



APPLICATION FOR IEC TEST REPORT

Client Name : Muller Energy Pty Ltd

Address 8 Christel Avenue, Carlingford NSW, 2118 Australia

Product Name : Lithium Battery

Date : Jan. 15, 2024

Shenzhen Anbotek Compliance Laboratory Limited

Shenzhen Anbotek Compliance Laboratory Limited

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Page 2 of 21

TEST REPORT

IEC 62619: 2022

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	
Reference No	: 18360BC30069901
Compiled by (+ signature)	: Doma Mao / Project Engineer
Approved by (+ signature)	
Date of issue	: Jan. 15, 2024
Contents	21 pages(including 1 page of photos)
Testing laboratory	
Name	: Shenzhen Anbotek Compliance Laboratory Limited
Address	Zone South,1/F.,Building2, Hengchangrong High-Tech Industrial Park, Huangtian Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China
Testing location	: Shenzhen Anbotek Compliance Laboratory Limited
Client potek probotion Atte	otek Anboten Anbo tek subotek Anbote An
Name	: Muller Energy Pty Ltd
Address	* 8 Christel Avenue, Carlingford NSW, 2118 Australia
Test specification	Anbolisti Anbolst Anbolst Andrek Anbolst
Standard	: IEC 62619: 2022
Test procedure	
Non-standard test method	
Test item	abotek Anbotek Anbotek Anbotek Anbotek
Description	: LiFePO4 Battery
Trade mark(s)	N.A. otek Anbotek Anbotek Anbotek Anbotek
Model and/or type reference	: KT-16012S
Name and address of Manufacturer .	

Name and address of factory

Rating(s).....: DC 12.8V, 160Ah, 2048Wh

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Page 3 of 21

Particulars: test item	vs. test requireme	ents Anboie	k hotek Ant	otek Anbo
Ambient temperature…	potor All	······ : 20°C	± 5°C. And	nbotek Anbo
Test case verdicts	Anbor A	botek Anb	oten Anbo	Anbotek Anbor
Test case does not app	bly to the test object	t······ N (.A	.)ooten Anbo	
Test item does meet th	e requirement······	·····: P (as	ss) motel Anbo	
Test item does not mee	et the requirement…	·····: F (ail)) Anbotek Anbor	
Testing	sm botek Anbo	tek Anbourtek	k anbotek Anbr	Am hotek
Date of receipt of test it	tem	: Dec.	22, 2023	
Date(s) of performance	of test·····	······ Dec.	23, 2023 to Jan. 07, 20	24
Tests performed (nan	ne of test and tes	t clause):	nbore Ans notek	Anboten Anbo
cl.7.2.3 Drop test (batte	ery system)			
cl.8.2.2 Overcharge co	ontrol of voltage (ba	attery system)		
cl.8.2.3 Overcharge co	ontrol of current (ba	ittery system)		
cl.8.2.4 Overheating co	ontrol (battery syste	em) Anbor		
The component cell (L TÜV SÜD certificate N			EC 62619:2022 by	
The samples comply w	vith the requiremen	t of IEC 62619: 2	2022.	
General remarks	Anbotek Anbot	Jotek Anbotek		
	ot be reproduced ex	cept in full withou	ut the written approval o	f the testing laboratory.
This test report shall no	botek	Anbo, Ar	otek unboter	f the testing laboratory.
This test report shall no The test results presen	ted in this report ar	e only relevant to	the test sample.	f the testing laboratory.
This test report shall no The test results presen "(see remark #)" refers	ted in this report are to a remark append	e only relevant to ded to the report.	the test sample.	f the testing laboratory.
General remarks This test report shall no The test results presen "(see remark #)" refers "(see appended table)" Throughout this report a	ited in this report an to a remark append refers to a table ap	e only relevant to ded to the report. opended to the rep	the test sample.	f the testing laboratory.

