

Prüfbericht-Nr.: <i>Test report no.:</i>	CN26V06H 001	Auftrags-Nr.: <i>Order no.:</i>	326187889 P02413495	Seite 1 von 29 <i>Page 1 of 29</i>
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	2089836	Auftragsdatum: <i>Order date:</i>	2026-05-21	
Auftraggeber: <i>Client:</i>	Pylon Technologies Co., Ltd. No.300, Miaoqiao Road, Kangqiao Town, Pudong New Area, 201315 Shanghai P.R. China			
Prüfgegenstand: <i>Test item:</i>	LFP Lithium Ion Energy Storage Battery System			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	RM-15, RM-22, RM-30, RM-37, RM-45, RM-52, RM-60, RM-67, RM-75 RM-15-Pro, RM-22-Pro, RM-30-Pro, RM-37-Pro, RM-45-Pro, RM-52-Pro, RM-60-Pro, RM-67-Pro, RM-75-Pro			
Auftrags-Inhalt: <i>Order content:</i>	TÜV mark approval			
Prüfgrundlage: <i>Test specification:</i>	IEC 62619: 2022; EN IEC 62619:2022 IEC 63056: 2020; EN IEC 63056:2020 EN 62477-1:2012+A11+A1+A12			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2026-07-16			
Prüfmuster-Nr.: <i>Test sample no.:</i>	A004337478-001 to A004337478-007			
Prüfzeitraum: <i>Testing period:</i>	2026-07-16 to 2026-07-27			
Ort der Prüfung: <i>Place of testing:</i>	See page 5 for details			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (Shanghai) Co., Ltd. Kunshan Branch			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von: tested by: Yashi Zhang		genehmigt von: authorized by: Scola Chen		
Datum: Date: 2026-08-07		Ausstellungsdatum: Issue date: 2026-08-07		
Stellung / Position:	Sachverständige(r)/Expert	Stellung / Position:	Sachverständige(r)/Expert	
Sonstiges / Other:	The products have been evaluated to EN 62477-1:2012+A11+A1+A12 refer to report No. CN26V28Q 001.			
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>	Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>			
* Legende:	P(ass) = entspricht o.g. Prüfgrundlage(n)	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
* Legend:	P(ass) = passed a.m. test specification(s)	F(ail) = failed a.m. test specification(s)	N/A = not applicable	N/T = not tested
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the above mentioned test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

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Test report no.:

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Anmerkungen
Remarks

1	Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben. Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden. <i>The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.</i>
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3	Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben. Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt. <i>Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report.</i> <i>Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.</i>
4	Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnissen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. Zu weiteren Informationen bezüglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019. <i>The decision rule for statements of conformity, based on numerical measurement results, in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report. For additional information to the resulting risk based of this decision rule please refer to ILAC G8:2019.</i>

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..... :	CN26V06H 001
Date of issue	See cover page
Total number of pages	See cover page
Name of Testing Laboratory preparing the Report	TÜV Rheinland (Shanghai) Co., Ltd.Kunshan Branch No. 38 Jingfan Road, Bacheng, Kunshan, Jiangsu, China
Applicant's name	See cover page
Address	See cover page
Test specification:	
Standard	See cover page
Test procedure	See cover page
Non-standard test method	N/A
TRF template used	IECEE OD-2020-F1:2022, Ed.1.5
Test Report Form No.	IEC62619B
Test Report Form(s) Originator....	UL Solutions (Demko)
Master TRF	Dated 2023-02-24
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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	LFP Lithium Ion Energy Storage Battery System	
Trademark(s)		
Manufacturer	Same as applicant	
Model/Type reference	See cover page	
Ratings	See copy of marking label and model list.	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
☐	CB Testing Laboratory:	
Testing location/ address		
Tested by (name, function, signature)		
Approved by (name, function, signature) ...:		
☐	Testing procedure: CTF Stage 1:	
Testing location/ address		
Tested by (name, function, signature)		
Approved by (name, function, signature) ...:		
☐	Testing procedure: CTF Stage 2:	
Testing location/ address		
Tested by (name + signature)		
Witnessed by (name, function, signature) .:		
Approved by (name, function, signature) ...:		
☐	Testing procedure: CTF Stage 3:	
☐	Testing procedure: CTF Stage 4:	
Testing location/ address		
Tested by (name, function, signature)		
Witnessed by (name, function, signature) .:		
Approved by (name, function, signature) ...:		
Supervised by (name, function, signature) :		

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

- Attachment 1: IEC 63056 Report (15 pages)

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

Clause(s)	Test(s)	Test Date
7.2.3.3	Edge and corner drop test (battery system)	2026-07-20
7.3.3	Propagation test	2026-07-20
8.2.2	Overcharge control of voltage (battery system)	2026-07-19
8.2.3	Overcharge control of current (battery system)	2026-07-22
8.2.4	Overheating control (battery system)	2026-07-25

Note: The tests were conducted on RM-15, the tests have covered the differences between the models. The samples comply with the requirement of IEC 62619:2022.

Testing location: (CBTL, SPTL, CTF, Subcontractor)

TÜV Rheinland (Shanghai) Co., Ltd. Kunshan Branch

Building 4 and Workshop 2, Building 5, No.38, Jingfan Road, Bacheng, Kunshan, Jiangsu, China

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

N/A

☒ The product fulfils the requirements of IEC 62619:2022; 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.

