



IEC TEST LABS LLP

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Web.: www.iectestlabs.com



TEST REPORT

Discipline:	Electrical	Group:	Environmental test
Location of testing Performance of the Laboratory & its address:	IEC Test Labs LLP Ground Floor, Plot No.N-47, Pkt. N Sector-5, Bawana Industrial Area, DSIDC, Bawana, Delhi-110039		
Test Specification:	UN38.3		
Report No. :	IEC/23120105	Issue Date:	04/01/2024
ULR No.:	ULR- TC89172400000009F	No. of Pages	Page 1 of 12
Name & Address of Manufacturer:	Shenzhen Grepow Battery Co., Ltd 1ST TO 3RD FLOOR OF COMPLEX BUILDING, 1ST TO 4TH FLOOR OF 2ND BUILDING, 1ST TO 4TH FLOOR OF 1ST BUILDING, TONGFUYU INDUSTRIAL PARK, GAOFENG COMMUNITY, DALANG STREET BAOAN DISTRICT, SHENZHEN, GUANGDONG, CHINA, SHENZHEN, 518118		
Name & Address of Applicant:	Shenzhen Grepow Battery Co., Ltd 1ST TO 3RD FLOOR OF COMPLEX BUILDING, 1ST TO 4TH FLOOR OF 2ND BUILDING, 1ST TO 4TH FLOOR OF 1ST BUILDING, TONGFUYU INDUSTRIAL PARK, GAOFENG COMMUNITY, DALANG STREET BAOAN DISTRICT, SHENZHEN, GUANGDONG, CHINA, SHENZHEN, 518118		

PART A. PARTICULARS OF SAMPLE SUBMITTED BY CUSTOMER

a) Sample Name:	Rechargeable Li-ion cell
b) Sample Description (Rating/Class/Type, etc):	Nominal Voltage: 3.8V, Rated Capacity: 24mAh, 0.0912Wh.
c) Model Number:	GRP160728
d) Trade mark:	GREPOW
e) Quantity of Sample:	35
f) Condition of Sample when received:	OK / Not OK
g) Document Number:	7.8F-01
h) Date of Receipt of Sample:	01/12/2023
i) Job Order No.:	23120105
j) Date of Commencement of Testing:	02/12/2023
k) Date of Completion of Testing:	04/01/2024
l) Environmental Conditions:	20°C ± 5°C
m) Customer Reference Number:	Letter Dated: 01/12/2023
n) Report refers to the Sample Received at:	Permanent Facility
o) Decision Rule applicable:	Yes / No
p) Code No. / Sr. No. / Batch No/Date of Manufacturer/Seal & IO's sign, if any	Sept.2023
q) Any Other Information, if any:	



PART B: SUPPLEMENTARY INFORMATIONS

a) Reference to sampling procedure, wherever applicable:	N/A
b) Supporting documents for the measurements taken and results derived like graphs, tables, sketches and/or photographs, as appropriate to test report, if any [To be attached]:	See attachment no.1
c) Deviation from the test methods as prescribed in relevant ISS/ work instructions,	NIL

Tested by:	Approved by / Reviewed By / Authorized Signatory:	Issued By:
PARVEEN (Testing Engineer)	PARVINDER (Technical Manager)	MANISH JADON (CEO)



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Report No: IEC/23120105

Dated: 04/01/2024

Discipline Name: Electrical

UN38.3

ULR-TC89172400000009F

Group Name: Environmental test

Application details / Description of the product:

The product under test is "Rechargeable Li-ion cell" which is used in portable applications. Detailed information of the Battery is given below:

Sl. No.	Item	Specification
1.	Nominal Voltage	3.8V
2.	Rated Capacity	24mAh
3.	Limited Charge Voltage	4.2V
4.	End Charge Current	4.8mA
5.	Cut-off Voltage	3.0V
6.	Charge Current	4.8mA (0.2C)
7.	Maximum Continuous Charge Current	12mA (0.5C)
8.	Max. Discharge Current	24mA