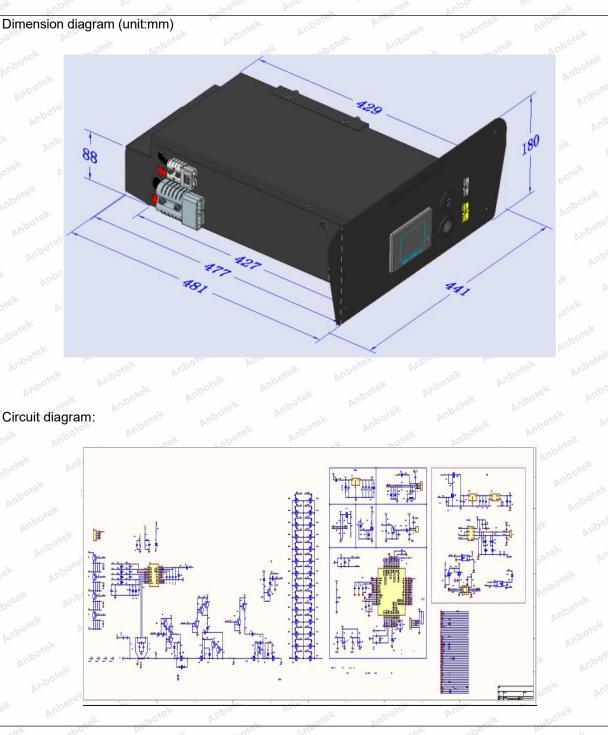
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Page 4 of 21



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Page 5 of 21

LiFePO4 Battery

Model:KT-16012S Rating:12.8V, 160Ah, 2048Wh

IFpP/55/175/155/[4S]E/-20+45/95

Recommended charge:50A charge to 14.6V CC-CV

Warning:

- Never throw the battery into water, keep it under dry, shady and cool circumstance when not use.
- Never upside down the positive and negative.
- Never connect the positive and negative of battery with metal.
- Never ship or store the battery together with metal
- Never knock, throw or trample the battery.
- Never cut through the battery with nail or other edge tool.

Date of code: YYMMDD

Remark:

The YY=01-99 represent the year, for example 23 means year of 2023; The MM=01-12 represent the month, for example 03 means March; The DD= 01-31 represent the date.

- 警·····告! (Warning!)。
- ●→ 严禁将电池浸入海水或水中,保存不用时,应放置于阴凉干燥的环境中; →
- > Never-throw-the-battery-into-water,-keep-it-under-dry,-shady-and-cool-circumstance-when-not-use.
- → 严禁颠倒正负极使用电池; →
- + Never-upside down the positive and negative.
- → 禁止用金属直接连接电池正负极短路; 🧋
- Never connect the positive and negative of battery with metal.
- → 禁止将电池与金属,如发夹、项链等一起运输或贮存; 🚽
- → Nevership or store the battery together with metal.
- → 禁止敲击或抛掷、踩踏电池等; →
- → Neverknock, throw or trample the battery.
- → 禁止直接焊接电池和用钉子或其它利器刺穿电池; 🚽
- → Never-cut-through-the-battery-with-nail-or-other-edge-tool.+

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General product information and other remarks:

This battery is constructed with 4PCS lithium-ion cells (4S1P), and has overcharge, over-discharge, over current and short-circuits proof circuit.

The main features of the cell and battery are shown as below:

Product name	Cell	Battery
Model Name	LF160	KT-16012S
Capacity (Ah)	160	160
Nominal voltage (V)	3.22	12.8
Nominal charge current (A)	80	50 Antoon Att
Maximum continuous charge current (A)	160 Anboret And	150 Anbotek Anbot
Nominal discharge current (A)	80 hotek Anbor A	80 at moote And
Maximum continuous discharge current (A)	160 Antonial Antonial	160 Anborek Anborek
Maximum Charge Voltage (V)	3.65 March March	14.6
Upper limited charging voltage (V)	3.80	14.6
End-of-discharge Voltage (V)	2.5 A AND AND AND AND AND AND AND AND AND A	10 hotek Anbor A
Charge temperature range (°C)	0 to 65	0 to 60
Discharge temperature range (°C)	-35 to 65	-20 to 60
Storage temperature range (°C)	-30 to 60	10 to 45
Recommend charging method declared by the manufacturer	At constant current 80A till cell voltage reaches 3.65V, then switch to constant voltage 3.65V till charge current drops to 8A	At constant current 50A till cell voltage reaches 14.6V, then switch to constant voltage 14.6V till charge current drops to 3.2A
Nominal mass (Kg)	3.0±0.1	23±3.0
Structure	Cylindrical 🛛 Prismatic	1 parallel & 4 series
External dimensions (mm)	L*T*H	W*L*H (444+0)======(404+0)======
Anbotek Anbotek Anbotek	(173.9±1.0)mm × (53.85±1.0)mm × (153.50.0±1.0)mm	(441±2)mm × (481±2)mm × (180±2)mm

