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Master Contract: 304401	Date From: 2 0 2 4 . 3 . 1	Model: 3777AH
Project / Network: 80192227	Date To: 2024.5.22	Description: Lithium-ion battery cell
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Standard(s): ANSI/CAN/UL-1973 (Third Edition, Dated February 25, 2022) - Batteries for Use in Stationary and Motive Auxiliary Power Applications

<b>Testing Laboratory Name:</b>	CCIC-CSA International Certification Co., Ltd. Kunshan Branch
<b>Address:</b>	Building 8, Tsinghua Science Park, No. 1666 Zuchongzhi Rd (S), Kunshan, Jiangsu (215347)
<b>Testing Program:</b>	<b>CB Scheme</b> : CBTL <input type="checkbox"/> , CTF <input type="checkbox"/> Stage: <b>Certification</b> : CSA Lab. <input type="checkbox"/> , WMTC <input checked="" type="checkbox"/> , SMTC <input type="checkbox"/> , CPC <input type="checkbox"/> , Other: <b>Custom Test</b> : Latter of Attestation <input type="checkbox"/> , Testing Only <input type="checkbox"/> Note: Double click on check box and checked

If tests were performed at another facility, then described below:

<b>Testing Laboratory Name:</b>	Nanjing Precise Testing Technology Co., Ltd.
<b>Address:</b>	Building A3, Lishui Intelligent Manufacturing Industrial Park, New Energy Avenue, Lishui District, Nanjing, Jiangsu, P.R.China.
<b>Facility Qualification Number:</b>	N/A

<b>Customer:</b>	As above / or describe otherwise Australia National Power Storage Holding Pty Ltd.
<b>Address:</b>	Chatswood West, Willoughby, New South Wales 2067, Australia

<b>Tested By:</b>	<u>Kangzhicheng</u> Print <u>Kangzhicheng</u> Signature
<input type="checkbox"/> <b>Reviewed by:</b>	<u>Iris Gao</u>
<input type="checkbox"/> <b>Witnessed by:</b>	<u>Iris Gao</u> Signature

Ver 1 – 05/17/2022



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1. Sample Ratings:

Test Model				
Model	3777AH			
Chemistry	LFP			
Cell Configuration	-			
Nominal Capacity	3777Ah			
Nominal Voltage	3.2			
Charging Method	CC-CV			
Charging Current, A	Standard/ Recommended	0.5C=1888.5	Max	0.5C=1888.5
Charging Voltage, Vdc	Standard/ Recommended	3.65	Max	3.7
Charging end condition	Limited Current	0.05C=180A	Time	-
	Other	-		
Discharge Current, A	Standard	0.5C=1888.5	Max	0.5C=1888.5
Discharge cut-off voltage	2.5V			
Nominal Weight	110±0.5KG			
Dimension	1095*203*294			
Upper limit charging temperature of DUT	60°C			
Recommended maximum temperature of cell case	-			
Upper limit charging voltage of cell	3.65			
Operating Temperature	Charge	0-60	Discharge	-30-60
Cell Data sheet:	-			

2. Sample Information:

Sample No.	Date Received (YYYY/MM/DD)	Material No.	Manufacturer, Model No.
NJ242T0001	2024.3.1	-	NPS. Lithium-ion battery cell, model 3777AH
NJ242T0002	2024.3.1	-	
NJ242T0003	2024.3.1	-	
NJ242T0004	2024.3.1	-	
NJ242T0005	2024.3.1	-	
NJ242T0006	2024.3.1	-	
NJ242T0007	2024.3.1	-	
NJ242T0009	2024.3.1	-	
NJ242T0010	2024.3.1	-	
NJ242T0011	2024.3.1	-	

3. Conducting the Test



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3.1. Risk Notification:

**THE TESTING SPECIFIED IN THIS PROCEDURE IS INHERENTLY DANGEROUS**

**DO NOT ATTEMPT TO PERFORM THIS TEST UNLESS YOU HAVE BEEN PROPERLY TRAINED REGARDING SAFELY WORKING WITH THE HAZARDS INVOLVED**

3.2. Important Test Consideration:

- 3.2.1. As some batteries expose in test described above, it is important that personnel be protected from the flying fragments, explosive force, and sudden release of heat, chemical burns, and noise resulting from such explosions. The test area is to be well ventilated to protect personnel from possible harmful fumes or gases.
- 3.2.2. Temperature of the surface of the battery casing shall be monitored during the tests described above. All personnel involved in the testing of batteries are to be instructed never to approach a battery until the surface temperature returns to ambient temperature.
- 3.2.3. Test shall be conducted in separate room or equipped with an adequate safety barrier separating the test area from observer.

3.3. General test setup.

- 3.3.1. Unless indicated otherwise the device under test (DUT) shall be at the maximum operational state of charge (MOSOC), in accordance with the manufacturer’s specifications, for conducting the tests in this standard. After charging and prior to testing, the samples shall be allowed to rest for a maximum period of 8 h at room ambient.
- 3.3.2. All tests, unless noted otherwise, are conducted in a room ambient 25 ±5°C (77 ±9°F). Tests shall be conducted with the DUTs heated to normal operating temperatures unless indicated otherwise in the test. For those tests that require the DUT to reach thermal equilibrium, thermal equilibrium is considered to be achieved if after three consecutive temperature measurements taken at intervals of 10% of the previously elapsed duration of the test but not less than 15 min, indicate no change in temperature greater than ±2°C (3.6°F).
- 3.3.3. Thermocouples shall be attached to the central component cell during testing as per Appendix E of UL 1973. Temperatures shall also be measured on any components affected by temperature in the control circuit during the tests. Temperature shall be measured using thermocouples consisting of wires not larger than 24 AWG (0.21 mm<sup>2</sup>) and not smaller than 30 AWG (0.05 mm<sup>2</sup>) connected to a potentiometer-type instrument. Temperature measurements shall be made with the measuring junction of the thermocouple held tightly against the component/location being measured.
- 3.3.4. Unless noted otherwise in the individual test methods, the tests shall be followed by a 1-h observation time prior to concluding the test and temperatures shall be monitored.
- 3.3.5. As an additional precaution, the temperatures on surfaces of the DUT shall be monitored during all test. **All personnel involved in the testing of battery systems shall be instructed to never approach the DUT until temperatures are falling and are at safe levels (30°C or below)**

Test	Section	Upper Limit Temperature	Lower Limit Temperature	Total Samples Tested
<b>Option 1</b>				



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Test	Section	Upper Limit Temperature	Lower Limit Temperature	Total Samples Tested
Short Circuit	E3	1	1	2
Cell Impact	E4	1	1	2
Drop Impact	E5	---	---	2
Heating	E6	1	1	2
Overcharge	E7	1	1	2
Forced Discharge	E8	---	---	2
Projectile	E9	---	---	2 (4)
<b>Option 2</b>				
Short Circuit	E11.1	---	---	2
Overcharge	E11.2	---	---	2
Crush	E11.3	---	---	2
Impact	E11.4	---	---	2
Shock	E11.5	---	---	2
Vibration	E11.6	---	---	2
Heating	E11.7	---	---	2
Temperature Cycling	E11.8	---	---	2
Low Pressure (Altitude Simulation)	E11.9	---	---	2
Projectile	E11.10	---	---	2 (4)

Note:

1. Refer to individual tests for additional compliance criteria details.
2. The upper limit temperature, lower limit temperature, upper limit charging voltage, maximum charging current, discharge current and end point voltage parameters used for conditioning of cell samples are specified by the cell manufacturer.



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4. Summary of Testing

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)  
 Test Waived: W (Waived)

Possible Non-complaint results:

Explosion: E  
 Fire: F  
 Combustible concentrations: C  
 Toxic Vapor release: V  
 Electrical shock hazard: S  
 Electrolyte leakage (External to enclosure): L  
 Rupture: R  
 Loss of Protection control: P  
 Other (specify)

Section	Test	Verdict	Comment	Non - Compliance Result
<b>Option 1</b>				
E3	Short Circuit			
E4	Cell Impact			
E5	Drop Impact			
E6	Heating			
E7	Overcharge			
E8	Forced Discharge			
E9	Projectile			
<b>Option 2</b>				
E11.1	Short Circuit	_____	_____	_____
E11.2	Overcharge	_____	_____	_____
E11.3	Crush	_____	_____	_____
E11.4	Impact	_____	_____	_____
E11.5	Shock	_____	_____	_____
E11.6	Vibration	_____	_____	_____
E11.7	Heating	_____	_____	_____
E11.8	Temperature Cycling	_____	_____	_____
E11.9	Low Pressure (Altitude Simulation)	_____	_____	_____
E11.10	Projectile	_____	_____	_____

5. Test

Sample Capacity Check:



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Prior to conducting testing, cells shall be tested for capacity check.

Cell Type (Lithium Ion/Lithium Metal): Lithium Ion

<b>Capacity Check Step:</b>
Required Ambient Temperature: 25°C ± 5°C
Step 1: Discharge cell at constant current (0.2C): 755.4 A, down to a specified end of discharge voltage: 2.5 V.
Step 2: Charge cell at charging parameter specified by manufacturer Charging Parameter Charge Voltage (V): 3.65 Charge Current (A): 1888.5 Charge End Condition (A): 180A
Step 3: Minimum time to allow stabilize at room temperature (Hour): 20min
Step 4: Discharge cell at constant current 1888.5 A, down to a specified end of discharge voltage: 2.5 V. Step 5: Record duration of the discharge during step 4 and calculate capacity of the cell up to three significant figures.
Calculated Capacity(Ahr):  (Discharge Current value in step 4 X Duration of discharge during step 4 in Sec)/3600
Recorded Ambient Temperature: 23.0°C to 26.0°C

Sample ID	Required Rated Capacity (Ahr)	Duration of the discharge during step 4 (Sec)	Calculated Capacity (Ahr)
NJ242T0001	3777	2h15s	3785.3
NJ242T0002	3777	2h10s	3782.7

**Sample Preconditioning:**

Samples of secondary lithium cells other than lithium ion shall be subjected to charge/discharge cycling as outlined in UL 1973 3<sup>rd</sup> edition, Section 2.1.2 prior to testing.