Registration  Manual 	PYLONTECH Rechargeable Li-ion Battery <table style="width: 100%;"> <tr> <td style="width: 33%;">Model:</td> <td style="width: 33%;">RMB70100-Pro</td> <td style="width: 33%;">Battery Category</td> <td style="width: 33%;">Industrial Battery</td> </tr> <tr> <td>Part Number:</td> <td></td> <td>Chemistry:</td> <td>LiFePO₄/LiPF₆/Graphite</td> </tr> <tr> <td>Rated Energy/Capacity:</td> <td>7.5kWh/102Ah</td> <td>Hazardous Substances:</td> <td>/</td> </tr> <tr> <td>Nominal Voltage:</td> <td>73.6Vd.c.</td> <td>Usable Fire-extinguishing Agent:</td> <td>A/B/C/F</td> </tr> <tr> <td>Charge Voltage:</td> <td>81.65Vd.c.</td> <td>Critical Raw Materials:</td> <td>Li>0.1%</td> </tr> <tr> <td>Max.Charging/Discharging Current:</td> <td>50A</td> <td>Weight:</td> <td>58kg</td> </tr> </table> SN: _____ Date of Manufacture: _____      Pylon Technologies Co., Ltd www.pylontech.com.cn Address: No.300, Miaojiao Road, Kangqiao Town, Pudong New Area, Shanghai 201315, China The place of manufacture: Intersection of Daqianshan Road and Gaocheng Road, Economic Development Zone, Feixi County, Hefei, Anhui Province 231299, China	Model:	RMB70100-Pro	Battery Category	Industrial Battery	Part Number:		Chemistry:	LiFePO ₄ /LiPF ₆ /Graphite	Rated Energy/Capacity:	7.5kWh/102Ah	Hazardous Substances:	/	Nominal Voltage:	73.6Vd.c.	Usable Fire-extinguishing Agent:	A/B/C/F	Charge Voltage:	81.65Vd.c.	Critical Raw Materials:	Li>0.1%	Max.Charging/Discharging Current:	50A	Weight:	58kg	⚠ DANGER DANGER HIGH DC VOLTAGE INSIDE DANGER HAUTE TENSION À L'INTÉRIEUR DANGER ARC FLASH & SHOCK HAZARD DANGER D'ARC ÉLECTRIQUE ET DE RISQUE D'ÉLECTROCUTION  • Do not disconnect, disassemble or repair by yourself. • Ne pas débrancher, désassembler ou réparer soi-même.  • Do not drop, deform, impact, cut or spear with a sharp object. • Ne pas échapper, déformer, frapper, couper ou transpercer avec un objet pointu.  • Do not place near open flame or incinerate. • Ne pas placer près des flammes nues ou incinérer.  • Do not sit or put heavy things on battery. • Ne pas s'asseoir ou mettre des objets lourds sur la batterie.  • Keep away from moisture or liquid. • Tenir loin de l'humidité ou de tout liquide.  • Keep out of reach of children, animals or insects. • Garder hors de la portée des enfants, des animaux ou des insectes.  • Contact your supplier within 24 hours if anything failure happens. • Contactez votre fournisseur dans les 24 heures en cas de panne.
Model:	RMB70100-Pro	Battery Category	Industrial Battery																							
Part Number:		Chemistry:	LiFePO ₄ /LiPF ₆ /Graphite																							
Rated Energy/Capacity:	7.5kWh/102Ah	Hazardous Substances:	/																							
Nominal Voltage:	73.6Vd.c.	Usable Fire-extinguishing Agent:	A/B/C/F																							
Charge Voltage:	81.65Vd.c.	Critical Raw Materials:	Li>0.1%																							
Max.Charging/Discharging Current:	50A	Weight:	58kg																							

Label for Battery Pack RMB70100-Pro(With heating function)

Importer:

Telephone:

Address:

Marking for all models

Test item particulars.....:	
Classification of installation and use.....: Class I	
Supply Connection Permanent 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 See cover page	
Date (s) of performance of tests See cover page	
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.	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC 60335-1:	
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) : Factory 1: Anhui Pylon Technologies Co., Ltd. Intersection of Daqianshan Road and Gaocheng Road, Economic Development Zone, Feixi County, Hefei, Anhui P.R. China Factory 2: Jiangsu Pylon Battery Co., Ltd. No.7, Keyan 3rd Road, Yizheng Economic Development Zone Yangzhou Jiangsu P.R. China	

General product information and other remarks:

Product Description:

1. The LFP Lithium Ion Energy Storage Battery System is used for energy storage system, comprising a Control box and a quantity of battery packs.
2. The Battery Pack (RMB70100, RMB70100-Pro) consists of 23 cells structured with 23S, also provide the fuse, the BMU board and related connection parts, the BMU board is used for measuring and collecting the cell parameters of each pack.

The difference between RMB70100 and RMB70100-Pro is RMB70100-Pro is equipped with heating function.

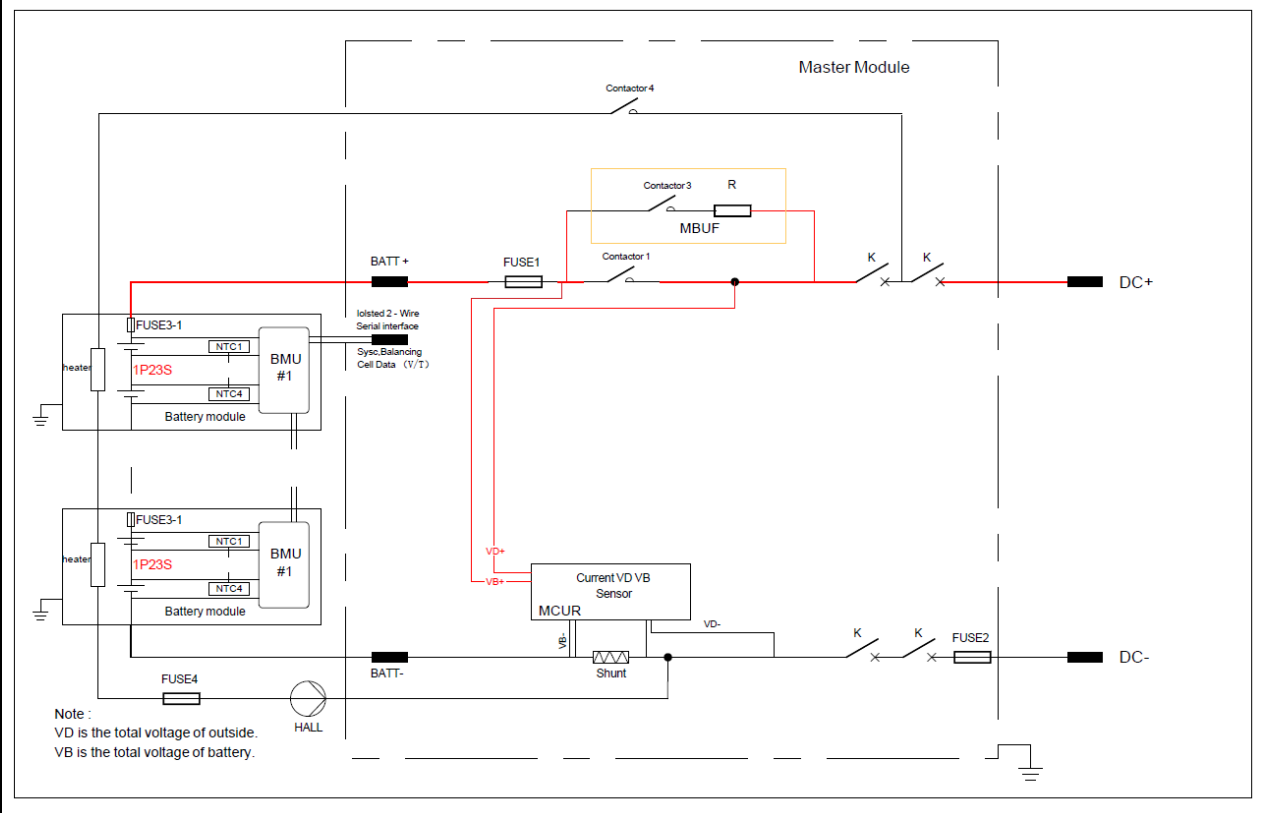
3. For RM-XX series and RM-XX-Pro series, the difference between models is only the number of battery packs in series connection and related parameters. Refer to the model list for details.