2. Test Item And Conclusion

Item	Standard	Conclusion
Altitude simulation	UN 38.3	Pass
Thermal test		Pass
Vibration		Pass
Shock		Pass
External Short Circuit		Pass
Impact test		Pass
Forced discharge		Pass



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Discipline Name: Electrical		Group Name: Environmental test

Clause	Requirement	Result-Remark	Verdict
38.3.4	PROCEDURE		
38.3.4.1	Test 1: Altitude simulation		
	Test cells and batteries shall be stored at a pressure of 11.6kPa or less for at least six hour at ambient temperature (20±5°C)	In compliance	
	Cells and batteries meet this requirement if there is no mass loss, no leakage, no venting, no disassemble, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.	No leakage, no venting, no disassemble, no rupture and no fire.	P
38.3.4.2	Test 2: Thermal test		
	Test cells and batteries are to be stored for at least six hours at a test temperature equal to 72±2°C, followed by storage for at least six hours at a test temperature equal to -40±2°C. The maximum time interval between test temperature extremes is 30 minutes. This procedure is to be repeated 10 times, after which all test cells and batteries are to be stored for 24 hours at ambient temperature (20±5°C). For large cells and batteries the duration of exposure to the test temperature extremes should be at least 12 hours.	In compliance	
	Cells and batteries meet this requirement if there is no mass loss, no leakage, no venting, no disassemble, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.	No leakage, no venting, no disassemble, no rupture and no fire.	P



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	Group Name: Environmental test

Clause	Requirement	Result-Remark	Verdict
	Test 3: Vibration		
	Cells and batteries are firmly secured to the platform of the vibration machine without distorting the cells in such a manner as to faithfully transmit the vibration. The vibration shall be a sinusoidal waveform with a logarithmic sweep between 7Hz and 200Hz and back to 7Hz traversed in 15 minutes. This cycle shall be repeated 12 times for a total of 3 hours for each of three mutually perpendicular mounting positions of the cell. One of the directions of vibration must be perpendicular to the terminal face.	In compliance	P
38.3.4.3	The logarithmic frequency sweep is as follows: from 7Hz a peak acceleration of 1gn is maintained until 18Hz is reached. The amplitude is then maintained at 0.8mm (1.6mm total excursion) and the frequency increased until a peak acceleration of 8gn occurs (approximately 50Hz). A peak acceleration of 8gn is then maintained until the frequency is increased to 200Hz.	No leakage, no venting, no disassemble, no rupture and no fire.	
	Cells and batteries meet this requirement if there is no mass loss, no leakage, no venting, no disassemble, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.		



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Discipline Name: Electrical	ULR-TC891724000000009F
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Clause	Requirement	Result-Remark	Verdict
38.3.4.4	Test 4: Shock		
	Test cells and batteries shall be secured to the testing machine by means of a rigid mount which will support all mounting surfaces of each test battery. Each cell or battery shall be subjected to a half-sine shock of peak acceleration of 150gn and pulse duration of 6 milliseconds. Each cell or battery shall be subjected to three shocks in the positive direction followed by three shocks in the negative direction of three mutually perpendicular mounting positions of the cell or battery for a total of 18 shocks.	In compliance	
	However, large cells and large batteries shall be subjected to a half-sine shock of peak acceleration of 50gn and pulse duration of 11 milliseconds. Each cell or battery is subjected to three shocks in the positive direction followed by three shocks in the negative direction of each of three mutually perpendicular mounting positions of the cell for a total of 18 shocks.	No leakage, no venting, no disassemble, no rupture and no fire.	P
38.3.4.5	Cells and batteries meet this requirement if there is no mass loss, no leakage, no venting, no disassemble, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.		
	Test 5: External Short Circuit		
	The cell or battery to be tested shall be temperature stabilized so that its external case temperature reaches 55±2°C and then the cell or battery shall be subjected to a short circuit condition with a total external resistance of less than 0.1 ohm at 55±2°C. This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to 55±2°C. The cell or battery must be observed for a further six hours for the test to be concluded.	In compliance	
	Cells and batteries meet this requirement if their external temperature does not exceed 170 °C and there is no disassemble, no rupture and no fire within six hours of this test.	No disassemble no rupture and no fire.	P