UL 1973 charge discharge cycling required (Yes/No):

Ambient Temperature: to



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Room Ambient Temperature Conditioning: 20 to 30

Charge	Discharge
Charge Voltage: 3.65Vdc Charge Current: 1888.5A Charge End Condition: 180A	Discharge Current: 1888.5A Discharge End Condition: 2.5Vdc

Upper Limit Ambient Temperature Conditioning: 60

Charge	Discharge
Charge Voltage: 3.65Vdc Charge Current: 1888.5A Charge End Condition: 180A	Discharge Current: 1888.5A Discharge End Condition: 2.5Vdc

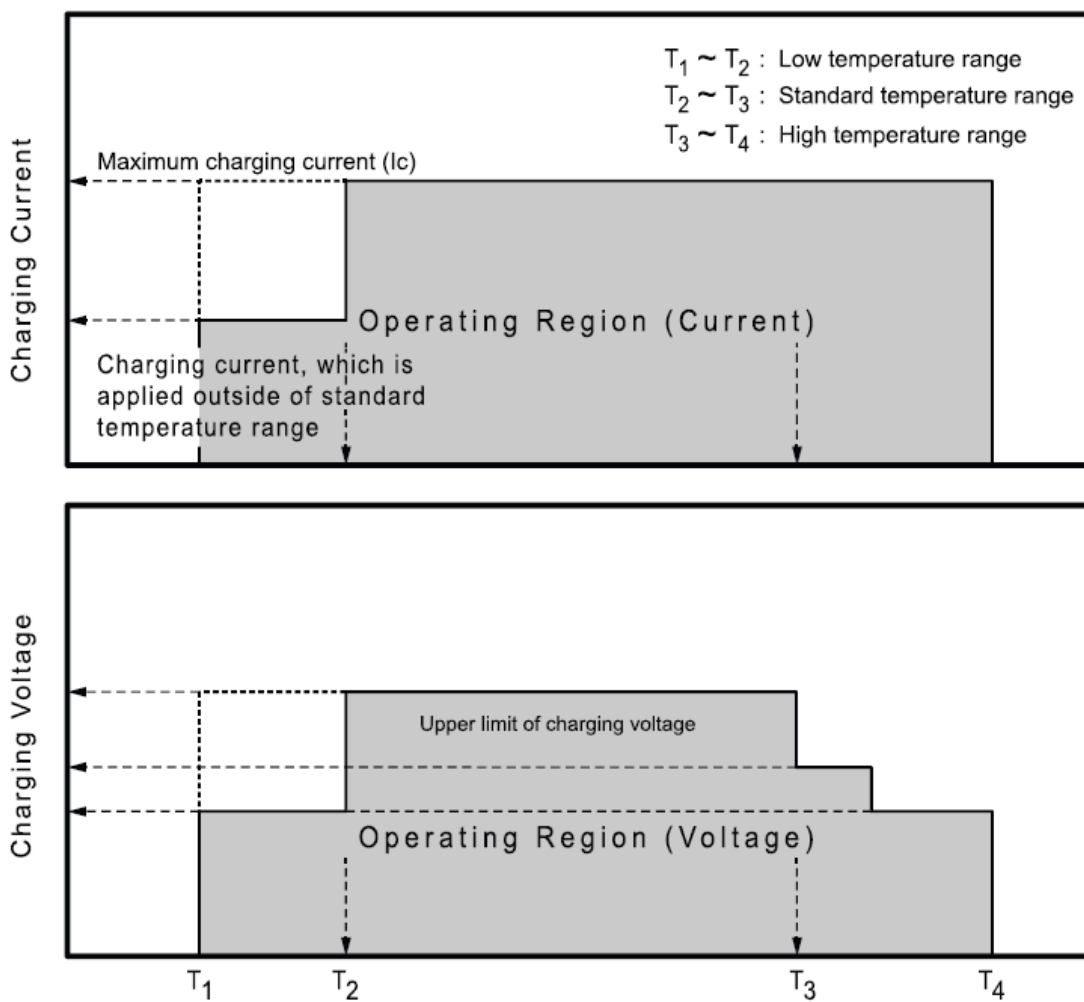
Lower Limit Ambient Temperature Conditioning: 0

Charge	Discharge
Charge Voltage: 3.65Vdc Charge Current: 1888.5A Charge End Condition: 180A	Discharge Current: 1888.5A Discharge End Condition: 2.5Vdc

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**Figure 3.1**  
**Diagram representing an example of a cell operating region**  
 (from the Battery Association of Japan)



Sample Conditioning		
Model/ Sample No.	Charging Condition	Comment
NJ242T0001	B	
NJ242T0002	A	





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NJ242T0003	B	
NJ242T0004	A	
NJ242T0005	B	
NJ242T0006	A	
NJ242T0007	C	
NJ242T0011	C	
NJ242T0009	B	
NJ242T0010	A	

Supplementary information:

Charging Condition:

- A: Sample are in fully charge state. Charge at upper limit ambient temperature
- B: Sample are in fully charge state. Charge at lower limit ambient temperature
- C: Sample are in fully charge state. Charge at room ambient temperature

Equipment Used: Item no. [See Table F below](#)

Date Start: 2024.3.1 (YY/MM/DD)

Date End: 2024.5.21 (YY/MM/DD)

Performed by: [Junhao Li](#)



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5.1. Section E3 - Short Circuit Test

Section E3	TABLE: Short Circuit Test					P
Sample No	Sample Condition	Open Circuit Voltage of DUT before test (Vdc)	Measured External Resistance (mΩ)	External resistance application duration (HH:MM)	Max cell surface temperature (°C)	Comments
NJ242T0006	A	3.480	19.920	7H	30.3	-
NJ242T0005	B	3.338	19.959	7H	27.8	-

Supplementary information:

Sample Condition:

A: Sample are in fully charge state. Charge at upper limit ambient temperature

B: Sample are in fully charge state. Charge at lower limit ambient temperature

C: Sample are in fully charge state. Charge at room ambient temperature

Following results observed.

Result:	(Yes/No)
Explosion:	No
Fire:	No
Other (specify): N/A	

Ambient Temperature(°C): 20.0°C to 26.0°C

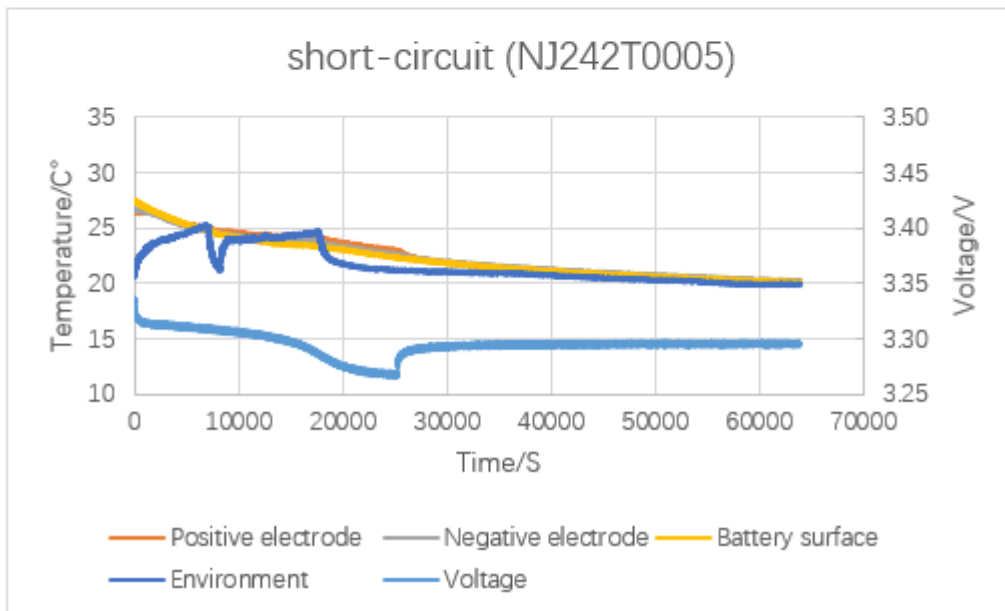
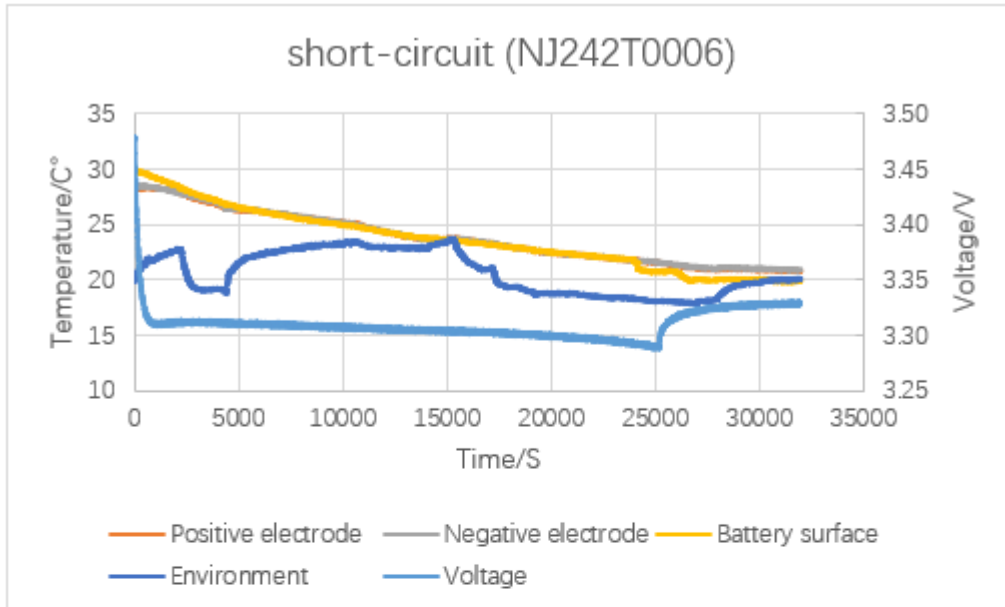
Equipment Used: Item no. See Table A below

Date Start: 2024.3.14 (YY/MM/DD)

Date End: 2024.3.19 (YY/MM/DD)

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5.2. Section E4 - Cell Impact

Section E4	TABLE: Cell Impact				P
Sample No	Sample Condition	Open Circuit Voltage of DUT before test (Vdc)	Distance weight dropped from (cm)	Max cell surface temperature (°C)	Comments
NJ242T0002	A	3.592	61	22.8	-
NJ242T0001	B	3.336	61	22.2	-

Supplementary information:

Sample Condition:

A: Sample are in fully charge state. Charge at upper limit ambient temperature

B: Sample are in fully charge state. Charge at lower limit ambient temperature

C: Sample are in fully charge state. Charge at room ambient temperature

Following results observed.