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	IEC 62619: 2022	IEC 62619: 2022			
Clause	Requirement + Test	Result - Remark	Verdic		
Anboter	Ant sek abotek Anbor At sotek	Anboten And	nbotek		
4	PARAMETER MEASUREMENT TOLERANCES		Brek		
Anbot	Parameter measurement tolerances	rek Anbotek Anbo	P		
5	GENERAL SAFETY CONSIDERATIONS	v oten And	Р		
5.1	General	anboten And ek abr	^{rek} P		
Anbotek	Cells and batteries are safe under conditions of both intended use and reasonably foreseeable misuse :	See also table 5.1 for Critical components information	nboteP		
All' hote	Reduce the risk of injuries from moving parts	ak botek Anboten	P		
5.2	Insulation and wiring	k Antotek Anbotek	Р		
otek phi	Voltage, current, altitude, and humidity requirements	potek Anbotek Anbotek	PM		
Anbotek	Adequate clearances and creepage distances between connectors and live parts at different voltages or between live parts and non-current- carrying accessible parts	Antootek Antootek Antoo	Anbotek		
Anbor	Protect from hazardous live parts, including during installation	otek Anbotek Anbotek	P ^O		
stek p	The mechanical integrity of internal connections	Wires and cables used are certified.	Р		
5.3	Venting	Anbote k hotek An	p ^{oter} P		
Anboren	Pressure relief function	Anboier Ante otek	nbop		
Anborer	Encapsulation used to support cells within an outer casing	Anborek Anbo	Pot		
5.4	Temperature/voltage/current management	oto All hotek Anboten	P		
Anbotek Anbotek	The design prevents abnormal temperature-rise	Overcharge, over current and overheating proof circuit used in this battery. See tests of clause 8.	P potek Anbotek		
Pun	Voltage, current, and temperature limits of the cells	An wotek unbotek	P		
arbo ak Ar	Specifications and charging instructions for equipment manufacturers	The charging limits specified in the user manual.	P		
5.5	Terminal contacts of the battery pack and/or batter	ery system	Net P		
L otek	Polarity marking(s)	And Lotek Anbotek Anb	P		
Anbotek	Polarity marking not provided for keyed external connector	Anbotek Anbotek A	Pel Anbote		
Anbot	Capability to carry the maximum anticipated current	DC connector complied with the requirements.	Pro		

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Page 8 of 21

	IEC 62619: 2022		
Clause	Requirement + Test	Result - Remark	Verdic
Anbo	External terminal contact surfaces	Anbo hotek	Brel
Anbote	Terminal contacts are arranged to minimize the risk of short circuits	tek Anbotek Anbotek	P
5.6 And	Assembly of cells, modules, or battery packs into	battery systems	P
5.6.1	General	anbotek Anbote And	re ^k P
Anbotek Anbotek Anbotek	Independent control and protection method(s)	Battery system has independent control and protective functions, and BMS is integrated into battery system.	nbote ^p Anbote ^k Anbo
htek Ar	Recommendations of cell operating limits, mounting advice, storage conditions and other design recommendations by the cell manufacturer	Anbotek Anbotek Anbotek Anbot	rek P
Anbotek	Batteries designed for the selective discharge of a portion of their series connected cells	No such design.	AnboNk
Anbo	Protective circuit component(s) and consideration to the end-device application	otek Anbotek Anbotek	۶P
.6.2	Battery system design	hotek Anbotek Anbo	_e ⊮ P
otek	The voltage control function	und sotek Anbotek Anbo	P
Anbotek	Maximum charging/discharging current of the cell are not exceeded	Anbotek Anbotek An	oon Pek
.7 Anboter	Operating region of lithium cells and battery syste	ems for safe use	Bot
Anbot	The cell operating region	Information mentioned in manufacturer's specifications.	P
ek Ant	Designation of battery system to comply with the cell operating region	Information mentioned in manufacturer's specifications.	[₩] P
.8 stek	System lock (or system lock function)	And otek Anbotek Ant	P
Anbotek Anbotek	Non-resettable function to stop battery operation	Non-resettable protect function provided in the BMS security Mechanism.	Anbote Anbote
kek Ant	Manual with procedure for resetting of battery operation	Information mentioned in maintenance manual.	P
or l	Emergency battery final discharge	Not for such application	N
.8	Quality plan	Anbois An hotek	nbotek
Anbote	Manufacturing quality plan (for example: ISO9001, etc.) prepared and implemented	Manufacturing quality plan provided.	AntPre
P.V.	The process capabilities and the process controls	Al stek suboten	P