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Group Name: Environmental test

Clause	Requirement	Result	Verdict
	Test 6: Impact / Crush		
	Impact (applicable to cylindrical cells not less than 18mm in diameter)	In compliance	
	The Samples cell or component cell is to be placed on a flat smooth surface. A 15.8mm±0.1mm diameter, at least 6cm long, or the longest dimension of the cell, whichever is greater, Type 316 stainless steel bar is to be placed across the centre of the Samples. A 9.1kg±0.1kg mass is to be dropped from a height of 61±2.5cm at the intersection of the bar and Samples in a controlled manner using a near frictionless, vertical sliding track or channel with minimal drag on the falling mass. The vertical track or channel used to guide the falling mass shall be oriented 90 degrees from the horizontal supporting surface	No disassemble, and no fire.	P
38.3.4.6	The test Samples is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8mm±0.1mm diameter curved surface lying across the centre of the test Samples. Each Samples is to be subjected to only a single impact.		
	Cells and component cells meet this requirement if their external temperature does not exceed 170°C and there is no disassemble and no fire during the test and within six hours after this test.		



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Clause	Requirement	Result	Verdict
38.3.4.6	Crush (applicable to prismatic, pouch, coin/button cells and cylindrical cells less than 18mm in diameter) A cell or component cell is to be crushed between two flat surfaces. The crushing is to be gradual with a speed of approximately 1.5cm/s at the first point of contact. The crushing is to be continued until the first of the three options below is reached (a) The applied force reaches 13kN±0.78kN; (b) The voltage of the cell drops by at least 100mV; or (c) The cell is deformed by 50% or more of its original thickness. Once the maximum pressure has been obtained, the voltage drops by 100mV or more, or the cell is deformed by at least 50% of its original thickness, the pressure shall be released. A prismatic or pouch cell shall be crushed by applying the force to the widest side. A button/coin cell shall be crushed by applying the force on its flat surfaces. For cylindrical cells, the crush force shall be applied perpendicular to the longitudinal axis. Each test cell or component cell is to be subjected to one crush only. The test Samples shall be observed for a further 6h. The test shall be conducted using test cells or component cells that have not previously been subjected to other tests. Cells and component cells meet this requirement if their external temperature does not exceed 170 °C and there is no disassemble and no fire during the test and within six hours after this test.	No such construction	N/A



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Clause	Requirement	Result	Verdict
38.3.4.7	Test 7: Overcharge The charge current shall be twice the manufacturer's recommended maximum continuous charge current. The minimum voltage of the test shall be as follows: (a) When the manufacturer's recommended charge voltage is not more than 18V, the minimum voltage of the test shall be the lesser of two times the maximum charge voltage of the battery or 22V. (b) When the manufacturer's recommended charge voltage is more than 18V, the minimum voltage of the test shall be 1.2 times the maximum charge voltage. Tests are to be conducted at ambient temperature; the duration of the test shall be 24 hours.	No such construction	N/A
	Rechargeable batteries meet this requirement if there is no disassemble and no fire during the test and within seven days after the test.		
38.3.4.8	Test 8: Forced discharge Each cell shall be forced discharged at ambient temperature by connecting it in series with a 12 V D.C. power supply at an initial current equal to the maximum discharge current specified by the manufacturer, The specified discharge current is to be obtained by connecting a resistive load of the appropriate size and rating in series with the test cell. Each cell shall be forced discharged for a time interval (in hours) equal to its rated capacity divided by the initial test current (in ampere)	No disassemble, and no fire.	P
	Primary or rechargeable cells meet this requirement if there is no disassemble and no fire during the test and within seven days after the test.		