Result:	(Yes/No)
Explosion:	No
Fire:	No
Other (specify): N/A	

Ambient Temperature(°C): 20.0°C to 23.0°C

Equipment Used: Item no. See Table B below

Date Start: 2024.3.6 (YY/MM/DD)

Date End: 2024.3.6 (YY/MM/DD)



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**5.3. Section E5 - Drop Impact**

Section E5		TABLE: Drop Impact			P
Sample No	Sample Condition	Open Circuit Voltage of DUT before test (Vdc)	Distance DUT dropped from (m)	DUT Orientation	Comments
NJ242T0007	C	3.444	1	Bottom	-
NJ242T0011	C	3.444	1	Bottom	-

**Supplementary information:**

Sample Condition:

A: Sample are in fully charge state. Charge at upper limit ambient temperature

B: Sample are in fully charge state. Charge at lower limit ambient temperature

C: Sample are in fully charge state. Charge at room ambient temperature

Following results observed.

Result:	(Yes/No)
Explosion:	No
Fire:	No
Other (specify): N/A	

Ambient Temperature(°C): 25.0°C to 28.0°C

Equipment Used: Item no. See Table C below

Date Start: 2024.5.20 (YY/MM/DD)

Date End: 2024.5.22 (YY/MM/DD)



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**5.4. Section E6 – Heating**

Section E6		TABLE: Heating			P
Sample No	Sample Condition	Open Circuit Voltage of DUT before test (Vdc)	Measured Oven Temperature (°C)	Duration (Min)	Comments
NJ242T0010	A	3.499	129.7	30	-
NJ242T0009	B	3.404	130	30	-

**Supplementary information:**

Sample Condition:

A: Sample are in fully charge state. Charge at upper limit ambient temperature

B: Sample are in fully charge state. Charge at lower limit ambient temperature

C: Sample are in fully charge state. Charge at room ambient temperature

Following results observed.

Result:	(Yes/No)
Explosion:	No
Fire:	No
Other (specify): N/A	

Ambient Temperature(°C): 25.0°C to 26.0°C

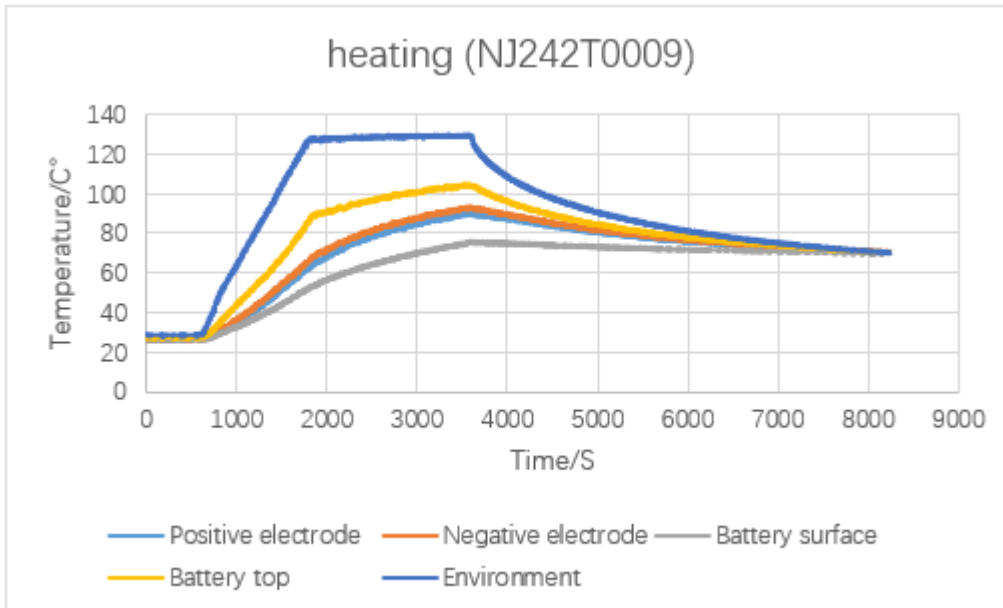
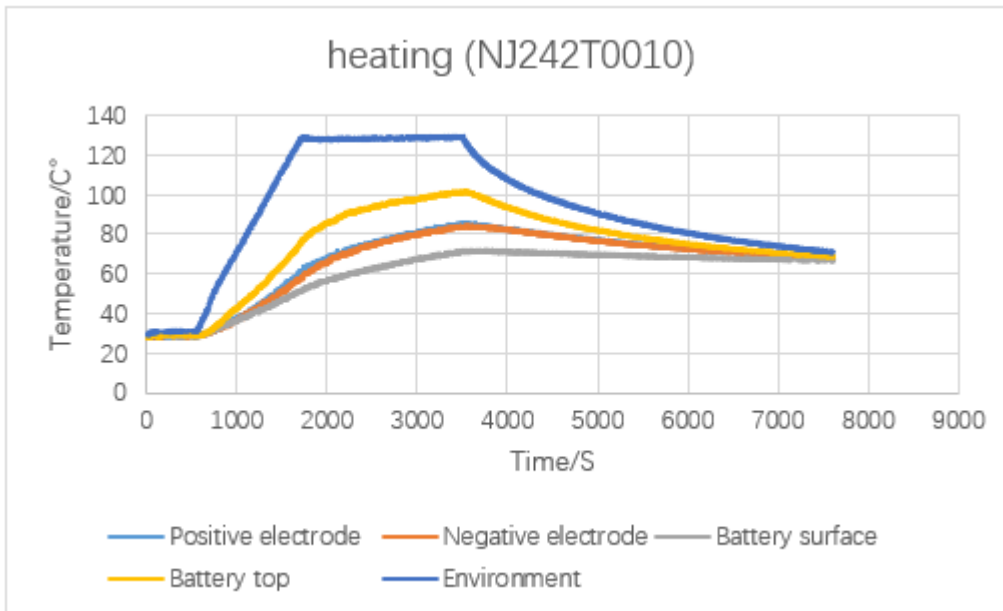
Equipment Used: Item no. See Table D below

Date Start: 2024.5.21 (YY/MM/DD)

Date End: 2024.5.21 (YY/MM/DD)

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5.5. Section E7 - Overcharge

Section E7	TABLE: Overcharge				P
Sample No	Sample Condition	Charge Current (A)	Overcharge end condition (Condition 1 or 2)	Max cell surface temperature (°C)	Comments
NJ242T0004	A	1888.5	Condition 1	41.3	-
NJ242T0003	B	1888.5	Condition 1	36.5	-

Supplementary information:

Sample Condition:

A: Sample are in fully charge state. Charge at upper limit ambient temperature

B: Sample are in fully charge state. Charge at lower limit ambient temperature

C: Sample are in fully charge state. Charge at room ambient temperature

Note: Fully charged sample discharged at 1888.5 A in accordance with manufacturer specification down to 2.5V (End point Voltage)

Overcharge end condition

Condition 1: 120% of maximum specified charge voltage: 1.2 X 3.7 = 4.44V

Condition 2: 130% of state of charge: 1.3 X 3777 = 4910.1 Ahr

Following results observed.

Result:	(Yes/No)
Explosion:	No
Fire:	No
Other (specify): N/A	

Ambient Temperature(°C): 20.0°C to 21.0°C

Equipment Used: Item no. See Table E below

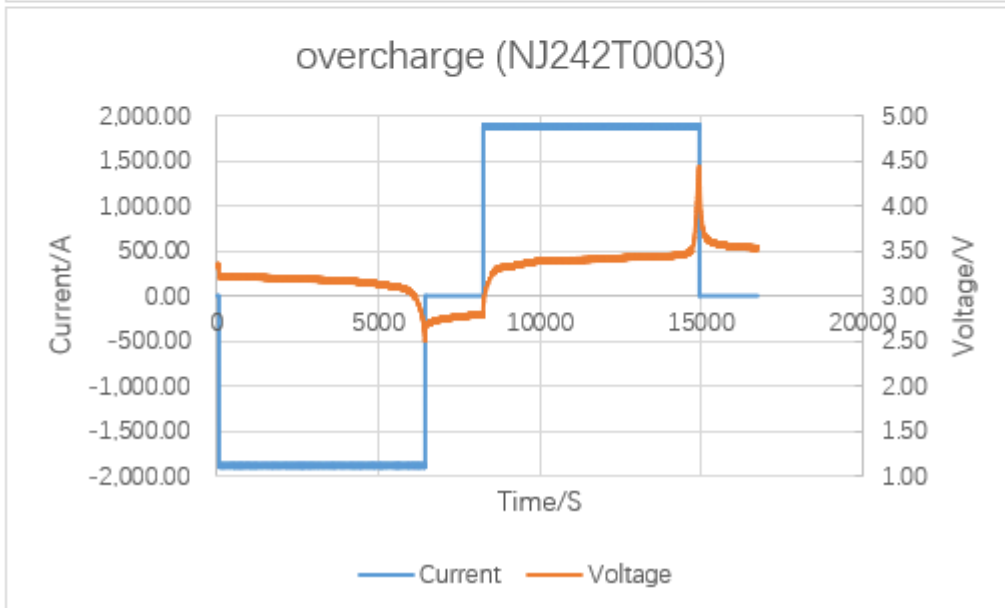
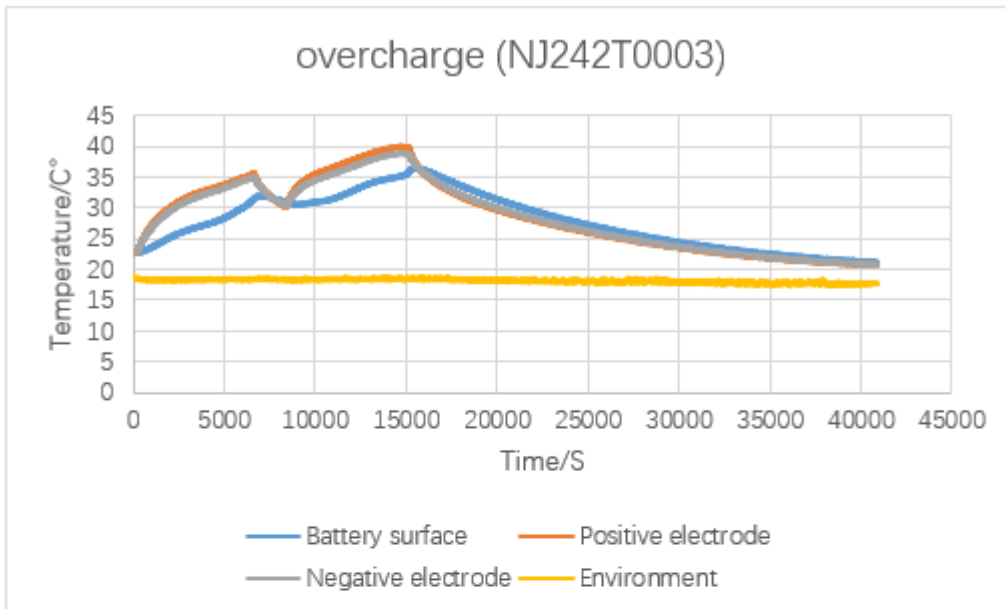
Date Start: 2024.3.12 (YY/MM/DD)