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Page 9 of 21

*6K	IEC 62619: 2022	unbo tek Anbotek Anbote	K PU
Clause	Requirement + Test	Result - Remark	Verdict
Anboth	Ante tek nooter Anbound to botek	Anbore And stek	oboten
6	TYPE TEST CONDITIONS		Р
6.1 Knote	General	hek unbotek Anbo	Puote
6.2	Test items	otek unbotek Anbot	Pin - P
potek I	Cells or batteries that are not more than six months old (See Table 1 of IEC62619)	Anbotek Anbotek Anbot	P
Anbotek	Capacity confirmation of the cells or batteries	Anbotek Anbo, tek	boteP
Anbotek	Default ambient temperature of test, 25 °C ± 5 °C	Tests were carried out in an ambient temperature of 25±5°C.	AnbRek

7	SPECIFIC REQUIREMENTS AND TESTS		
7.1	Charging procedure for test purposes	Anboten Anbo	Ne ^k
Anbotek	The battery discharged to a specified final voltage prior to charging	Final voltage: 10V.	abotel
Anbote	The cells or batteries charged using the method specified by the manufacturer	The method mentioned in manufacturer's specifications.	Anb
7.2 Anto	Reasonably foreseeable misuse	botek Anbote. And wotek	
7.2.1	External short-circuit test (cell or cell block)	CB approved cell used.	-Ya
Inbotek	Short circuit with total resistance of 30 m $\Omega\pm$ 10 m Ω at 25 °C \pm 5 °C	Anbotek Anbotek Anb	potel
Anbore	Results: no fire, no explosion	Anbore Am hotek	Anb
7.2.2	Impact test (cell or cell block)	CB approved cell used.	D.
K Anbr	Cylindrical cell, longitudinal axis impact	optek Anbore And And	
otek A	Prismatic cell, longitudinal axis and lateral axis impact	Anbotek Anbotek Anbot	e ³⁴ v
nbor	Results: no fire, no explosion.	Anbo, An Andrek An	ooter
7.2.3	Drop test (cell or cell block, and battery system)	Anbois An botek	Anbo
7.2.3.1	General	Anbors Ann botek	P1
7.2.3.2	Whole drop test (cell or cell block, and battery system)	otek Anboro Ant	×.
. ek	Description of the Test Unit	anbor hi abotek Anbot	
ipo'	Mass of the test unit (kg)	Anbo, ak abotek Ant	
Anbor	Height of drop (m):	Anbors An potek	
Anbora	Results: no fire, no explosion	Anboit Am hotek	An
7.2.3.3	Edge and corner drop test (cell or cell block, and battery system)	Tested complied.	
be.	Description of the Test Unit	Battery system.	

