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## Certification

UN38-3-CR2025-00-14

model name : CR2025			
<input checked="" type="checkbox"/> Lithium metal cell or battery		<input type="checkbox"/> Lithium-ion cell or battery	
Lithium content		Watt-hour rating	
<input checked="" type="checkbox"/> cell	<input type="checkbox"/> battery(pack)	<input type="checkbox"/> cell	<input type="checkbox"/> battery(pack)
<input checked="" type="checkbox"/> $\leq 0.3g$	<input type="checkbox"/> $\leq 0.3g$	<input type="checkbox"/> $\leq 2.7Wh$	<input type="checkbox"/> $\leq 2.7Wh$
<input type="checkbox"/> $\leq 1g$	<input type="checkbox"/> $\leq 2g$	<input type="checkbox"/> $\leq 20Wh$	<input type="checkbox"/> $\leq 100Wh$
<input type="checkbox"/> $> 1g$	<input type="checkbox"/> $> 2g$	<input type="checkbox"/> $> 20Wh$	<input type="checkbox"/> $> 100Wh$
		Nominal Voltage	V
		Rated Capacity	mAh

### Transport tests and results

Test number	Designation	Results	Remarks
T-1	Altitude	Accepted	
T-2	Thermal cycling	Accepted	
T-3	Vibration	Accepted	
T-4	Shock	Accepted	
T-5	External short circuit	Accepted	
T-6	Crush	Accepted	
T-7	Overcharge	Not applicable	for rechargeable battery only
T-8	Forced Discharge	Accepted	

We certify that above results are confirmed in accordance with the Manual of Tests and Criteria of the UN Recommendations on the Transport of Dangerous Goods(5th revised edition Amendment1), Part III, sub-section 38.3

Name / Title of Signatory

Takashi Kimura / SENIOR MANAGER

Signature

*T. Kimura*

Jan. 1st, 2014



Test	T.1: Altitude simulation										
Test procedure											
Test cells shall be stored at a pressure of 11.6 kPa or less for at least six hours at ambient temperature (20 ± 5 °C).											
Criteria											
There is no mass loss, no leakage, no venting, no disassembly, no rupture and no fire. The open circuit voltage of each test cell after testing is not less than 90% of its voltage immediately prior to this procedure. (Undischarged status only)											
*1: Voltage change[%]= $V_2/V_1 \times 100$											
*2: Mass loss[%]= $(M_1-M_2)/M_1 \times 100$											
Status	Undischarged										Number of test specimen: 10
Test result											
No.		1	2	3	4	5	6	7	8	9	10
Initial	Voltage(V <sub>1</sub> ) [V]	3.261	3.265	3.264	3.260	3.259	3.259	3.263	3.271	3.258	3.272
	Mass(M <sub>1</sub> ) [g]	2.465	2.468	2.465	2.465	2.478	2.459	2.463	2.472	2.474	2.476
After Test	Voltage(V <sub>2</sub> ) [V]	3.261	3.265	3.265	3.261	3.260	3.259	3.264	3.271	3.259	3.273
	Voltage change <sup>1</sup> [%]	100	100	100	100	100	100	100	100	100	100
	Mass(M <sub>2</sub> ) [g]	2.465	2.468	2.465	2.465	2.478	2.459	2.463	2.472	2.474	2.476
	Mass loss <sup>2</sup> [%]	0	0	0	0	0	0	0	0	0	0
	Leakage	No	No	No	No	No	No	No	No	No	No
	Venting	No	No	No	No	No	No	No	No	No	No
	Disassembly	No	No	No	No	No	No	No	No	No	No
	Rupture	No	No	No	No	No	No	No	No	No	No
	Fire	No	No	No	No	No	No	No	No	No	No
Status	Fully discharged										Number of test specimen: 10
Test result											
No.		1	2	3	4	5	6	7	8	9	10
Initial	Voltage(V <sub>1</sub> ) [V]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Mass(M <sub>1</sub> ) [g]	2.460	2.473	2.482	2.501	2.481	2.457	2.493	2.462	2.474	2.440
After Test	Voltage(V <sub>2</sub> ) [V]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Voltage change <sup>1</sup> [%]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Mass(M <sub>2</sub> ) [g]	2.460	2.473	2.482	2.501	2.481	2.457	2.493	2.462	2.474	2.440
	Mass loss <sup>2</sup> [%]	0	0	0	0	0	0	0	0	0	0
	Leakage	No	No	No	No	No	No	No	No	No	No
	Venting	No	No	No	No	No	No	No	No	No	No
	Disassembly	No	No	No	No	No	No	No	No	No	No
	Rupture	No	No	No	No	No	No	No	No	No	No
	Fire	No	No	No	No	No	No	No	No	No	No
N/A: Not Applicable											