Date End: 2024.3.13 (YY/MM/DD)



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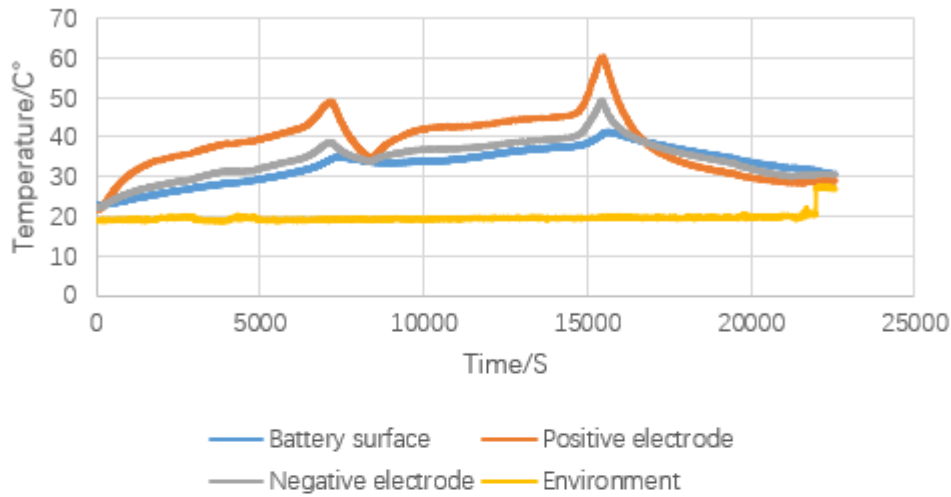
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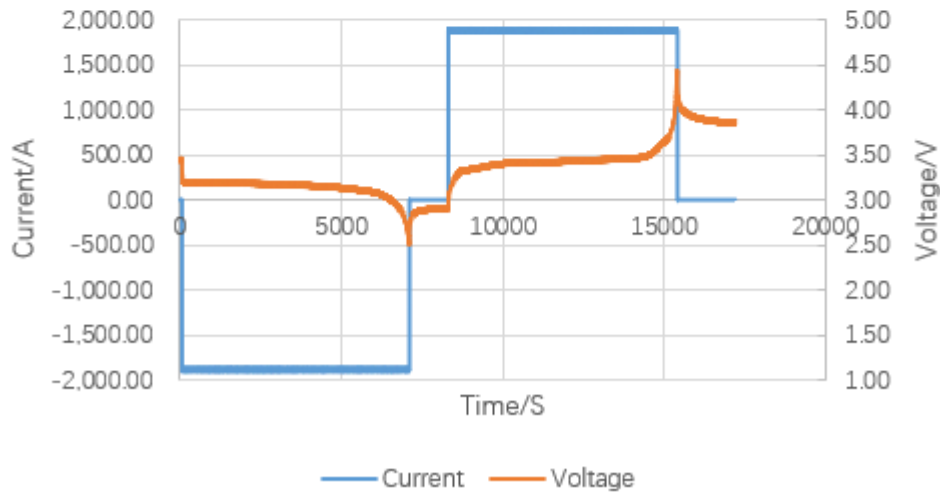
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overcharge (NJ242T0004)



overcharge (NJ242T0004)





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5.6. Section E8 - Forced Discharge 待定-在客户那边测试

Section E8	TABLE: Forced Discharge					_____
Sample No	Sample Condition	Discharge Current (A)	Upper Limit Charging Voltage of DUT (Vdc):	Forced discharge end condition (Condition 1 or 2)	Max cell surface temperature (°C)	Comments
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____

Supplementary information:

Sample Condition:

A: Sample are in fully charge state. Charge at upper limit ambient temperature

B: Sample are in fully charge state. Charge at lower limit ambient temperature

C: Sample are in fully charge state. Charge at room ambient temperature

Note: Fully charged sample discharged at \_\_\_\_\_ A in accordance with manufacturer specification down to \_\_\_\_\_ V (End point Voltage)

Overcharge end condition

Condition 1: Voltage limit not to exceed the numerical value of the upper limit charging voltage specified for the cell.

Condition 2: Voltage limit is reached before the 90 min, cell discharged at a constant voltage discharge equal to the manufacturer's determined low voltage cutoff, with the current decreasing as necessary until the 90-min time period is reached.

Following results observed:

Result:	(Yes/No)
Explosion:	_____
Fire:	_____
Other (specify): _____	

Ambient Temperature(°C): \_\_\_\_\_ to \_\_\_\_\_

Equipment Used: Item no. \_\_\_\_\_

Date Start: \_\_\_\_\_ (YY/MM/DD)

Date End: \_\_\_\_\_ (YY/MM/DD)



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5.7. Section E9 – Projectile-待定

Section E9	TABLE: Projectile			_____
Sample No	Sample Condition	Open Circuit Voltage of DUT before test (Vdc)	Distance from Test screen to the cell in any direction (MM)	Comments
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Supplementary information:

Sample Condition:

A: Sample are in fully charge state. Charge at upper limit ambient temperature

B: Sample are in fully charge state. Charge at lower limit ambient temperature

C: Sample are in fully charge state. Charge at room ambient temperature

Following results observed:

Result:	(Yes/No)
Explosion of the cells resulting in projectiles with sufficient force to penetrate the test cage screen	_____
Other (specify): _____	

Ambient Temperature(°C): \_\_\_\_\_ to \_\_\_\_\_

Equipment Used: Item no. \_\_\_\_\_

Date Start: \_\_\_\_\_ (YY/MM/DD)

Date End: \_\_\_\_\_ (YY/MM/DD)



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Master Contract: 304401	Date From: 2 0 2 4 . 3 . 1	Model: 3777AH
Project / Network: 80192227	Date To: 2024.5.22	Description: Lithium-ion battery cell
Page number 21 of 32	Test record number:	

**6. Test Equipment:**

Item No.	Inventory Code / ID	Description	Manufacturer	Model	Range Used	Calibration Date (YYYY-MM-DD)	Next Calibration Due Date (YYYY-MM-DD)
<b>Table A. Short circuit test</b>							
1	LABWSD-020	Digital hygrograph	YNGDO	288-CTH	Temperature: -50°C ~+70°C Humidity: 10%~99%RH	2023-7-30	2024-7-29
2	LABDXY-007	Battery tester	KEXIN	BT3563A	Resistance: 0~3Ω Voltage: 0~450V	2023-7-19	2024-7-18
3	LABDLY-011	Battery pack short-circuit testing machine	GAOXIN	GX-6055-10000C	Short circuit current: 10000A (maximum through current 11000A) Resistance: 2mΩ-120mΩ	2023-8-18	2024-8-17



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Master Contract: 304401	Date From: 2 0 2 4 . 3 . 1	Model: 3777AH
Project / Network: 80192227	Date To: 2024.5.22	Description: Lithium-ion battery cell
Page number 22 of 32	Test record number:	

Item No.	Inventory Code / ID	Description	Manufacturer	Model	Range Used	Calibration Date (YYYY-MM-DD)	Next Calibration Due Date (YYYY-MM-DD)
----------	---------------------	-------------	--------------	-------	------------	----------------------------------	---

Table A. Short circuit test

					adjust able		
4	LABCJQ-085	High frequency acquisition equipment	Gantner	POWER-HS	Voltage: 0-1200V (2ch) 0-60V(2 pcs-16ch) ) 0.08V-2.4V(2 ch) Temperature: -100°C (4pcs-32ch) ) Auxiliary function: low voltage switching power supply 12V(2 ch)、24V(1 ch)	2023-8-17	2024-8-16
5	LABRDO-007	thermocouple	JINGYI	TI-30-1000	Temperature:	2024-2-26	2024-8-25



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Master Contract: 304401	Date From: 2 0 2 4 . 3 . 1	Model: 3777AH
Project / Network: 80192227	Date To: 2024.5.22	Description: Lithium-ion battery cell
Page number 23 of 32	Test record number:	

Item No.	Inventory Code / ID	Description	Manufacturer	Model	Range Used	Calibration Date (YYYY-MM-DD)	Next Calibration Due Date (YYYY-MM-DD)
----------	---------------------	-------------	--------------	-------	------------	----------------------------------	---

**Table A. Short circuit test**

					- 50~20 0°C		
--	--	--	--	--	-------------------	--	--

**Table B. Cell Impact t test**

1	LABWSD-020	Digital hygrograph	YNGDO	288-CTH	Temperature: -50°C ~+70°C Humidness: 10%~99%RH	2023-7-30	2024-7-29
2	LABDX-007	Battery tester	KEXIN	BT3563A	Resistance: 0~3Ω Voltage: 0~450V	2023-7-19	2024-7-18
3	LABTGQ-001	3T electric decoupling device	Yangzhou LEILISI	TGQ-3-WD	Maximum safe load 3 tons	calibration-free	calibration-free
4	LABDC-002	All-electric single-arm crane	RUILI	FSC1000	200KG~1000KG	calibration-free	calibration-free
5	LABCJQ-102	Data acquisition instrument	KEXIN	LR8450	Measuring range: ±10mV; ±100mV; ±10V; ±100V	2023-7-25	2024-7-24



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Master Contract: 304401	Date From: 2 0 2 4 . 3 . 1	Model: 3777AH
Project / Network: 80192227	Date To: 2024.5.22	Description: Lithium-ion battery cell
Page number 24 of 32	Test record number:	

Item No.	Inventory Code / ID	Description	Manufacturer	Model	Range Used	Calibration Date (YYYY-MM-DD)	Next Calibration Due Date (YYYY-MM-DD)
----------	---------------------	-------------	--------------	-------	------------	----------------------------------	---

**Table A. Short circuit test**

					Voltage: 10mV ~100V Temperature: -40 °C ~150 °C		
6	LABRDO-007	thermocouple	JINGYI	TI-30-1000	Temperature: - 50~20 0°C	2024-2-26	2024-8-25
7	LABGJC-009	Tape measure	STANLEY	30-628	0~8m	2023-8-2	2024-8-1

**Table C. Drop Impact test**

1	LABWSD-020	Digital hygograph	YNGDO	288-CTH	Temperature: - 50°C ~+70 °C Humidness: : 10%~ 99%RH	2023-7-30	2024-7-29
2	LABDX-007	Battery tester	KEXIN	BT3563 A	Resistance: 0~3 Ω Voltage:0~ 450V	2023-7-19	2024-7-18