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A **Product Safety**

Yek	IEC 62619: 2022	Ant Ant	
Clause	Requirement + Test	Result - Remark	0,1
Anbor	An botek Anboten Ant atek anbotek	Anbor An hotek	20
Anboter	Mass of the test unit (kg):	20.99kg.	
Anbote	Height of drop (m):	0.1m. Mooter Andre Car	
rek ont	Results: no fire, no explosion	See Table 7.2.3.3.	-
7.2.4	Thermal abuse test (cell or cell block)	CB approved cell used.	
,bu i	Results: no fire, no explosion	Anbo tek anbotek Anb	510
7.2.5	Overcharge test (cell or cell block)	CB approved cell used.	0,00
Anbone	For those battery systems that are provided with only a single protection for the charging voltage control	ek Anbotek Anbotek	
er Anb	Results: no fire, no explosion	poter. And tek nbotek	
7.2.6	Forced discharge test (cell or cell block)	CB approved cell used.	,eX
Anbotek	Upper limit charge voltage of the cell	unbotek Anbout All	00
nbotek	Cells connected in series in the battery system:	Anbotek Anbore A	
Anbotek	Redundant or single protection for discharge voltage control provided in battery system	ak Anbotek Anbotek	Þ.
Aup	Target Voltage:	oter Anbo tek nbotek	
otek Ar	Maximum discharge current of the cell, Im	Anborek Anbor tek abo	e¥-
nbotek	Discharge current for forced discharge, 1.0 It	Nupotek Aupon ak	, o'
abotek	Discharging time, t = (1 It / I _m) x 90 (min.):	Anborek Anborr Al	
hisobotek	Results: no fire, no explosion	k abotek Anbote	P.C
7.3	Considerations for internal short-circuit – Design	evaluation	
7.3.1	General	CB approved cell used.	
7.3.2	Internal short-circuit test (cell)	nbor An botek Anbot	
Anbotek Anbotek	Samples preparation procedure: In accordance with Clause A.5 and A.6 of IEC 62133-2:2017	Anbotek Anbotek An Anbotek Anbotek	port
Anbot	Tested per 7.3.2 b) in an ambient temperature of 25 °C \pm 5 °C.	tek Anbotek Anbotek	
untek Ant	The appearance of the short-circuit location recorded by photograph or other means	hbotek Anbotek Anbote	
Anbotek	The pressing was stopped - When a voltage drop of 50 mV was detected; or	Antotek Anbotek Ant	nb
Anbore	- The pressing force of 800 N (cylindrical cells) or 400 N (prismatic cells) was reached	ek nteotek Antotek	ſ
ek w	Results: no fire:	tek obotek Anbote	
7.3.3	Propagation test (battery system)	bo, by	[

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		IEC 62619: 2022		
Clause	Requirement + Test	Anbo otek Anbotek	Result - Remark	Verdic
Anbor	An sotek Anboten	And tek abotek	Anborn Annotek	anboter
Anboten	Method to create a therma	al runaway in one cell :	Anboten And tek	Ne
	Results: No external fire find no battery case rupture		lek Anbotek Anbo	N Anb
Pup,	k Lotek An	poto Ana rek	abotet Anbourk ho	tek p
3	BATTERY SYSTEM SAF	ETY (CONSIDERING FUN	CTIONAL SAFETY)	N
B.1 otek	General requirements		An anbotek Anboten Ar	N
An. Lotek	Functional safety analysis	for critical controls	Ann hotek Anboten	AND Nev
Anbotek	Conduct of a process haz cell manufacturing proces	s and the	ok Anbotek Anbotek	Anbo Anbo
K Anbo	battery system manufactu	ring process	botek Anbore An-	ek Al
otek pr	Conduct of risk assessme battery system	nt and mitigation of the	Anbotek Anboten Anbo	oo ^{tek} N
3.2	Battery management sy	stem (or battery managen	nent unit)	Nibote P
3.2.1	Requirements for the BMS	S Anborn k hotek	Anboten Anbo	P
Anbotek	The safety integrity level (SIL) target of the BMS	ek anbotek Anbo	N
Anbot	The charge control evalua 8.2.2 to 8.2.4	ated by tests in clauses	otek Anbotek Anbot	× P _A r
3.2.2	Overcharge control of volt	age (battery system)	unborten Anbo	o ^{tek} P
hbotek hotek	The exceeded charging vertex battery system	oltage applied to the whole	16.06V.	Anbotek P
Anbotek	The exceeded charging very part of the battery system	oltage applied to only a , such as the cell(s):	Anbotek Anbotek	Anbo
Anbor	Results: no fire, no explos	ion:	See Table 8.2.2.	+ Pod
rek Ant	The BMS terminated the of the upper limit charging vo	charging before exceeding bltage	chotek Anbotek Anb	P
3.2.3	Overcharge control of cur	rent (battery system)	Anborn All hotek	nb ^{oten} P
Anboter	Results: no fire, no explos	sion	See Table 8.2.3.	Anborek P
Anboten	The BMS detected the ov controlled the charging to maximum charging currer	ercharging current and a level below the	Anbotek Anbotek Anbotek	Anbote P Anb
3.2.4	Overheating control (batte	ery system)	hoter And tek ab	P
potek P	The cooling system, if pro	vided, was disconnected	Anbotek Anbo, At	obotek P
Anbotek	Elevated temperature for maximum operating temp	charging, 5 °C above	65°C.	Anbotek P
And	Results: no fire, no explos	sion	See Table 8.2.4.	Anboie
Anboro	The BMS detected the ov terminated charging	e, bur	k Anbor An	P