The difference between RM-XX series and RM-XX-Pro series is only: RM-XX-Pro series is equipped with heating function.

4. The battery system has overcharge, over-discharge, over current and short-circuits proof circuit. The electronic circuits and software controls for the battery system replied upon protective functions of the battery management system which have been evaluated in accordance with ISO 13849-1.

5. The IP rating of LFP Lithium Ion Energy Storage Battery System is IP65, and the Pollution Degree is considered as PD 2 inside, which specified by the manufacturer.

The system diagram block is outlined as below:



Model list:

Product name	Lithium-Ion Rechargeable Cell	Rechargeable Li-ion Battery Pack	
Type /model	IFP50160116-102Ah	RMB70100	RMB70100-Pro
Nominal voltage	3.2Vd.c.	73.6Vd.c.	
Rated capacity	102Ah	102Ah	
Rated energy	326.4Wh	7.5kWh	
Charging voltage declared by manufacturer	3.65Vd.c.	81.65Vd.c.	
Upper limit charging voltage	3.9Vd.c.	83.95Vd.c.	
Maximum continuous charging current	102A	50A(55 A@15min)	
Maximum continuous discharging current	255A	50A(55 A@15min)	
Discharging cut off voltage	2.5Vd.c.	See table 1	
Lower limit discharging voltage	2.0Vd.c.	See table 1	
Standard charging temperature range	0°C to 65°C	1°C to 55°C	-20°C to 55°C
Standard discharging temperature range	-30°C to 65°C	-10°C to 55°C	-20°C to 55°C
Standard charging method by manufacturer	Charging the cell with 20.4A constant current until to 3.65V, then constant voltage 3.65V until charging current reduces to 5.1A	-	
Charging method for internal short-circuit test	Charging the cell with 102A constant current until to 3.9V, then constant voltage 3.9V until charging current reduces to 5.1A	-	
Dimension	T× W×H: (49.9±0.5)mm×(160±0.8)mm×(118.5±0.5)mm	W×D×H: 770mm*380mm*170mm	
Weight	(1970±30)g	58 ± 2kg	
Ingress protection	-	IP65	
Protection class	-	Class I	
Operating altitude range	-	≤4000m	

Model list for System:

Product name	LFP Lithium Ion Energy Storage Battery System			
Type /model	RM-15	RM-22	RM-30	RM-37

Nominal voltage [V]	147.2	220.8	294.4	368.0
Rated capacity [Ah]	102			
Rated energy [kWh]	15.0	22.5	30.0	37.5
Charging voltage declared by manufacturer	163.3V	244.95V	326.6V	408.25V
Maximum continuous charging current [A]	50A(55 A@15min)			
Maximum continuous discharging current [A]	50A(55 A@15min)			
Standard charging temperature range [°C]	1°C to 55°C			
Standard discharging temperature range [°C]	-10°C to 55°C			
Dimension [mm](W*H*D)	770mm*380mm*550mm	770mm*380mm*720mm	770mm*380mm*890mm	770mm*380mm*1060mm
Weight [kg]	136	194	252	310
Ingress protection	IP65			
Protection class	Class I			
Operating altitude range	≤4000m			

Product name	LFP Lithium Ion Energy Storage Battery System				
Type /model	RM-45	RM-52	RM-60	RM-67	RM-75
Nominal voltage [V]	441.6	515.2	588.8	662.4	736.0
Rated capacity [Ah]	102				
Rated energy [kWh]	45.0	52.5	60.0	67.5	75.0
Charging voltage declared by manufacturer	489.9	571.55	653.2	734.85	816.5
Maximum continuous charging current [A]	50A (55 A@15min)				
Maximum continuous discharging current [A]	50A (55 A@15min)				
Standard	1°C to 55°C				

charging temperature range [°C]					
Standard discharging temperature range [°C]	-10°C to 55°C				
Dimension [mm](W*H*D)	770mm*380mm*1230 mm	770mm*380mm*1400 mm	770mm*380mm*1570 mm	770mm*380mm*1740 mm	770mm*380mm*1910 mm
Weight [kg]	368	426	484	542	600
Ingress protection	IP65				
Protection class	Class I				
Operating altitude range	≤4000m				

Continued:

Product name	LFP Lithium Ion Energy Storage Battery System			
Type /model	RM-15-Pro	RM-22-Pro	RM-30-Pro	RM-37-Pro
Nominal voltage [V]	147.2	220.8	294.4	368.0
Rated capacity [Ah]	102			
Rated energy [kWh]	15.0	22.5	30.0	37.5
Charging voltage declared by manufacturer	163.3V	244.95V	326.6V	408.25V
Maximum continuous charging current [A]	50A (55 A@15min)			
Maximum continuous discharging current [A]	50A (55 A@15min)			
Standard charging temperature range [°C]	-20°C to 55°C*			
Standard discharging temperature range [°C]	-20°C to 55°C			
Dimension [mm](W*H*D)	770mm*380mm*550mm	770mm*380mm*720mm	770mm*380mm*890mm	770mm*380mm*1060mm
Weight [kg]	136	194	252	310
Ingress protection	IP65			
Protection class	Class I			
Operating altitude range	≤4000m			
Note*: with heating function. Heating is only started when the battery temperature is ≤ the set opening temperature (Minimum opening temperature is 0).				

Product name	LFP Lithium Ion Energy Storage Battery System				
Type /model	RM-45-Pro	RM-52-Pro	RM-60-Pro	RM-67-Pro	RM-75-Pro
Nominal voltage [V]	441.6	515.2	588.8	662.4	736.0
Rated capacity [Ah]	102				
Rated energy [kWh]	45.0	52.5	60.0	67.5	75.0
Charging voltage declared by manufacturer	489.9	571.55	653.2	734.85	816.5
Maximum continuous charging current [A]	50A (55 A@15min)				
Maximum continuous discharging current [A]	50A (55 A@15min)				
Standard charging temperature range [°C]	-20°C to 55°C*				
Standard discharging temperature range [°C]	-20°C to 55°C				
Dimension [mm](W*H*D)	770mm*380mm*1230 mm	770mm*380mm*1400 mm	770mm*380mm*1570 mm	770mm*380mm*1740 mm	770mm*380mm*1910 mm
Weight [kg]	368	426	484	542	600
Ingress protection	IP65				
Protection class	Class I				
Operating altitude range	≤4000m				
Note*: with heating function. Heating is only started when the battery temperature is ≤ the set opening temperature (Minimum opening temperature is 0).					

Table 1:

Rate of constant current (C)	[0~0.002)	[0.002~0.01)	[0.01~0.03)	[0.03~0.05)	[0.05~0.1)	[0.1~0.2)	[0.2~0.3)	[0.3~0.4)	[0.4~0.5)	[0.5~0.55)
Temperature(°C)										
[-20~-15)	3.083	3.044	2.889	2.500	2.500	2.500	2.500	2.500	2.500	2.500
[-15~-10)	3.083	3.044	2.889	2.500	2.500	2.500	2.500	2.500	2.500	2.500
[-10~-5)	3.083	3.044	2.889	2.500	2.500	2.500	2.500	2.500	2.500	2.500
[-5~0)	3.082	3.056	2.954	2.699	2.500	2.500	2.500	2.500	2.500	2.500
[0~5)	3.082	3.069	3.017	2.886	2.689	2.500	2.500	2.500	2.500	2.500
[5~10)	3.082	3.075	3.048	2.981	2.880	2.698	2.500	2.500	2.500	2.500
[10~15)	3.082	3.078	3.062	3.021	2.960	2.864	2.676	2.588	2.500	2.500
[15~20)	3.081	3.078	3.067	3.038	2.994	2.950	2.848	2.753	2.658	2.579
[20~25)	3.081	3.078	3.068	3.043	3.005	2.982	2.930	2.870	2.810	2.751
[25~30)	3.081	3.079	3.072	3.054	3.027	3.009	2.976	2.943	2.910	2.873
[30~35)	3.081	3.079	3.072	3.054	3.028	3.015	2.991	2.971	2.951	2.926
[35~40)	3.081	3.079	3.072	3.055	3.028	3.018	3.002	2.988	2.974	2.960
[40~47.5)	3.080	3.078	3.072	3.055	3.028	3.018	3.004	2.993	2.981	2.970
[47.5~55)	3.080	3.078	3.072	3.055	3.028	3.018	3.006	2.997	2.988	2.979

Note: For Battery pack and System, the discharge protection voltage of cell is determined based on the current and temperature.

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		P
5.4	Temperature/voltage/current management		P
	The design prevents abnormal temperature-rise	Overcharge, over current and overheating proof circuit used in this battery.	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

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	Terminal contacts are arranged to minimize the risk of short circuits		P
5.6	Assembly of cells, modules, or battery packs into battery systems		P
5.6.1	General		P
	Independent control and protection method(s)	Battery system has independent control and protective functions, and BMS is integrated into battery system.	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		P
	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..... :		P
	Designation of battery system to comply with the cell operating region	Information mentioned in manufacturer's specifications.	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 :	ISO 9001:2015 certification provided.	P
	The process capabilities and the process controls		P
6	TYPE TEST CONDITIONS		P
6.1	General		P
6.2	Test items		P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	Cells or batteries that are not more than six months old (See Table 1 of IEC 62619)		P
	Capacity confirmation of the cells or batteries		P
	Default ambient temperature of test, 25 °C ± 5 °C		P
7	SPECIFIC REQUIREMENTS AND TESTS		P
7.1	Charging procedure for test purposes		P
	The battery discharged to a specified final voltage prior to charging		P
	The cells or batteries charged using the method specified by the manufacturer..... :	The method mentioned in manufacturer's specifications	P
7.2	Reasonably foreseeable misuse		N/A
7.2.1	External short-circuit test (cell or cell block)	Approval cell used.	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)	Approval cell 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)		P
7.2.3.1	General		P
7.2.3.2	Whole drop test (cell or cell block, and battery system)		P
	Description of the Test Unit..... :	High voltage box	—
	Mass of the test unit (kg)..... :	15.1	—
	Height of drop (m)..... :	0.1	—
	Results: no fire, no explosion	no fire, no explosion	P
7.2.3.3	Edge and corner drop test (cell or cell block, and battery system)		P
	Description of the Test Unit..... :	Battery Pack	—
	Mass of the test unit (kg)..... :	Battery Pack: 59	—
	Height of drop (m)..... :	0.05	—
	Results: no fire, no explosion	no fire, no explosion	P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
7.2.4	Thermal abuse test (cell or cell block)	Approval cell used.	N/A
	Results: no fire, no explosion		N/A
7.2.5	Overcharge test (cell or cell block)	Approval cell used.	N/A
	For those battery systems that are provided with only a single protection for the charging voltage control		—
	Results: no fire, no explosion		N/A
7.2.6	Forced discharge test (cell or cell block)	Approval cell 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
7.3	Considerations for internal short-circuit – Design evaluation		P
7.3.1	General	Approval cell used.	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 $25^\circ\text{C} \pm 5^\circ\text{C}$.		N/A
	The appearance of the short-circuit location recorded by photograph or other means		—
	The pressing was stopped - When a voltage drop of 50 mV was detected; or		N/A
	- The pressing force of 800 N (cylindrical cells) or 400 N (prismatic cells) was reached		N/A
	Results: no fire		N/A
7.3.3	Propagation test (battery system)		P
	Method to create a thermal runaway in one cell ...		P
	Results: No external fire from the battery system, no battery case rupture	See table 7.3.3	P