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Master Contract: 304401	Date From: 2 0 2 4 . 3 . 1	Model: 3777AH
Project / Network: 80192227	Date To: 2024.5.22	Description: Lithium-ion battery cell
Page number 25 of 32	Test record number:	

Item No.	Inventory Code / ID	Description	Manufacturer	Model	Range Used	Calibration Date (YYYY-MM-DD)	Next Calibration Due Date (YYYY-MM-DD)
----------	---------------------	-------------	--------------	-------	------------	----------------------------------	---

Table A. Short circuit test

3	LABTGQ-001	3T electric decoupling device	Yangzhou LEILISI	TGQ-3-WD	Maximum safe load 3 tons	calibration-free	calibration-free
4	LABDC-002	All-electric single-arm crane	RUILI	FSC1000	200KG~1000KG	calibration-free	calibration-free
5	LABCJQ-102	Data acquisition instrument	KEXIN	LR8450	Measuring range: ±10mV; ±100mV; ±10V; ±100V Voltage: 10mV~100V Temperature: -40℃~150℃	2023-7-25	2024-7-24
6	LABRDO-007	thermocouple	JINGYI	TI-30-1000	Temperature: -50~200℃	2024-2-26	2024-8-25
7	LABGJC-009	Tape measure	STANLEY	30-628	0~8m	2023-8-2	2024-8-1

Table D. Heating test

1	LABWSD-020	Digital hygroph	YNGDO	288-CTH	Temperature: -50℃	2023-7-30	2024-7-29
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Master Contract: 304401	Date From: 2 0 2 4 . 3 . 1	Model: 3777AH
Project / Network: 80192227	Date To: 2024.5.22	Description: Lithium-ion battery cell
Page number 26 of 32	Test record number:	

Item No.	Inventory Code / ID	Description	Manufacturer	Model	Range Used	Calibration Date (YYYY-MM-DD)	Next Calibration Due Date (YYYY-MM-DD)
<b>Table A. Short circuit test</b>							
					~+70 °C Humid ness : 10%~ 99%R H		
2	LABDXY-007	Battery tester	KEXIN	BT3563 A	Resist ance: 0~3 Ω Volutag e:0~ 450V	2023-7-19	2024-7-18
3	LABGWX-027	Programmable high temperature test chamber	DINGZHUN	HT-1000BS W	Temp eratur e range: RT+1 0°C ~ 200°C; Temp eratur e rise 5°C /min (RT~1 80° C linear, load 20kg steel) Temp eratur e overs hoot ≤3°C;	2024-4-11	2025-4-10



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Master Contract: 304401	Date From: 2 0 2 4 . 3 . 1	Model: 3777AH
Project / Network: 80192227	Date To: 2024.5.22	Description: Lithium-ion battery cell
Page number 27 of 32	Test record number:	

Item No.	Inventory Code / ID	Description	Manufacturer	Model	Range Used	Calibration Date (YYYY-MM-DD)	Next Calibration Due Date (YYYY-MM-DD)
<b>Table A. Short circuit test</b>							
4	LABCJQ-083	High frequency acquisition equipment	Gantner	POWER-HS	Voltag e:-0- 1200V (2ch) 0- 60V(2 pcs- 16ch ) 0.08V- 2.4V(2 ch) Temp eratur e: - 100°C -1000 °C ( 4pcs- 32ch ) Auxilia ry functio n: low voltag e switch ing power supply 12V(2 ch), 24V(1 ch)	2023-8-18	2024-8-17
5	LABRDO-007	thermocouple	JINGYI	TI-30-1000	Temp eratur e:	2024-2-26	2024-8-25



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Master Contract: 304401	Date From: 2 0 2 4 . 3 . 1	Model: 3777AH
Project / Network: 80192227	Date To: 2024.5.22	Description: Lithium-ion battery cell
Page number 28 of 32	Test record number:	

Item No.	Inventory Code / ID	Description	Manufacturer	Model	Range Used	Calibration Date (YYYY-MM-DD)	Next Calibration Due Date (YYYY-MM-DD)
----------	---------------------	-------------	--------------	-------	------------	----------------------------------	---

**Table A. Short circuit test**

					- 50~20 0°C		
--	--	--	--	--	-------------------	--	--

**Table E. Overcharge test**

1	LABWSD-020	Digital hygrograph	YNGDO	288-CTH	Temperat e: - 50°C ~+70 °C Humid ness : 10%~ 99%R H	2023-7-30	2024-7-29
2	LABDXY-007	Battery tester	KEXIN	BT3563 A	Resist ance: 0~3 Ω Volutag e:0~ 450V	2023-7-19	2024-7-18
3	LABJYT-011	Power battery module negative pressure test system	Stropower	MTN-150-600-2ISO	Volutag e:-40- 150V Curre nt:± 600A Ripple injecti on: Frequ ency: 20Hz- 1KHz Temp eratur e:-40- 200°C	2023-7-19	2024-7-18



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Master Contract: 304401	Date From: 2 0 2 4 . 3 . 1	Model: 3777AH
Project / Network: 80192227	Date To: 2024.5.22	Description: Lithium-ion battery cell
Page number 29 of 32	Test record number:	

Item No.	Inventory Code / ID	Description	Manufacturer	Model	Range Used	Calibration Date (YYYY-MM-DD)	Next Calibration Due Date (YYYY-MM-DD)
----------	---------------------	-------------	--------------	-------	------------	----------------------------------	---

Table A. Short circuit test

					(24CH )		
4	LABCJQ-080	High frequency acquisition equipment	Gantner	POWER-HS	Voltage:0-1200V (2ch) 0-60V(2 pcs-16ch ) 0.08V-2.4V(2 ch) Temperature:-100 °C-1000 °C ( 4pcs-32ch ) Auxiliary function: low voltage switching power supply 12V(2 ch)、24V(1 ch)	2023-8-18	2024-8-17
5	LABRDO-007	thermocouple	JINGYI	TI-30-1000	Temperature:	2024-2-26	2024-8-25



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Master Contract: 304401	Date From: 2 0 2 4 . 3 . 1	Model: 3777AH
Project / Network: 80192227	Date To: 2024.5.22	Description: Lithium-ion battery cell
Page number 30 of 32	Test record number:	

Item No.	Inventory Code / ID	Description	Manufacturer	Model	Range Used	Calibration Date (YYYY-MM-DD)	Next Calibration Due Date (YYYY-MM-DD)
----------	---------------------	-------------	--------------	-------	------------	-------------------------------	--

Table A. Short circuit test

					- 50~20 0°C		
--	--	--	--	--	-------------------	--	--

Table F. Preconditioning

1	LABJCG-287	Battery charging and discharging cabinet	NEWARE	CE-6008n-6V600A-H	Voltage: 30mV ~6V; Minimum discharge voltage: 2V Output current: 3A~600A Constant voltage cut-off current: 1.2A Auxiliary temperature: -40 ~ 220°C (32ch) Auxiliary voltage: 0 ~ 5V(32ch)	2024-04-20	2025-04-19
---	------------	--	--------	-------------------	---	------------	------------



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Master Contract: 304401	Date From: 2 0 2 4 . 3 . 1	Model: 3777AH
Project / Network: 80192227	Date To: 2024.5.22	Description: Lithium-ion battery cell
Page number 31 of 32	Test record number:	

Item No.	Inventory Code / ID	Description	Manufacturer	Model	Range Used	Calibration Date (YYYY-MM-DD)	Next Calibration Due Date (YYYY-MM-DD)
----------	---------------------	-------------	--------------	-------	------------	----------------------------------	---

Table A. Short circuit test

2	LABJCG-288	Battery charging and discharging cabinet	NEWARE	CE-6008n-6V600A-H	Voltage: 30mV ~ 6V; Minimum discharge voltage: 2V Output current: 3A~600A Constant voltage cut-off current: 1.2A Auxiliary temperature: -40 ~ 220°C (32ch) Auxiliary voltage: 0 ~ 5V(32ch)	2024-4-9	2025-4-8
3	LABGDW-150	High and low temperature test chamber	TOMILO	TON-B2000E XL	Temperature: -40 °C	2024-4-17	2025-4-16



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Master Contract: 304401	Date From: 2 0 2 4 . 3 . 1	Model: 3777AH
Project / Network: 80192227	Date To: 2024.5.22	Description: Lithium-ion battery cell
Page number 32 of 32	Test record number:	

Item No.	Inventory Code / ID	Description	Manufacturer	Model	Range Used	Calibration Date (YYYY-MM-DD)	Next Calibration Due Date (YYYY-MM-DD)
<b>Table A. Short circuit test</b>							
					~+150 °C		
4	LABGDW-165	High and low temperature test chamber	TOMILO	TON-B1050E XL	Temperature: -40 °C ~+150 °C	2024-4-10	2025-4-9
5	LABRDO-007	thermocouple	JINGYI	TI-30-1000	Temperature: -50~20 0°C	2024-2-26	2024-8-25

End of this test data...





