11V-55V Topr: -40°C to 85°C	IEC 62619	Tested with appliance
Temp sensing	Kepengda	MS_343F_103F	R_{25}=10kΩ±1%, $B_{25/50}$=3435K±1%, Topr: -40°C to 105°C	IEC 62619	Tested with appliance
Relay	HONGFA	HF170F	35A, 277VAC	IEC 62619	Ref. TUV Certif. No. R50384178
Fuse	Zhejing Galaxy fuse Co., Ltd.	YRPV-30	20A, 1000VDC	IEC 62619	Ref. TUV Certif. No. R50276247
Circuit Breaker	Projoy	PEDS150-HM-32-2	600VDC, 32A, 2P, -40°C to 85°C	IEC 62619	Ref. TUV Certif. No. R50494197
Connector for D+, D-	Shenzhen Grid Power Connectors Co., Ltd.	MPC50	50A, 600VDC (E357218)	IEC 62619	Tested with appliance
Connector between controller and module	WCON	3210-H20PB01	1000VDC, 3A/20pin (20 pins used) (E248993)	IEC 62619	Tested with appliance

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

Connector between controller and module	WCON	3210-50SG0BLA1	1000VDC, 3A/20pin (20 pins used) (E248993)	IEC 62619	Tested with appliance
Wire for main circuit	JIUKAI	10269	10AWG 105℃ 1000V VW-1 (E342399)	IEC 62619	Tested with appliance
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):___					

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**

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:

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

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

Supplementary information:

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

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**

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 (m^2)

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 Cell/Cell Blocks, (V dc)**	**Maximum Charging Current, (A)**	**Max. Charging Voltage, (V dc)**	**Max. Voltage of Cell/Cell Blocks, (V dc)**	**Results**
CUBE15.36-H with control box	3.190 to 3.199	25	701.2	3.65	A, D, F

	Charge Voltage Applied Battery System: 1)	
	Whole	**Part**
	Yes	-

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): The voltage of a single cell reaches the protection value, triggering the overvoltage protection of the battery system.

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**
CUBE15.36-H with control box	612.48	25	701.2	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): The product is connected to pcs and the maximum charging current is 25A. The voltage of a single cell reaches the protection value, triggering the overvoltage protection of the battery system.

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**	
CUBE15.36-H with control box	640.84	25	700.1	
Maximum Specified Temperature of Battery System, °C		**Maximum Measured Cell Case Temperature, °C**	**Results**	
55		57.0	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): Charging temperature range is 0°C to 55°C and the sample is steady at 53.5°C. Then the temperature sets to 60°C while the charging is continued until the BMS terminates the charging. Finally, the temperature is 57.0°C.

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: Photos of product

Battery system overall view (CUBE7.68-H)

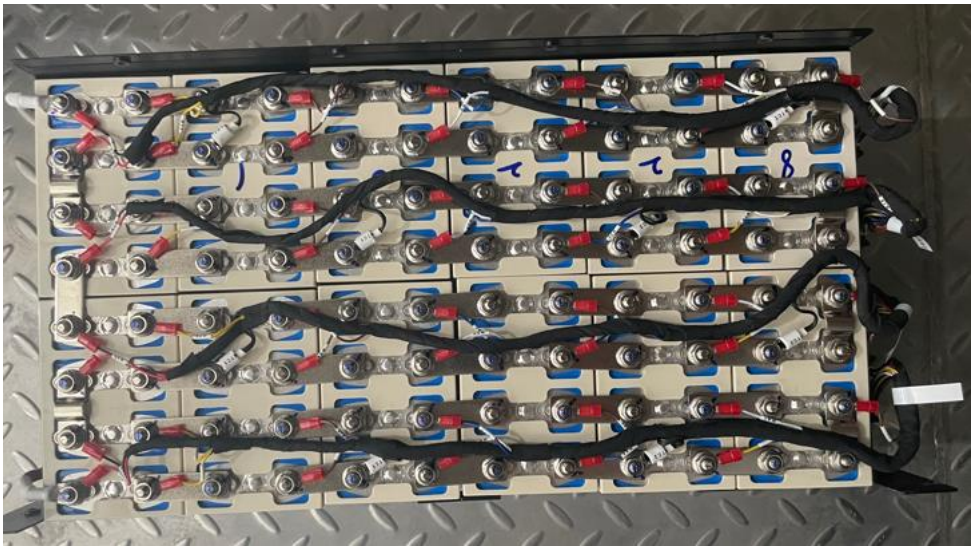
Battery system overall view (CUBE11.52-H)

Battery system overall view (CUBE11.52-H)

Overall view 1 of battery pack

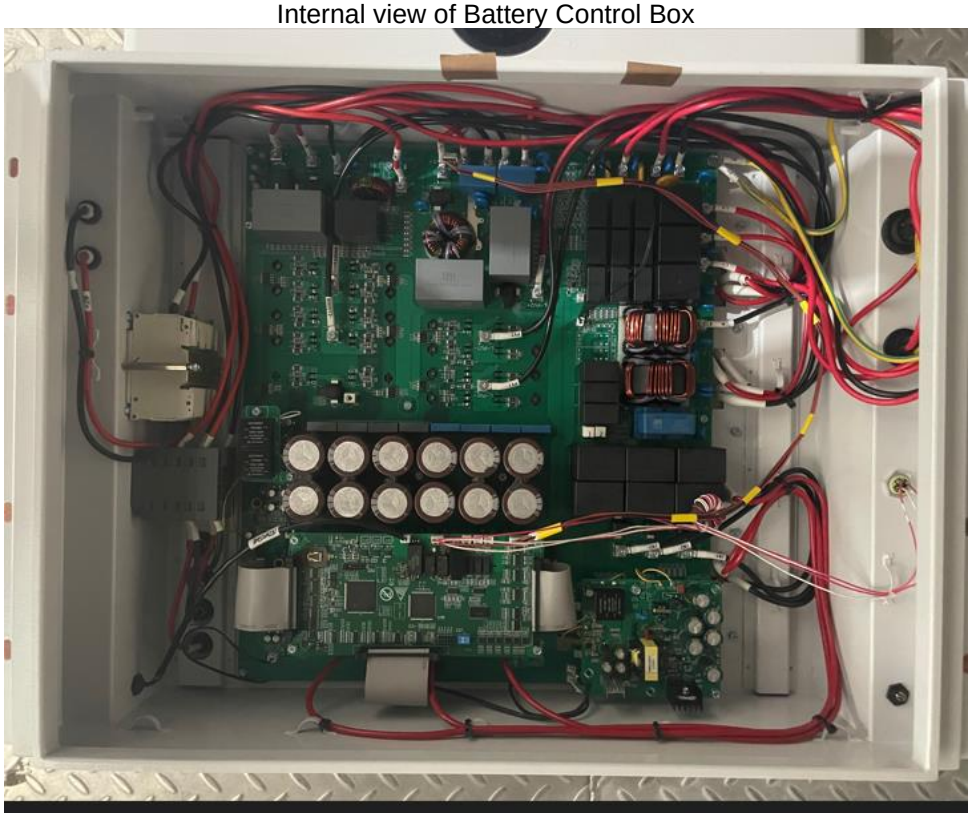
Overall view 2 of battery pack

Internal View of battery pack



Overall view of Battery Control Box

Internal view of Battery Control Box



Front view of PCB for Slave Board