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	Functional safety evaluated acc. to ISO 13849-1.	P
	Conduct of a process hazard analysis for both the cell manufacturing process and the battery system manufacturing process	See above	P
	Conduct of risk assessment and mitigation of the battery system	Considered	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	Complied with Class B of ISO 13849-1.	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		N/A
	The exceeded charging voltage applied to only a part of the battery system, such as the cell(s)..... :		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		N/A
	Elevated temperature for charging, 5 °C above maximum operating temperature..... :		P
	Results: no fire, no explosion..... :	See Table 8.2.4	P
	The BMS detected the overheat temperature and terminated charging		P
	The battery system operated as designed during test		P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
9	EMC		P
	Battery system fulfil EMC requirements of the end-device application	See Table 9 [] Refer to report. [] Intended for to be tested in the end use application <i>[include specific application]</i>	P
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	See copy of marking plate.	P
	Battery structure formulation	See copy of marking plate.	P
12	PACKAGING AND TRANSPORT		P
	Refer to Annex D	Considered	P
ANNEX A	OPERATING REGION OF CELLS FOR SAFE USE		P
A.1	General		P
A.2	Charging conditions for safe use		P
A.3	Consideration on charging voltage		P
A.4	Consideration on temperature		P
A.5	High temperature range		P
A.6	Low temperature range		P
A.7	Discharging conditions for safe use		P
A.8	Example of operating region		P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
ANNEX B	PROCEDURE OF 7.3.3 PROPAGATION TEST BY LASER IRRADIATION		N/A
B.1	General		N/A
B.2	Test conditions		N/A
B.2.1	Cell test (preliminary test)		N/A
	The cell fully charged according to the manufacturer recommended conditions		—
	Laser irradiation point on the cell		—
	Output power of laser irradiation		—
	Tested in an ambient temperature of 25 °C ± 5 °C		N/A
	Repeat of cell test for 3 times		N/A
B.2.2	Battery system test (main test)		N/A
	The battery system fully charged according to the manufacturer recommended conditions		—
	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		P
C.1	General		P
C.2	Test conditions:		P
	– The battery fully charged according to the manufacturer recommended conditions	Fully charged	—
	– Target cell forced into thermal runaway	Mid location cell	—
	– A specially prepared sample (e.g. a heater or a hole for nail penetration provided) used for ease of testing	Heater used	—
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	1) Heater	—

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
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⁾	
-	-	-	-	-	-	
Supplementary information:						
1) Provided evidence ensures the agreed level of compliance. See OD-CB2039.						
2) See attachment 3						

7.2.1	TABLE: External short-circuit test (cell or cell block)					N/A
Sample No.	Ambient (at 25°C ± 5°C)	OCV at start of test (V dc)	Resistance of Circuit (mΩ)	Maximum Case Temperature Rise ΔT (°C)	Results	
--	--	--	--	--	--	
--	--	--	--	--	--	
Supplementary information:						
A – No fire or Explosion						
B – Fire						
C – Explosion						
D – The test was completed after 6 h						
E – The test was completed after the cell casing cooled to 20% of the maximum temperature rise						
F – Other (Please explain): ____						

7.2.5	TABLE: Overcharge test (cell or cell block)					N/A
Sample No.	OCV at start of test (V dc)	OCV at end of test (V dc)	Measured Maximum Charging Current (A)	Measured Maximum Charging Voltage (V dc)	Max. Cell Case Temperature, (°C)	Results
--	--	--	--	--	--	
--	--	--	--	--	--	
Supplementary information:						
Results:						
A – No fire or Explosion						
B – Fire						
C – Explosion						
D – Test concluded when temperature reached a steady state condition						
E – Test concluded when temperature returned to ambient						
F – Other (Please explain): _____						

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

7.2.6	TABLE: Forced discharge test (cell or cell block)					N/A
Sample No.	OCV before applying reverse charge, (V dc)	Target Voltage (V dc)	Measured Reverse Charge Current I_t , (A)	Total Time for Reversed Charge Application (min)	Results	
--	--	--	--	--	--	
--	--	--	--	--	--	
Supplementary information: Results: A – No fire or Explosion B – Fire C – Explosion D – Other (Please explain): ____						

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)					P
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	
A004337478-002	78.8	3.420	687.2	163.8	A	
Method of cell failure ¹⁾		Location of target cell		Area for fire protection (m ²)		
applied heat		Mid cell in the pack		--		
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.						
3) Test was conducted on single battery pack.						
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	
A004337478-001	143.9	50	168.3	3.657	A, D, F	
			Charge Voltage Applied Battery System: 1)			
			Whole		Part	
			3.9*46*1.1=197.34Vdc		--	
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.						
2) Test was conducted on RM-15.						
Results:						
A – No Fire or Explosion						
B – Fire						
C – Explosion						
D – The voltage of the measured cells or cell blocks did not exceed the upper limit charging voltage						
E – The voltage of the measured cells or cell blocks did exceed the upper limit charging voltage						
F – All function of battery system did operate as intended during the test.						
G – All function of battery system did not operate as intended during the test.						
H – Other (Please explain): ____						