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Master Contract: 304401	Date From: 2024.03.01	Model: 3777AH
Project / Network: 80192227	Date To: 2024.06.07	Description: Lithium-ion battery cell
Page number 1 of 9	Test record number:	

Standard(s): ANSI/CAN/UL-1973 (Third Edition, Dated February 25, 2022) - Batteries for Use in Stationary and Motive Auxiliary Power Applications

**Testing Laboratory Name:** CCIC-CSA International Certification Co., Ltd. Kunshan Branch

**Address:** Building 8, Tsinghua Science Park, No. 1666 Zuchongzhi Rd (S), Kunshan, Jiangsu (215347)

**Testing Program:**      **CB Scheme** : CBTL , CTF  Stage:  
**Certification** : CSA Lab. , WMTC , SMTC , CPC , Other:  
**Custom Test** : Latter of Attestation , Testing Only

Note: Double click on check box and checked

If tests were performed at another facility, then described below:

**Testing Laboratory Name:** Shaanxi Baobao Energy Storage Technology Co., Ltd

**Address:** Xinfeng Street, Lintong District, No. 2, Xinfeng Xitong Road xian , Shaanxi 710000

**Facility Qualification Number:** N/A

**Customer:** As above / or describe otherwise  
Australia National Power Storage Holding Pty Ltd.

**Address:** Chatswood West, Willoughby, New South Wales 2067, Australia

**Tested By:** Tengfei Zhai  
Print  
Tengfei Zhai  
Signature

**Reviewed by:** Iris Gao

**Witnessed by:** Print  
Iris Gao  
Signature

Ver 1 – 05/17/2022



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Master Contract: 304401	Date From: 2024.03.01	Model: 3777AH
Project / Network: 80192227	Date To: 2024.06.07	Description: Lithium-ion battery cell
Page number 2 of 9	Test record number:	

1. Sample Ratings:

Test Model				
Model	3777AH			
Chemistry	LFP			
Cell Configuration	-			
Nominal Capacity	3777Ah			
Nominal Voltage	3.2			
Charging Method	CC-CV			
Charging Current, A	Standard/ Recommended	0.5C=1888.5	Max	0.5C=1888.5
Charging Voltage, Vdc	Standard/ Recommended	3.65	Max	3.7
Charging end condition	Limited Current	0.05C=180A	Time	-
	Other	-		
Discharge Current, A	Standard	0.5C=1888.5	Max	0.5C=1888.5
Discharge cut-off voltage	2.5V			
Nominal Weight	110±0.5KG			
Dimension	1095*203*294			
Upper limit charging temperature of DUT	60°C			
Recommended maximum temperature of cell case	-			
Upper limit charging voltage of cell	3.65			
Operating Temperature	Charge	0-60	Discharge	-30-60
Cell Data sheet:	-			

2. Sample Information:

Sample No.	Date Received (YYYY/MM/DD)	Material No.	Manufacturer, Model No.
1	2024-03-01	-	NPS. Lithium-ion battery cell, model 3777AH
2	2024-03-01	-	

3. Conducting the Test

3.1. Risk Notification:

**THE TESTING SPECIFIED IN THIS PROCEDURE IS INHERENTLY DANGEROUS**

**DO NOT ATTEMPT TO PERFORM THIS TEST UNLESS YOU HAVE BEEN PROPERLY TRAINED REGARDING SAFELY WORKING WITH THE HAZARDS INVOLVED**

3.2. Important Test Consideration:



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Master Contract: 304401	Date From: 2024.03.01	Model: 3777AH
Project / Network: 80192227	Date To: 2024.06.07	Description: Lithium-ion battery cell
Page number 3 of 9	Test record number:	

- 3.2.1. As some batteries expose in test described above, it is important that personnel be protected from the flying fragments, explosive force, and sudden release of heat, chemical burns, and noise resulting from such explosions. The test area is to be well ventilated to protect personnel from possible harmful fumes or gases.
- 3.2.2. Temperature of the surface of the battery casing shall be monitored during the tests described above. All personnel involved in the testing of batteries are to be instructed never to approach a battery until the surface temperature returns to ambient temperature.
- 3.2.3. Test shall be conducted in separate room or equipped with an adequate safety barrier separating the test area from observer.

**3.3. General test setup.**

- 3.3.1. Unless indicated otherwise the device under test (DUT) shall be at the maximum operational state of charge (MOSOC), in accordance with the manufacturer’s specifications, for conducting the tests in this standard. After charging and prior to testing, the samples shall be allowed to rest for a maximum period of 8 h at room ambient.
- 3.3.2. All tests, unless noted otherwise, are conducted in a room ambient 25 ±5°C (77 ±9°F). Tests shall be conducted with the DUTs heated to normal operating temperatures unless indicated otherwise in the test. For those tests that require the DUT to reach thermal equilibrium, thermal equilibrium is considered to be achieved if after three consecutive temperature measurements taken at intervals of 10% of the previously elapsed duration of the test but not less than 15 min, indicate no change in temperature greater than ±2°C (3.6°F).
- 3.3.3. Thermocouples shall be attached to the central component cell during testing as per Appendix E of UL 1973. Temperatures shall also be measured on any components affected by temperature in the control circuit during the tests. Temperature shall be measured using thermocouples consisting of wires not larger than 24 AWG (0.21 mm<sup>2</sup>) and not smaller than 30 AWG (0.05 mm<sup>2</sup>) connected to a potentiometer-type instrument. Temperature measurements shall be made with the measuring junction of the thermocouple held tightly against the component/location being measured.
- 3.3.4. Unless noted otherwise in the individual test methods, the tests shall be followed by a 1-h observation time prior to concluding the test and temperatures shall be monitored.
- 3.3.5. As an additional precaution, the temperatures on surfaces of the DUT shall be monitored during all test. **All personnel involved in the testing of battery systems shall be instructed to never approach the DUT until temperatures are falling and are at safe levels (30°C or below)**

Test	Section	Upper Limit Temperature	Lower Limit Temperature	Total Samples Tested
<b>Option 1</b>				
Short Circuit	E3	1	1	2
Cell Impact	E4	1	1	2
Drop Impact	E5	---	---	2
Heating	E6	1	1	2
Overcharge	E7	1	1	2
Forced Discharge	E8	---	---	2
Projectile	E9	---	---	2 (4)
<b>Option 2</b>				



## ORIGINAL TEST DATA

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Master Contract: 304401	Date From: 2024.03.01	Model: 3777AH
Project / Network: 80192227	Date To: 2024.06.07	Description: Lithium-ion battery cell
Page number 4 of 9	Test record number:	

Test	Section	Upper Limit Temperature	Lower Limit Temperature	Total Samples Tested
Short Circuit	E11.1	---	---	2
Overcharge	E11.2	---	---	2
Crush	E11.3	---	---	2
Impact	E11.4	---	---	2
Shock	E11.5	---	---	2
Vibration	E11.6	---	---	2
Heating	E11.7	---	---	2
Temperature Cycling	E11.8	---	---	2
Low Pressure (Altitude Simulation)	E11.9	---	---	2
Projectile	E11.10	---	---	2 (4)

## Note:

1. Refer to individual tests for additional compliance criteria details.
2. The upper limit temperature, lower limit temperature, upper limit charging voltage, maximum charging current, discharge current and end point voltage parameters used for conditioning of cell samples are specified by the cell manufacturer.



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Master Contract: 304401	Date From: 2024.03.01	Model: 3777AH
Project / Network: 80192227	Date To: 2024.06.07	Description: Lithium-ion battery cell
Page number 5 of 9	Test record number:	

4. Summary of Testing

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)  
 Test Waived: W (Waived)

Possible Non-complaint results:

Explosion: E  
 Fire: F  
 Combustible concentrations: C  
 Toxic Vapor release: V  
 Electrical shock hazard: S  
 Electrolyte leakage (External to enclosure): L  
 Rupture: R  
 Loss of Protection control: P  
 Other (specify)

Section	Test	Verdict	Comment	Non - Compliance Result
<b>Option 1</b>				
E3	Short Circuit	---	---	---
E4	Cell Impact	---	---	---
E5	Drop Impact	---	---	---
E6	Heating	---	---	---
E7	Overcharge	---	---	---
E8	Forced Discharge	P	-	-
E9	Projectile	---	---	---
<b>Option 2</b>				
E11.1	Short Circuit	---	---	---
E11.2	Overcharge	---	---	---
E11.3	Crush	---	---	---
E11.4	Impact	---	---	---
E11.5	Shock	---	---	---
E11.6	Vibration	---	---	---
E11.7	Heating	---	---	---
E11.8	Temperature Cycling	---	---	---
E11.9	Low Pressure (Altitude Simulation)	---	---	---
E11.10	Projectile	---	---	---

5. Test



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Master Contract: 304401	Date From: 2024.03.01	Model: 3777AH
Project / Network: 80192227	Date To: 2024.06.07	Description: Lithium-ion battery cell
Page number 6 of 9	Test record number:	

Room Ambient Temperature Conditioning: 20 to 30

Charge	Discharge
Charge Voltage: 3.65Vdc Charge Current: 1888.5A Charge End Condition: 180A	Discharge Current: 1888.5A Discharge End Condition: 2.5Vdc

Sample Conditioning		-
Model/ Sample No.	Charging Condition	Comment
1	C	-
2	C	-

Supplementary information:

Charging Condition:

- A: Sample are in fully charge state. Charge at upper limit ambient temperature
- B: Sample are in fully charge state. Charge at lower limit ambient temperature
- C: Sample are in fully charge state. Charge at room ambient temperature

Equipment Used: Item no. See 6. Test Equipment

Date Start: 2024.06.06 (YY/MM/DD)

Date End: 2024.06.07 (YY/MM/DD)

Performed by: Tengfei Zhai



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Master Contract: 304401	Date From: 2024.03.01	Model: 3777AH
Project / Network: 80192227	Date To: 2024.06.07	Description: Lithium-ion battery cell
Page number 7 of 9	Test record number:	

5.1. Section E8 - Forced Discharge

Section E8	TABLE: Forced Discharge					P
Sample No	Sample Condition	Discharge Current (A)	Upper Limit Charging Voltage of DUT (Vdc):	Forced discharge end condition (Condition 1 or 2)	Max cell surface temperature (°C)	Comments
1	C	3777	3.65	Condition 2	60.8	-
2	C	3777	3.65	Condition 2	59.1	-

Supplementary information:

Sample Condition:

A: Sample are in fully charge state. Charge at upper limit ambient temperature

B: Sample are in fully charge state. Charge at lower limit ambient temperature

C: Sample are in fully charge state. Charge at room ambient temperature

Note: Fully charged sample discharged at 1888.5A in accordance with manufacturer specification down to 2.5V (End point Voltage)

Overcharge end condition

Condition 1: Voltage limit not to exceed the numerical value of the upper limit charging voltage specified for the cell.

Condition 2: Voltage limit is reached before the 90 min, cell discharged at a constant voltage discharge equal to the manufacturer’s determined low voltage cutoff, with the current decreasing as necessary until the 90-min time period is reached.

Following results observed.