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Discipline Name: Electrical		Group Name: Environmental test

38.3.4.1	TABLE: Altitude simulation				P
Sample No.	Sample Condition	Voltage Before Test(V)	Weight Before Test(gm)	Voltage After Test(V)	Weight After Test(gm)
1.	A	4.190	0.57	4.188	0.57
2.	A	4.196	0.59	4.194	0.59
3.	A	4.193	0.56	4.191	0.56
4.	A	4.191	0.58	4.188	0.58
5.	A	4.195	0.60	4.192	0.60
6.	B	4.183	0.58	4.181	0.58
7.	B	4.184	0.57	4.180	0.57
8.	B	4.189	0.59	4.186	0.59
9.	B	4.187	0.58	4.185	0.58
10.	B	4.182	0.57	4.180	0.57

Supplementary Information:

Sample Condition A : at first cycle, in fully charged states(5 pcs)

Sample Condition B : after 25th cycles ending in fully charged states(5 pcs)

38.3.4.2	TABLE: Thermal test				P
Sample No.	Sample Condition	Voltage Before Test(V)	Weight Before Test(gm)	Voltage After Test(V)	Weight After Test(gm)
1.	A	4.192	0.59	4.189	0.59
2.	A	4.194	0.57	4.195	0.57
3.	A	4.187	0.58	4.184	0.58
4.	A	4.193	0.56	4.191	0.56
5.	A	4.190	0.57	4.190	0.57
6.	B	4.187	0.56	4.187	0.56
7.	B	4.193	0.58	4.193	0.58
8.	B	4.186	0.57	4.185	0.57
9.	B	4.182	0.59	4.187	0.59
10.	B	4.184	0.57	4.186	0.57

Supplementary Information:

Sample Condition A : at first cycle, in fully charged states(5 pcs)

Sample Condition B : after 25th cycles ending in fully charged states(5 pcs)



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38.3.4.3	TABLE: Vibration				P
Sample No.	Sample Condition	Voltage Before Test(V)	Weight Before Test(gm)	Voltage After Test(V)	Weight After Test(gm)
1.	A	4.196	0.59	4.196	0.59
2.	A	4.195	0.57	4.195	0.57
3.	A	4.198	0.58	4.198	0.58
4.	A	4.189	0.56	4.189	0.56
5.	A	4.193	0.57	4.193	0.57
6.	B	4.195	0.56	4.195	0.56
7.	B	4.188	0.58	4.188	0.58
8.	B	4.193	0.57	4.193	0.57
9.	B	4.192	0.59	4.192	0.59
10	B	4.188	0.57	4.188	0.57

Supplementary Information:

Sample Condition A : at first cycle, in fully charged states(5 pcs)

Sample Condition B : after 25th cycles ending in fully charged states(5 pcs)

38.3.4.4	TABLE: Shock				P
Sample No.	Sample Condition	Voltage Before Test(V)	Weight Before Test(gm)	Voltage After Test(V)	Weight After Test(gm)
1.	A	4.191	0.58	4.191	0.58
2.	A	4.194	0.55	4.194	0.55
3.	A	4.196	0.59	4.196	0.59
4.	A	4.196	0.57	4.196	0.57
5.	A	4.190	0.56	4.190	0.56
6.	B	4.185	0.54	4.185	0.54
7.	B	4.189	0.57	4.189	0.57
8.	B	4.187	0.56	4.187	0.56
9.	B	4.193	0.58	4.193	0.58
10	B	4.196	0.59	4.196	0.59

Supplementary Information:

Sample Condition A : at first cycle, in fully charged states(5 pcs)

Sample Condition B : after 25th cycles ending in fully charged states(5 pcs)



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38.3.4.5	TABLE: EXTERNAL SHORT-CIRCUIT		P
Sample No.	Sample Condition	Maximum Temperature(°C)	Test result
1.	A	66.9	O
2.	A	68.6	O
3.	A	65.7	O
4.	A	67.3	O
5.	A	76.4	O
6.	B	75.8	O
7.	B	68.6	O
8.	B	66.9	O
9.	B	73.5	O
10	B	65.4	O