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*eK	IEC 62619: 2022				
Clause	Requirement + Test	Result - Remark	Verdict		
Anbor	And tek anboten Anbo tk botek	Anbor Ann sek	nboten		
	The battery system operated as designed during test	Anbotek Anbo	AnPrek		
Aup	k hotek Anboi Ali stek nobo	And And And	Anbo.		
9	EMC		N		
lbotek	Battery system fulfil EMC requirements of the end- device application	Anbotek Anbote Anb	_{stek} N		
Anbore	And sek abover Andor k hotek	Anboth Ann tek	abotet		
10	INFORMATION FOR SAFETY		Р		
ek An	The cell manufacturer provides information about current, voltage and temperature limits of their products	Included in datasheet.	Anbote		
potek	The battery system manufacturer provides information regarding how to mitigate hazards to equipment manufacturers or end-users.	Written in instruction manual.	rek P A		

11	MARKING AND DESIGNATION (REFER TO CLAUSE 5 OF IEC 62620)		
Jotek Anbr	The marking items shown in Table 1 in IEC 62620 indicated on the cell, battery system or instruction manual.	The battery is marked in accordance with IEC 62620, also see page 4.	P _{Anbo}
Anbotek	Cell or battery system has clear and durable markings	Anbotek Anbotek An	poter P
p	Cell designation	et abotek Anbote	An Nick
k Aupo	Battery designation	IFpP/55/175/155/[4S]E/ -20+45/95	Anbot
oten pr	Battery structure formulation	4S1P	P An
abotek	Anbor k wotek Anbore An	abotek Anbo	otek
12	PACKAGING AND TRANSPORT		N
All	Refer to Annex D	All sotek Anboten	N.ok

ANNEX A	OPERATING REGION OF CELLS FOR SAFE USE		
A.1 Anto	General	botek Anbote Atte	K P Anto
A.2	Charging conditions for safe use	abotek Anbote And	Hek P
A.3	Consideration on charging voltage	And Anboten And	R
A.4	Consideration on temperature	Antotek Anboter P	nb ² P _{tek}
A.5	High temperature range	Charging high temperature limit 60°C.	Anbon Anbotel

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	IEC 62619: 2022		
Clause	Requirement + Test	Result - Remark	Verdi
Anbo	An abotek Anbotes Anu atek Anbotek	Anbo, A. Anbotek	nbote
A.6 http://www.above	Low temperature range	Charging low temperature limit 0°C.	Anbore
A.7	Discharging conditions for safe use	-20°C to 60°C.	P
A.8	Example of operating region	bore Ane botek Anbore	Р
thoto. b	he botek Anbo k otek	Anbore Ann Lak b	ster.
ANNEX B	PROCEDURE OF 7.3.3 PROPAGATION TEST BY I	LASER IRRADIATION	boteN
B.1 botek	General	Anborek Anbo, p	Ne
B.2 botek	Test conditions	ek nbotek Anbore	N
B.2.1	Cell test (preliminary test)	lek abotek Anbote	N
potek Ar	The cell fully charged according to the manufacturer recommended conditions	nnbotek Anbotek Anbotek	_
abotek	Laser irradiation point on the cell	anbotek Anbote And	
potek	Output power of laser irradiation	Anbotek Anbote A	
Autobek	Tested in an ambient temperature of 25 °C ± 5 °C	K botek Anboten	N
K NO	Repeat of cell test for 3 times	ak hotek Anboten	N
B.2.2	Battery system test (main test)	poter And hotek Anbotek	N
oter Ar	The battery system fully charged according to the manufacturer recommended conditions	anbotek Anbotek Anbot	
botek	Target cell to be laser irradiated	An botek Anboten An	_
Anbotek	The irradiation point on the target cell same or similar as that on the cell test	k Anbotek Anbotek	
K Anbor	Output power of laser irradiation	ptek Anbore Anthotek	_
otek Ant	Tested in an ambient temperature of 25 °C ± 5 °C	nbotek Anbotet And	N
ANNEX C	PROCEDURE OF 7.3.3 PROPAGATION TEST BY I LASER	METHODS OTHER THAN	N hoter
C.1	General	Anb.	N
C.2	Test conditions:	tek unbotek Anboro	N
stek Anb	 The battery fully charged according to the manufacturer recommended conditions 	nbotek Anbotek Anbote	
nbotek f	- Target cell forced into thermal runaway	Anborek Anbo stek ant	_
Anbotek Anbotek	 A specially prepared sample (e.g. a heater or a hole for nail penetration provided) used for ease of testing 	Anbotek Anbor An Anbotek Anbotek	
C.3 Model	Method used for initiating the thermal runaway. 1) Heater (Heater, Burner, Laser, Inductive heating 2) Overcharge	tek Anbone Anborek Anborek	_