Result:	(Yes/No)
Explosion:	No
Fire:	No
Other (specify): N/A	

Ambient Temperature(°C): 23 to 26

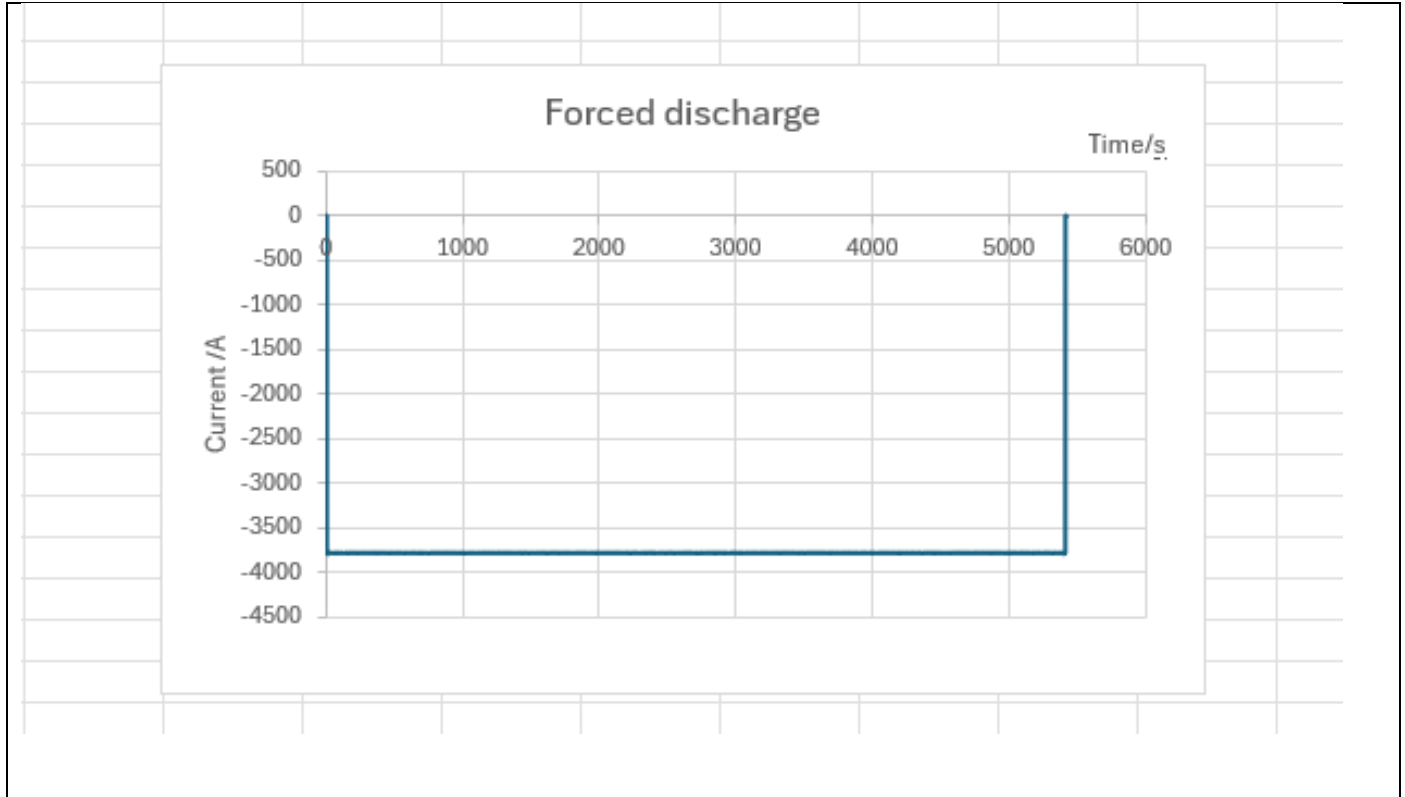
Equipment Used: Item no. See 6. Test Equipment

Date Start: 2024.06.06(Y Y/MM/DD)

Date End: 2024.06.07 (Y Y/MM/DD)

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Master Contract: 304401	Date From: 2024.03.01	Model: 3777AH
Project / Network: 80192227	Date To: 2024.06.07	Description: Lithium-ion battery cell
Page number 8 of 9	Test record number:	



6. Test Equipment:

Item No.	Inventory Code / ID	Description	Manufacturer	Model	Range Used	Calibration Date (YYYY-MM-DD)	Next Calibration Due Date (YYYY-MM-DD)
1	BBXF-SB-CS-034	Battery charging and discharging cabinet (2ch in parallel)	Baite	BT20V2000AC1-1AT	Voltage: charge 0~20V, discharge 2~20V, current: charge 0.2A~2000A	2024-05-29	2025-05-28





**CSA GROUP**  
**Laboratory Test Data - ANSI/CAN/UL - 1973 Appendix E Test Data Pack**  
**ORIGINAL TEST DATA**

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Master Contract: 304401	Date From: 2024.03.01	Model: 3777AH
Project / Network: 80192227	Date To: 2024.06.07	Description: Lithium-ion battery cell
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Item No.	Inventory Code / ID	Description	Manufacturer	Model	Range Used	Calibration Date (YYYY-MM-DD)	Next Calibration Due Date (YYYY-MM-DD)
					(every y ch) Discharge - 0.2A-- 2000A (every y ch)		
2	KS-TM002	Stopwatch	Casio	HS-3	10s, 10min , 1h	5/20/2024	5/20/2025

*End of this test data...*



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Master Contract: 304401	Date From: 2024.05.24	Model: 3777AH
Project / Network: 80192227	Date To: 2024.05.27	Description: Lithium-ion battery cell
Page number 1 of 10	Test record number:	

Standard(s): ANSI/CAN/UL-1973 (Third Edition, Dated February 25, 2022) - Batteries for Use in Stationary and Motive Auxiliary Power Applications

**Testing Laboratory Name:** CCIC-CSA International Certification Co., Ltd. Kunshan Branch

**Address:** Building 8, Tsinghua Science Park, No. 1666 Zuchongzhi Rd (S), Kunshan, Jiangsu (215347)

**Testing Program:**

**CB Scheme** : CBTL , CTF  Stage:

**Certification** : CSA Lab. , WMTC , SMTC , CPC , Other:

**Custom Test** : Latter of Attestation , Testing Only

Note: Double click on check box and checked

If tests were performed at another facility, then described below:

**Testing Laboratory Name:** ChuWeiNeng Testing Technology (Shanghai) Co. Ltd

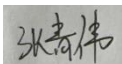
**Address:** Building 3, No.1065 Beihe Gonglu, Jiading District, Shanghai

**Facility Qualification Number:** N/A

**Customer:** As above / or describe otherwise  
Australia National Power Storage Holding Pty Ltd.


**Address:** Chatswood West, Willoughby, New South Wales 2067, Australia

**Tested By:** Zhangqingwei  
Print

  
Signature

**Reviewed by:** Iris Gao

**Witnessed by:** Print

  
Signature

Ver 1 – 05/17/2022



ORIGINAL TEST DATA

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Master Contract: 304401	Date From: 2024.05.24	Model: 3777AH
Project / Network: 80192227	Date To: 2024.05.27	Description: Lithium-ion battery cell
Page number 2 of 10	Test record number:	

1. Sample Ratings:

Test Model				
Model	3777AH			
Chemistry	LFP			
Cell Configuration	-			
Nominal Capacity	3777Ah			
Nominal Voltage	3.2			
Charging Method	CC-CV			
Charging Current, A	Standard/ Recommended	0.5C=1888.5	Max	0.5C=1888.5
Charging Voltage, Vdc	Standard/ Recommended	3.65	Max	3.7
Charging end condition	Limited Current	0.05C=180A	Time	-
	Other	-		
Discharge Current, A	Standard	0.5C=1888.5	Max	0.5C=1888.5
Discharge cut-off voltage	2.5V			
Nominal Weight	110±0.5KG			
Dimension	1095*203*294			
Upper limit charging temperature of DUT	60°C			
Recommended maximum temperature of cell case	-			
Upper limit charging voltage of cell	3.65			
Operating Temperature	Charge	0-60	Discharge	-30-60
Cell Data sheet:	-			

2. Sample Information:

Sample No.	Date Received (YYYY/MM/DD)	Material No.	Manufacturer, Model No.
202405020	2024/05/20	-	NPS, 3777AH



## ORIGINAL TEST DATA

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Master Contract:	304401	Date From:	2024.05.24	Model:	3777AH
Project / Network:	80192227	Date To:	2024.05.27	Description:	Lithium-ion battery cell
Page number	3 of 10	Test record number:			

### 3. Conducting the Test

#### 3.1. Risk Notification:

#### **THE TESTING SPECIFIED IN THIS PROCEDURE IS INHERENTLY DANGEROUS**

**DO NOT ATTEMPT TO PERFORM THIS TEST UNLESS YOU HAVE BEEN PROPERLY TRAINED REGARDING SAFELY WORKING WITH THE HAZARDS INVOLVED**

#### 3.2. Important Test Consideration:

- 3.2.1. As some batteries expose in test described above, it is important that personnel be protected from the flying fragments, explosive force, and sudden release of heat, chemical burns, and noise resulting from such explosions. The test area is to be well ventilated to protect personnel from possible harmful fumes or gases.
- 3.2.2. Temperature of the surface of the battery casing shall be monitored during the tests described above. All personnel involved in the testing of batteries are to be instructed never to approach a battery until the surface temperature returns to ambient temperature.
- 3.2.3. Test shall be conducted in separate room or equipped with an adequate safety barrier separating the test area from observer.

#### 3.3. General test setup.

- 3.3.1. Unless indicated otherwise the device under test (DUT) shall be at the maximum operational state of charge (MOSOC), in accordance with the manufacturer's specifications, for conducting the tests in this standard. After charging and prior to testing, the samples shall be allowed to rest for a maximum period of 8 h at room ambient.
- 3.3.2. All tests, unless noted otherwise, are conducted in a room ambient  $25 \pm 5^{\circ}\text{C}$  ( $77 \pm 9^{\circ}\text{F}$ ). Tests shall be conducted with the DUTs heated to normal operating temperatures unless indicated otherwise in the test. For those tests that require the DUT to reach thermal equilibrium, thermal equilibrium is considered to be achieved if after three consecutive temperature measurements taken at intervals of 10% of the previously elapsed duration of the test but not less than 15 min, indicate no change in temperature greater than  $\pm 2^{\circ}\text{C}$  ( $3.6^{\circ}\text{F}$ ).
- 3.3.3. Thermocouples shall be attached to the central component cell during testing as per Appendix E of UL 1973. Temperatures shall also be measured on any components affected by temperature in the control circuit during the tests. Temperature shall be measured using thermocouples consisting of wires not larger than 24 AWG (0.21 mm<sup>2</sup>) and not smaller than 30 AWG (0.05 mm<sup>2</sup>) connected to a potentiometer-type instrument. Temperature measurements shall be made with the measuring junction of the thermocouple held tightly against the component/location being measured.
- 3.3.4. Unless noted otherwise in the individual test methods, the tests shall be followed by a 1-h observation time prior to concluding the test and temperatures shall be monitored.
- 3.3.5. As an additional precaution, the temperatures on surfaces of the DUT shall be monitored during all test. **All personnel involved in the testing of battery systems shall be instructed to never approach the DUT until temperatures are falling and are at safe levels ( $30^{\circ}\text{C}$  or below)**



ORIGINAL TEST DATA

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Master Contract: 304401	Date From: 2024.05.24	Model: 3777AH
Project / Network: 80192227	Date To: 2024.05.27	Description: Lithium-ion battery cell
Page number 4 of 10	Test record number:	

Test	Section	Upper Limit Temperature	Lower Limit Temperature	Total Samples Tested
<b>Option 1</b>				
Short Circuit	E3	1	1	2
Cell Impact	E4	1	1	2
Drop Impact	E5	---	---	2
Heating	E6	1	1	2
Overcharge	E7	1	1	2
Forced Discharge	E8	---	---	2
Projectile	E9	---	---	2 (4)
<b>Option 2</b>				
Short Circuit	E11.1	---	---	2
Overcharge	E11.2	---	---	2
Crush	E11.3	---	---	2
Impact	E11.4	---	---	2
Shock	E11.5	---	---	2
Vibration	E11.6	---	---	2
Heating	E11.7	---	---	2
Temperature Cycling	E11.8	---	---	2
Low Pressure (Altitude Simulation)	E11.9	---	---	2
Projectile	E11.10	---	---	2 (4)

Note:

1. Refer to individual tests for additional compliance criteria details.
2. The upper limit temperature, lower limit temperature, upper limit charging voltage, maximum charging current, discharge current and end point voltage parameters used for conditioning of cell samples are specified by the cell manufacturer.