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

8.2.3	TABLE: Overcharge control of current (battery system)				P
Sample No.	OCV at start of test, (V dc)	Max. Charging Current, (A)	Max. Charging Voltage, (V dc)	Results	
A004337478-001	140.75	60.0	149.53	A, D, F	
Supplementary information: Test was conducted on RM-15. 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	
A004337478-001	152.0	10	157.7	
Maximum Specified Temperature of Battery System, °C		Maximum Measured Cell Case Temperature, °C	Results	
55.0		60.0	A, D, F	
Supplementary information: Test was conducted on RM-15. Results: A – No fire or Explosion B – Fire C – Explosion D – Temperature sensing function of BMU did operate and then charging stopped E – Temperature sensing function of BMU did not operate and then charging stopped F – All function of battery system did operate as intended during the test. G – All function of battery system did not operate as intended during the test. H – Other (Please explain): _____				

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

9	TABLE: EMC					P
Standard used for EMC test:			Refer to report no: CN26K4XV 001			
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): ____						

- End of test report -

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.....	CN26V06H 001 attachment 1
Date of issue.....	See cover page
Total number of pages	See cover page
Name of Testing Laboratory preparing the Report	TÜV Rheinland (Shanghai) Co., Ltd.Kunshan Branch No. 38 Jingfan Road, Bacheng, Kunshan, Jiangsu, China
Applicant's name	See cover page
Address	See cover page
Test specification:	
Standard	See cover page
Test procedure	See cover page
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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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	LFP Lithium Ion Energy Storage Battery System	
Trade Mark(s)		
Manufacturer	Same as applicant	
Model/Type reference	See cover page	
Ratings	See copy of marking label and model list.	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
☐	CB Testing Laboratory:	
Testing location/ address		
Tested by (name, function, signature)		
Approved by (name, function, signature) ...		
☐	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): N/A													
Summary of testing:													
Tests performed (name of test and test clause): <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #f2f2f2;"> <th style="text-align: left; padding: 2px;">Clause(s)</th> <th style="text-align: left; padding: 2px;">Test(s)</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;">7.2</td> <td style="padding: 2px;">Resistance to abnormal heat</td> </tr> <tr> <td style="padding: 2px;">7.4</td> <td style="padding: 2px;">Electric insulation check during transport and installation</td> </tr> <tr> <td style="padding: 2px;">7.6</td> <td style="padding: 2px;">Protection against short circuit during transport and installation</td> </tr> <tr> <td style="padding: 2px;">7.8</td> <td style="padding: 2px;">Over discharge control of voltage (battery system)</td> </tr> <tr> <td style="padding: 2px;">7.9.3</td> <td style="padding: 2px;">Edge and corner drop test</td> </tr> </tbody> </table>	Clause(s)	Test(s)	7.2	Resistance to abnormal heat	7.4	Electric insulation check during transport and installation	7.6	Protection against short circuit during transport and installation	7.8	Over discharge control of voltage (battery system)	7.9.3	Edge and corner drop test	Testing location: TÜV Rheinland (Shanghai) Co., Ltd.Kunshan Branch Building 4 and Workshop 2, Building 5, No.38, Jingfan Road, Bacheng, Kunshan, Jiangsu, China
Clause(s)	Test(s)												
7.2	Resistance to abnormal heat												
7.4	Electric insulation check during transport and installation												
7.6	Protection against short circuit during transport and installation												
7.8	Over discharge control of voltage (battery system)												
7.9.3	Edge and corner drop test												
Summary of compliance with National Differences (List of countries addressed): N/A													
☒ The product fulfils the requirements of <u>IEC 63056:2020, EN IEC 63056:2020</u>													
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. See report CN26V06H 001.													

Test item particulars: See report CN26V06H 001	
Classification of installation and use: Class I	
Supply Connection: Permanent 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: See report CN26V06H 001	
Date (s) of performance of tests: See report CN26V06H 001	
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.	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC 60335-1:	
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): See report CN26V06H 001	
General product information and other remarks: See report CN26V06H 001.	

IEC 63056			
Clause	Requirement + Test	Result - Remark	Verdict
4	PARAMETER MEASUREMENT TOLERANCES		
	Parameter measurement tolerances		P
5	GENERAL SAFETY CONSIDERATIONS		
5.1	General		P
	Battery systems and the cells comply with the applicable general safety considerations of IEC 62619.	Complied with IEC 62619	P
	Lithium-ion cells be operated within the operating region and the storage conditions.		P
	Cells and batteries are safe under conditions of both intended use and reasonably foreseeable misuse.. :		P
5.2	Insulation and wiring		P
	Voltage, current, altitude, and humidity requirements		P
	Adequate clearances and creepage distances between connectors in accordance with IEC 60950-1:2005, 3.1 and 3.2		P
	Hazardous live parts of the battery system be protected to avoid the risk of electric shocks, including during installation.		P
	Mechanical integrity of the battery system and connections follow the requirements from the end-use equipment manufacturer or Annex A.		P
	Maximum allowed number of series connections in the specification or instruction manual..... :		P
5.3	The peak voltage of charging		P
	Peak voltage of the alternating component of charging current is under the upper limit charging voltage, by monitoring the voltage of every single cell or cell block.		P
	Encapsulation used to support cells within an outer casing		P
6	TYPE TEST CONDITIONS		
6.1	General		P
6.2	Test items		P
	Cells or batteries that are not more than six months old (See Table 1 of IEC63056)	Considered	P
	Capacity confirmation of the cells or batteries	Considered	P