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Report	No.: 18360BC30069901 Pag	ge 14 of 21
×ek	IEC 62619: 2022	Anbore An
Clause	Requirement + Test Result - Remark	Verdict
Anbor	Annotek snboter And ak sotek Anbott Annotek	nboten
nboten	3) Nail penetration of the cell	N
An	4) Combination of above methods	ler.
Anbo	5) Other methods	botek
tek Aup	ot An otek unbote And ak untek Anbo	atek ant
ANNEX D	PACKAGING AND TRANSPORT	N
Anbotek Anbotek	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	Anbonek Anbotek
ek Anbo	Regulations concerning international transport of secondary lithium batteries	potek N ^{oote}

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Page 15 of 21

Object/part No.	Manufacturer/				
	trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity ¹)
Cell	EVE Power Co., Ltd.	LF160	3.22V, 160Ah	IEC 62619: 2022	TÜV SÜD certificate No.: B 098952 0028 Rev. 00

1) Provided evidence ensures the agreed level of compliance. See OD-2039.

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Page 16 of 21

7.2.1 TABLE: External short-circuit test (cell or cell block)						
Sample N	o. Ambient (at 25°C ± 5°C)	OCV at start of test (V dc)	Resistance of Circuit (mΩ)	Maximum Case Temperature Rise ∆T (°C)	Results	
C1 C1	anbotek - Anboi	ak hotek	Anboten A	no-	k papor	
C2	ek abotek Anb	dis <u>A</u> nn	Antotek	Anbouter	otek Anbot	
C3	rek sporek h	hore - And	rek Anbotek	Anbo	abotek - An	

Supplementary information:

Results:

- 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: Overch	arge test (cell	or cell block)	Anboten Anbo	tek subotek	AnbN
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
C16	nbore - Ant	otek - Anbo	er Anbu	ek botek	Anbore	An
C17	Anboten An	stek-	potek - Anb	on	ek priboten	Ann- stek
C18	Anboter	Anbu	nbotek P	hborn Am	otek - Anboten	Anbo

Supplementary information:

Results:

- 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):

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Page 17 of 21

7.2.6	TABLE: Forced	d discharge tes	t (cell or cell bl	ock)			N
Sample No	OCV bef applying re charge, (\	everse Volta	age Reve	rge Appli	al Time for sed Charge cation (min)	Res	sults
C19 ⁰⁰	All hote	k Anboten	Anti-	nbotek	P-oport	P	Anb
C20 M	pore Ant	otek Anbote	K Anbo	botek	Anbore	Pur	otek p
C21	Anboren And	wotek Ant	otek Anbo.	ek potek	- Anborer	K	- Notek
Supplement	tary information	ND-	Lotek Anbo	bi.	tek soot	e. P	"Up-

Supplementary information:

Results:

A – No fire or Explosion

B – Fire

C – Explosion

D – Other (Please explain): _

7.3.2	TAB	LE: Internal short-circ	uit test (cell)		N
Sample	e No.	OCV at start of test, (V dc)	Particle location ¹⁾	Maximum applied pressure, (N)	Results
C2:	2 ^{nu} Lote	Anbotek Anb	ek obotek	Anbote - Ano	anbotek A
C2	3 America	tek Anvotek A	hbor ek - phi	Anboten Anbo	K Anvotek
C24	4 Ant	hotek Anbotek	Anbor tek- An aborel	Anboren Ano	otek Anbotek
C2	5	hotek - Anbotek	Anbor Anbor	rek Anboro An	hotek - Anbotek
C2	6	Ante botek - Anbotel	Anbo	botek Asboth	hotek Anbo

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): _

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7.3.3	TAE	BLE: Propagation	test (b	attery sys	tem)		N
Sample No) .	OCV of Battery System Before Test, (V dc)	Cell	of Target Before t, (V dc)	Maximum Cell Case Temperature, (°C)	Maximum DUT Enclosure Temperature, (°C)	Results
Arthoter		Anutek	botek	- Aupor	ok botek	Anboten Ar	to- otek - nho
K Anbot	er	Anbo-	nbotel	- pupo	All botek	Antoter	Anbe
otek - An	ooter	Anbo	h.	stek pr	bore Ann	ek Anbotek	Anbo
Met	hod	of cell failure ¹⁾		Locatio	n of target cell	Area for fire	protection (m ²)
Ann		hotek Anbo	ek P	botek	Anbote, Ar	otek nabo	ek Anbo
Anbo		anbotek Anbo	all all	An hotek	- Anboten	And stek	betek Anbor
Aupo.	V	- wotek ar	100101	Pur	ek potek	Anbor	- wotek anbot

Supplementary information:

- 1) Cell can be failed through 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):

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Page 19 of 21

8.2.2	TAE	BLE: Overcharge co	ontrol of voltag	e (battery systen	n)	P
Sample N	lo.	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
B2		3.036	150	14.38	3.650	otek A, D, F
				Charge Volt	age Applied Batter	ry System: 1)
				Whole		Part
				16.06V	stek phibo.	A. stek

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):

8.2.3 TABLE: Overcharge control of current (battery system) P						
Sample	e No.	OCV at start of test, (V dc)	Max. Charging Current, (A)	Max. Charging Voltage, (V dc)	Resul	ts
Anbo B2	pr.	12.26	180	12.88	A, D,	Enboren

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):

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Page 20 of 21

8.2.4 TABLE: Overheating control (battery system)						
Mode	l No.	OCV at start(SOC 50%) of test, V dc	Maximum Charging Current, A	Maximum Charging Voltage, V dc		
B	2 Anbor	12.66	150	14.60		
Maximum Specified Temperature of Battery System, °C			Maximum Measured Cell Case Temperature, °C	Results		
~otek	Anbore	60.0	61.9	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):

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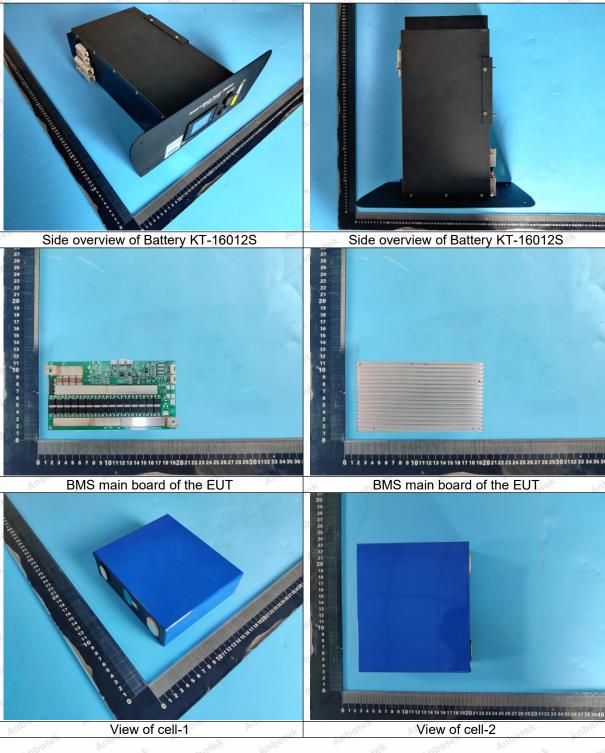
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ANNEX 1: PHOTOS

Model type: KT-16012S



End of the report

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Page 21 of 21