Supplementary Information:

Sample Condition A : at first cycle, in fully charged states(5 pcs)

Sample Condition B : after 25th cycles ending in fully charged states(5 pcs)

Test result : O-No Disassembly, No Rupture, No Fire / D-Disassembly / R-Rupture / F-Fire

38.3.4.6	TABLE: Impact			P
Sample No.	Sample Condition	Voltage Before Test(V)	Maximum Temperature(°C)	Test result
T6-1	C	3.70	24.3	O
T6-2	C	3.76	24.4	O
T6-3	C	3.83	24.6	O
T6-4	C	3.78	23.4	O
T6-5	C	3.75	23.5	O
T6-6	D	3.77	24.3	O
T6-7	D	3.75	24.6	O
T6-8	D	3.76	23.7	O
T6-9	D	3.74	23.8	O
T6-10	D	3.78	24.6	O

Supplementary Information:

Sample Condition C : at first cycle, in 50% charged states(5 pcs)

Sample Condition D : at 25th cycles in 50% charged states(5 pcs)

Test result : O-No Disassembly, No Rupture, No Fire / D-Disassembly / R-Rupture / F-Fire



(1) The above results are related only to the Tests performed on the product received. Endorsement of product is neither inferred nor implied. (2) This report is not to be reproduced wholly or in part & forbidden to be used as an evidence in the court law & ought not to be used in any advertising media without our special permission in writing. (3) Samples for BIS and other than BIS will be destroyed after 90 days and 15 days respectively from the date of reporting unless otherwise specified. (4) Total liability of Lab is limited to the invoice amount. (5) The NABL Accreditation and BIS recognition claimed is valid only for the scope of accreditation and recognition as on date of the report as mentioned on NABL and BIS Website respectively.



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TEST REPORT

Report No: IEC/23120105	Page 12 of 12
Dated: 04/01/2024	UN38.3
Discipline Name: Electrical	ULR-TC89172400000009F
	Group Name: Environmental test

38.3.4.8	TABLE: FORCED DISCHARGE				P
Sample No.	Sample Condition	Test result	Sample No.	Sample Condition	Test result
T8-1	E	O	T8-11	F	O
T8-2	E	O	T8-12	F	O
T8-3	E	O	T8-13	F	O
T8-4	E	O	T8-14	F	O
T8-5	E	O	T8-15	F	O
T8-6	E	O	T8-16	F	O
T8-7	E	O	T8-17	F	O
T8-8	E	O	T8-18	F	O
T8-9	E	O	T8-19	F	O
T8-10	E	O	T8-20	F	O

Supplementary Information:

Sample Condition E : at first cycle, in fully discharged states(10 pcs)

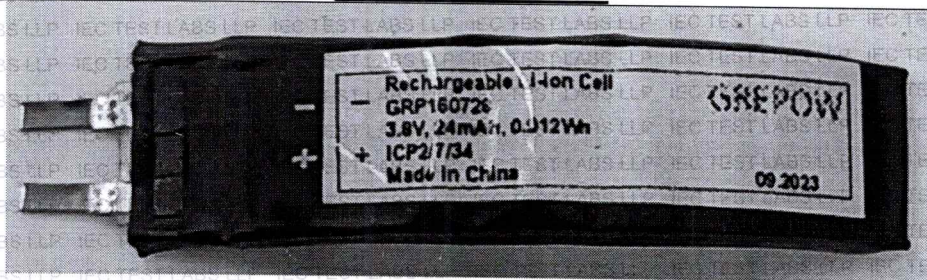
Sample Condition F : after 25th cycles ending in fully discharged states(10 pcs)

Test result : O-No Disassembly, No Rupture, No Fire / D-Disassembly / R-Rupture / F-Fire

ATTACHMENT

Supplement Id	Description
01	Rechargeable Li-ion cell

ATTACHMENT – 1



Battery View

End of Test Report



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