IEC 63056			
Clause	Requirement + Test	Result - Remark	Verdict
	Default ambient temperature of test, 25 °C ± 5 °C	Considered	P
7	SPECIFIC REQUIREMENTS AND TESTS		
7.1	Basic requirement		P
	Cells and battery systems comply with the tests of IEC62619 in addition to the test requirements of this document.		P
7.2	Resistance to abnormal heat		P
	Non-metallic materials on which parts at HAZARDOUS VOLTAGE are directly mounted, resistant to abnormal heat.		P
	Ball pressure test according to IEC60695-10-2 at $(\Delta T + T_{max} + 15 \text{ °C}) \pm 2 \text{ °C}$	125°C	P
7.3	Casing material of a battery system that can be transported for installation or maintenance		P
	Thermoplastic materials used for casing be of class V-2, V-1 or V-0	Metal enclosure	P
	Components mounted on V-1 CLASS MATERIAL and be separated from case material of V-2 CLASS MATERIAL by at least 13 mm of air, or by a solid barrier of V-1 CLASS MATERIAL		N/A
	Materials be tested at a thickness equal to the smallest thickness used in the application and classified in accordance with IEC 60695-11-10.....		N/A
7.4	Electric insulation check during transport and installation		P
	Hazardous live parts be covered or insulated against contact with the personnel during transport and installation.	Considered	P
	Insulation resistance test in an ambient temperature of 25 °C ± 5 °C tested in accordance with IEC 62133:2017, 5.2.		P
	Ambient (°C); measured insulation resistance (MΩ); $\geq 5 \text{ M}\Omega$		P
7.5	Charging procedures for test purposes		P
	Prior to charging, the DUT have been discharged at 20 °C ± 5 °C at a constant current of 0,2 It A down to a specified final voltage	Considered	P
	Unless otherwise stated, the DUT is then charged in an ambient temperature of 25 °C ± 5 °C, using the method specified by the manufacturer.		P
7.6	Protection against short circuit during transport and installation		P

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Clause	Requirement + Test	Result - Remark	Verdict
	A safeguard is provided by the battery system manufacturer to reduce the risk of short circuit for personnel at the time of electrical installation or transport.		P
	Where the battery pack is divided into parts for the purpose of transportation, protective safeguards shall be provided not only for the battery system, but also for each part.		P
	Short circuit the DUT with total external resistance of $(30 \text{ m}\Omega \pm 10 \text{ m}\Omega) \times \text{module configuration}$ (= number of series connections / number of parallel connections) or less than 5 m Ω , whichever is higher, and less than 100 m Ω .		—
	Results: no rupture, no fire, no explosion :	See Table 7.6	P
7.7	Protection for reverse connection		N/A
	When a battery system has multiple battery packs or modules, the battery system shall remain in a safe condition at the time of installation, even if one of the battery packs or modules is connected with opposite polarity to the others.	The products could not connect with opposite polarity to the others.	N/A
	A DUT has a feature that prevents a reverse connection, or when modules or battery packs are connected in the battery system with the BMS at the factory, test is not required.		N/A
	Test the battery system with one module reverse connected.		—
	Results: no rupture, no fire, no explosion :		P
7.8	Overdischarge control of voltage (battery system)		P
	The BMS shall control the cell voltage during discharging above the lower limit discharging voltage of the cells.		P
	Monitor the cells voltage while overdischarge the battery system or part of system.		—
	Results: BMS interrupt the overdischarging current by an automatic disconnect of the main contactors :	See Table 7.8	P
7.9	Drop test		P
7.9.1	General		P
	This test is performed to simulate a drop during installation and maintenance		P
7.9.2	Whole drop test (for DUT $\leq 50\text{kg}$)		P

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Clause	Requirement + Test	Result - Remark	Verdict
	The DUT is dropped one time from a height shown in Table 2 onto a flat concrete or metal floor.	High voltage box: 15.2kg 0.1m	P
	Results: no fire, no explosion..... :	See Table 7.9	P
7.9.3	Edge and corner drop test (for DUT > 50kg)	Battery Pack: 59kg	P
	Test arrangements as shown in Figure 3, Figure 4 and Figure 5. The DUT is dropped two times from a height shown in Table 2 onto a flat concrete or metal floor, with reproducible impact points for the shortest edge drop impact and the corner impacted.	Battery Pack: 5cm	P
	Results: no fire, no explosion..... :	See Table 7.9	P

8	INFORMATION FOR SAFETY		
	Information for safety in accordance with IEC 62619		P

9	MARKING AND DESIGNATION (REFER TO CLAUSE 5 OF IEC 62620)		
	The marking items shown in Table 1 in IEC 62620 indicated on the cell, battery system or instruction manual.		P
	Cell or battery system has clear and durable markings		P
	Cell designation		N/A
	Battery designation	See battery system label	P
	Battery structure formulation	See battery system label	P

ANNEX A	Wiring, connections and supply		P
A.1	Summarizes wiring, connections and supply, as addressed in IEC 60950-1:2005.		P
3.1.1	Current rating and overcurrent protection		P
3.1.2	Protection against mechanical damage		P
3.1.3	Securing of internal wiring		P
3.1.4	Insulation of conductors		P
3.1.5	Beads and ceramic insulators	No such part	N/A
3.1.6	Screws for electrical contact pressure		P
3.1.7	Insulating materials in electrical connections		P
3.1.8	Self-tapping and spaced thread screws		P
3.1.9	Termination of conductors		P