**CSA GROUP**  
**Laboratory Test Data - ANSI/CAN/UL - 1973 Appendix E Test Data Pack**  
**ORIGINAL TEST DATA**

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Master Contract: 304401	Date From: 2024.05.24	Model: 3777AH	
Project / Network: 80192227	Date To: 2024.05.27	Description: Lithium-ion battery cell	
Page number 5 of 10	Test record number:		

**4. Summary of Testing**

**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)  
 Test Waived: W (Waived)

Possible Non-complaint results:

Explosion: E  
 Fire: F  
 Combustible concentrations: C  
 Toxic Vapor release: V  
 Electrical shock hazard: S  
 Electrolyte leakage (External to enclosure): L  
 Rupture: R  
 Loss of Protection control: P  
 Other (specify)

Section	Test	Verdict	Comment	Non - Compliance Result
<b>Option 1</b>				
E3	Short Circuit	_____	_____	_____
E4	Cell Impact	_____	_____	_____
E5	Drop Impact	_____	_____	_____
E6	Heating	_____	_____	_____
E7	Overcharge	_____	_____	_____
E8	Forced Discharge	_____	_____	_____
E9	Projectile	P	/	/
<b>Option 2</b>				
E11.1	Short Circuit	_____	_____	_____
E11.2	Overcharge	_____	_____	_____
E11.3	Crush	_____	_____	_____
E11.4	Impact	_____	_____	_____
E11.5	Shock	_____	_____	_____
E11.6	Vibration	_____	_____	_____
E11.7	Heating	_____	_____	_____
E11.8	Temperature Cycling	_____	_____	_____
E11.9	Low Pressure (Altitude Simulation)	_____	_____	_____
E11.10	Projectile	_____	_____	_____

**5. Test**

**Sample Preconditioning:**



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Master Contract: 304401	Date From: 2024.05.24	Model: 3777AH
Project / Network: 80192227	Date To: 2024.05.27	Description: Lithium-ion battery cell
Page number 6 of 10	Test record number:	

Samples of secondary lithium cells other than lithium ion shall be subjected to charge/discharge cycling as outlined in UL 1973 3<sup>rd</sup> edition, Section 2.1.2 prior to testing.

UL 1973 charge discharge cycling required (Yes/No): No

Ambient Temperature: 23°C to 27°C

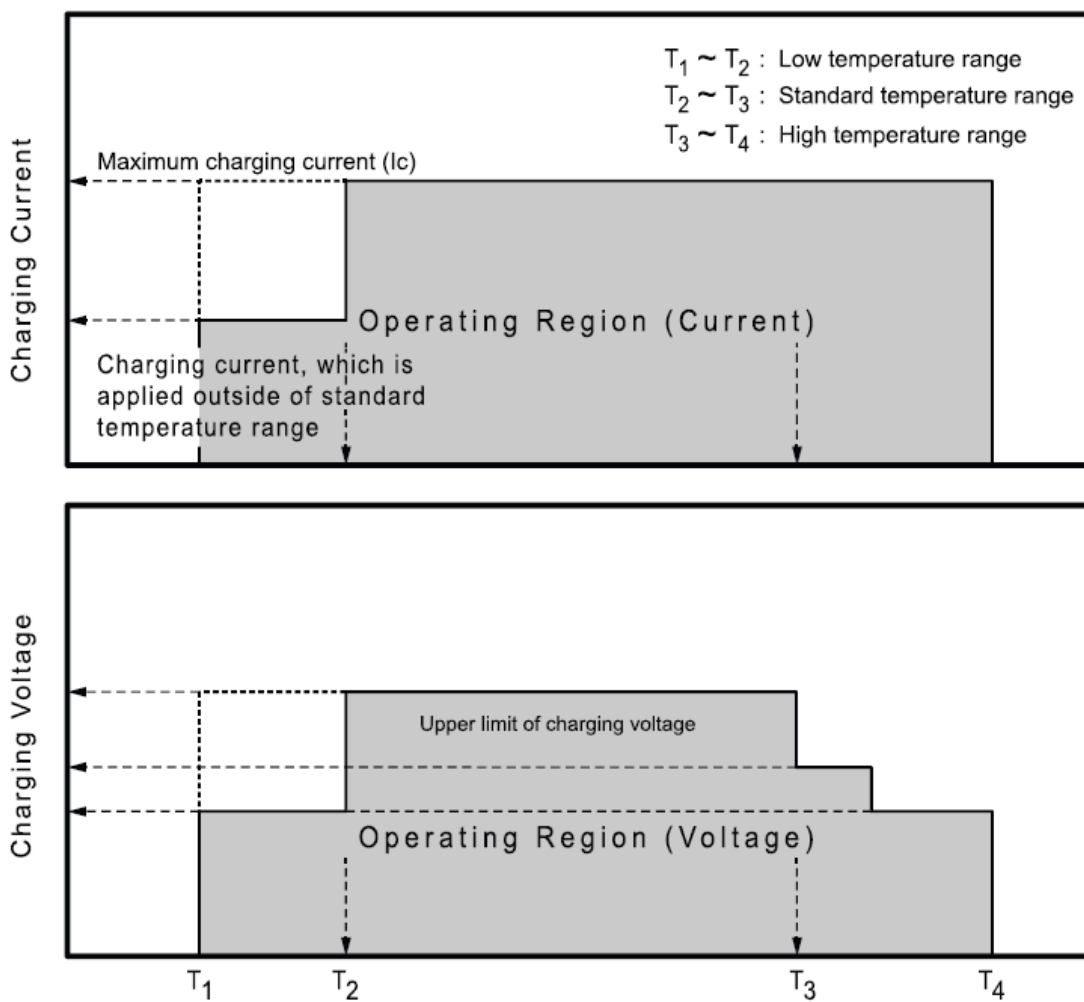
Room Ambient Temperature Conditioning: 23°C to 27°C

Charge	Discharge
Charge Voltage: 3.65Vdc Charge Current: 1888.5A Charge End Condition: 180A	Discharge Current: 1888.5A Discharge End Condition: 2.5Vdc

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Master Contract: 304401	Date From: 2024.05.24	Model: 3777AH
Project / Network: 80192227	Date To: 2024.05.27	Description: Lithium-ion battery cell
Page number 7 of 10	Test record number:	

**Figure 3.1**  
**Diagram representing an example of a cell operating region**  
 (from the Battery Association of Japan)



Sample Conditioning		
Model/ Sample No.	Charging Condition	Comment
1#	C	P
2#	C	P





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Project / Network: 80192227	Date To: 2024.05.27	Description: Lithium-ion battery cell
Page number 8 of 10	Test record number:	

Supplementary information:

Charging Condition:

- A: Sample are in fully charge state. Charge at upper limit ambient temperature
- B: Sample are in fully charge state. Charge at lower limit ambient temperature
- C: Sample are in fully charge state. Charge at room ambient temperature

Equipment Used: Item no.

Date Start: 2024/05/24 13:42 (YY/MM/DD)

Date End: 2024/05/27 21:00 (YY/MM/DD)

Performed by:



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Master Contract: 304401	Date From: 2024.05.24	Model: 3777AH
Project / Network: 80192227	Date To: 2024.05.27	Description: Lithium-ion battery cell
Page number 9 of 10	Test record number:	

5.1. Section E9 – Projectile

Section E9	TABLE: Projectile			P
Sample No	Sample Condition	Open Circuit Voltage of DUT before test (Vdc)	Distance from Test screen to the cell in any direction (MM)	Comments
1#	C	3.458	500	-
2#	C	3.486	500	-

Supplementary information:

Sample Condition:

A: Sample are in fully charge state. Charge at upper limit ambient temperature

B: Sample are in fully charge state. Charge at lower limit ambient temperature

C: Sample are in fully charge state. Charge at room ambient temperature

Following results observed.

Result:	(Yes/No)
Explosion of the cells resulting in projectiles with sufficient force to penetrate the test cage screen	NO
Other (specify):	

Ambient Temperature(°C): 24°C to 27°C

Equipment Used: Item no. 1 2 3 4 5

Date Start: 2024/05/24 13:42 (YY/MM/DD)

Date End: 2024/05/27 21:00 (YY/MM/DD)



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Master Contract: 304401	Date From: 2024.05.24	Model: 3777AH
Project / Network: 80192227	Date To: 2024.05.27	Description: Lithium-ion battery cell
Page number 10 of 10	Test record number:	

**6. Test Equipment:**

Item No.	Inventory Code / ID	Description	Manufacturer	Model	Range Used	Calibration Date (YYYY-MM-DD)	Next Calibration Due Date (YYYY-MM-DD)
1	T-049	Multichannel thermometer	HIOKI	LR8450	0-1000°C	2024/02/26	2025/02/25
2	T-060	Electronic ledger	Yongkang Dayang weighing instrument Co., LTD	TCS-600	20-2000kg	2024/02/20	2025/02/19
3	T-021	Digital multimeter	CHAUVIN ARNOUX	C.A 5217	0-1000V	2024/03/12	2025/03/11
4	T-100	Combustion injection test equipment	/	/	/	/	/
5	T-112	Steel tape measure	SATA Shida Tools (Shanghai) Co., LTD	5000m	0~5000mm	2023/08/25	2024/08/24
6	-	Battery test system	Ningbo Beit measurement and control Technology Co., LTD	BT5V1500A C2-2AI	0-5V	2024/04/19	2025/04/18

End of this test data...