IEC 63056			
Clause	Requirement + Test	Result - Remark	Verdict
	10 N pull test		P
3.1.10	Sleeving on wiring		P
3.2.1.2	Connection to a d.c. mains supply		P
3.2.5.2	DC power supply cords	No such part	N/A
3.2.6	Cord anchorages and strain relief	No such part	N/A
	Mass of equipment (kg), pull (N)		—
	Longitudinal displacement (mm)		—
3.2.7	Protection against mechanical damage		P
3.2.8	Cord guards	No such part	N/A
	Diameter or minor dimension D (mm); test mass (g)		—
	Radius of curvature of cord (mm)		—
A.2	Summarizes wiring, connections and supply, as addressed in IEC 62368-1.		P
5.4	Isolation materials and requirements (including clearances and creepage distances)		P
G.7	Mains supply cords	No such part	N/A
G.7.1	General requirements		N/A
	Type		—
G.7.2	Cross sectional area (mm ² or AWG)		N/A
G.7.3	Cord anchorages and strain relief for non-detachable power supply cords		N/A
G.7.3.2	Cord strain relief		N/A
G.7.3.2.1	Requirements		N/A
	Strain relief test force (N)		N/A
G.7.3.2.2	Strain relief mechanism failure		N/A
G.7.3.2.3	Cord sheath or jacket position, distance (mm)		N/A
G.7.3.2.4	Strain relief and cord anchorage material		N/A
G.7.4	Cord Entry		N/A
G.7.5	Non-detachable cord bend protection		N/A
G.7.5.1	Requirements		N/A
G.7.5.2	Test method and compliance		N/A
	Overall diameter or minor overall dimension, D (mm)		—

IEC 63056			
Clause	Requirement + Test	Result - Remark	Verdict
	Radius of curvature after test (mm)..... :		—
G.7.6	Supply wiring space		P
G.7.6.1	General requirements		P
G.7.6.2	Stranded wire		P
G.7.6.2.1	Requirements		P
G.7.6.2.2	Test with 8 mm strand		P

IEC 63056			
Clause	Requirement + Test	Result - Remark	Verdict

7.2	TABLE: Resistance of abnormal heat			P
Allowed impression diameter (mm) :		2.0		—
Object/ Part No./ Material	Manufacturer/ trademark	Test temperature (°C)	Impression diameter (mm)	
FR6065	Covestro Deutschland AG[PC Resins]	140	0.5	
PBT-NPG30	Kingfa Sci. & Tech. Co. Ltd.	125	0.9	
Supplementary information: The test is made in a heating cabinet at a temperature of $(\Delta T + T_{max} + 15\text{ }^{\circ}\text{C}) \pm 2\text{ }^{\circ}\text{C}$. • ΔT means the maximum temperature rise of thermoplastic parts during the most adverse operation specified by the battery system manufacturer at $25\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$. • 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
A004227932-001		>1000MΩ	Pass
A004227932-001		>1000MΩ	Pass
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 Note: The test was conducted on RM-15. 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		Verdict
7.6	TABLE: Protection for short circuit during transport and installation		P
Constant discharging current, 0,2 It (A).....:		20.4	—
SOC for installation or maintenance (Ah or Wh).....:		102Ah	—
Battery configuration (XS/YP).....:		Undefined, the tests were conducted in fully charged condition.	—
Sample No.	DUT's temperature at start of test (°C)(1)	External resistance (mΩ)(2)	Results
A004337478-006	25.2	19.40	A,F
A004337478-002	25.2	19.39	A,F
A004337478-003	25.2	18.34	A,F
A004337478-004	25.2	18.34	A,F
A004337478-005	25.2	18.34	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. 3. A004337478-006, A004337478-002 for battery pack, A004337478-003, A004337478-004, A004337478-005 for RM-75. 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): ____			

IEC 63056			
Clause	Requirement + Test	Result - Remark	Verdict

7.7	TABLE: Protection for reverse connection				N/A
Constant discharging current, 0,2 It (A) :			--		—
SOC for installation or maintenance (Ah or Wh)..... :			--		—
Sample No.	Charging voltage (Vdc)	Charging current (A)	Maximum discharging current (A)	Results	
-	-	-	-	-	
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): ____					

7.8	TABLE: Overdischarge control of voltage test (battery system)					P
Constant discharging current, 0,2 It (A).....					20.4	—
30% of rated capacity (Ah).....					30.6	—
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)		
A00433747 8-001	50.0	-	137.2	Min 2.950	2.000	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. Test was conducted on RM-15. 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): ____						

IEC 63056			
Clause	Requirement + Test	Result - Remark	Verdict

7.9.2	TABLE: Whole drop test					P
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	
A004337478-007	15.2	0.1	-	Whole	A	
Supplementary information:						
Mass of the DUT, <i>m</i>		Test method	Orientation		Height of drop	
<i>m</i> < 7 kg		Whole	Random		100,0 cm	
7 kg ≤ <i>m</i> < 20 kg		Whole	Bottom down direction (Note)		100,0 cm	
20 kg ≤ <i>m</i> < 50 kg		Whole	Bottom down direction (Note)		50,0 cm	
50 kg ≤ <i>m</i> < 100 kg		Edge and corner	--		5,0 cm	
<i>m</i> ≥ 100 kg		Edge and corner	--		2,5 cm	
Note – The bottom surface of the DUT is specified by the manufacturer						
Note: The test was conducted on Control Box.						
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)..... :					20.4	—
SOC for installation or maintenance (Ah or Wh)..... :					102Ah	—
Sample No.	Mass of DUT (kg)	Height of drop (m)(1)	OCV at start of the test (Vdc)	Impacted points (2)	Results	
A004337478-006	59.0	0.05	77.11	Edge and Corner	A	
Supplementary information:						
Mass of the DUT, <i>m</i>		Test method	Orientation		Height of drop	
<i>m</i> < 7 kg		Whole	Random		100,0 cm	
7 kg ≤ <i>m</i> < 20 kg		Whole	Bottom down direction (Note)		100,0 cm	
20 kg ≤ <i>m</i> < 50 kg		Whole	Bottom down direction (Note)		50,0 cm	
50 kg ≤ <i>m</i> < 100 kg		Edge and corner	--		5,0 cm	
<i>m</i> ≥ 100 kg		Edge and corner	--		2,5 cm	
Note – The bottom surface of the DUT is specified by the manufacturer						
Note: The test was conducted on Battery Pack.						
Results:						
A – No fire or explosion			C – Explosion			
B – Fire			D – Other (Please explain): ____			

5.1	TABLE: Critical components information					P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard	Mark(s) of conformity ¹⁾	
-	-	-	-	-	-	
Supplementary information:						
1) Provided evidence ensures the agreed level of compliance. See OD-CB2039.						
2) See attachment 3						

- End of test report -