Test

**T.2: Thermal test****Test procedure**

Test cells are to be stored for at least six hours at a test temperature equal to  $75 \pm 2 \text{ }^\circ\text{C}$ , followed by storage for at least six hours at a test temperature equal to  $-40 \pm 2 \text{ }^\circ\text{C}$ . The maximum time interval between test temperature extremes is 30 minutes. This procedure is to be repeated 10 times, after which all test cells are to be stored for 24 hours at ambient

**Criteria**

There is no mass loss, no leakage, no venting, no disassembly, no rupture and no fire. The open circuit voltage of each test cell after testing is not less than 90% of its voltage immediately prior to this procedure. (Undischarged status only)

\*1: Voltage change[%]= $V_2/V_1 \times 100$

\*2: Mass loss[%]= $(M_1-M_2)/M_1 \times 100$

Status

Undischarged

Number of test specimen: 10

**Test result**

No.		1	2	3	4	5	6	7	8	9	10
Initial	Voltage( $V_1$ ) [V]	3.261	3.265	3.265	3.261	3.260	3.259	3.264	3.271	3.259	3.273
	Mass( $M_1$ ) [g]	2.465	2.468	2.465	2.465	2.478	2.459	2.463	2.472	2.474	2.476
After Test	Voltage( $V_2$ ) [V]	3.262	3.265	3.264	3.261	3.260	3.260	3.263	3.270	3.262	3.271
	Voltage change*1 [%]	100	100	100	100	100	100	100	100	100	100
	Mass( $M_2$ ) [g]	2.464	2.468	2.465	2.464	2.478	2.459	2.463	2.472	2.473	2.475
	Mass loss*2 [%]	0	0	0	0	0	0	0	0	0	0
	Leakage	No	No	No	No	No	No	No	No	No	No
	Venting	No	No	No	No	No	No	No	No	No	No
	Disassembly	No	No	No	No	No	No	No	No	No	No
	Rupture	No	No	No	No	No	No	No	No	No	No
	Fire	No	No	No	No	No	No	No	No	No	No

Status

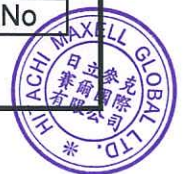
Fully discharged

Number of test specimen: 10

**Test result**

No.		1	2	3	4	5	6	7	8	9	10
Initial	Voltage( $V_1$ ) [V]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Mass( $M_1$ ) [g]	2.460	2.473	2.482	2.501	2.481	2.457	2.493	2.462	2.474	2.440
After Test	Voltage( $V_2$ ) [V]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Voltage change*1 [%]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Mass( $M_2$ ) [g]	2.460	2.473	2.482	2.501	2.481	2.457	2.493	2.462	2.474	2.441
	Mass loss*2 [%]	0	0	0	0	0	0	0	0	0	0
	Leakage	No	No	No	No	No	No	No	No	No	No
	Venting	No	No	No	No	No	No	No	No	No	No
	Disassembly	No	No	No	No	No	No	No	No	No	No
	Rupture	No	No	No	No	No	No	No	No	No	No
	Fire	No	No	No	No	No	No	No	No	No	No

N/A: Not Applicable





Test

**T.3: Vibration****Test procedure**

Cells 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 7 Hz and 200 Hz and back to 7 Hz 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.

The logarithmic frequency sweep is as follows: from 7 Hz a peak acceleration of 1  $g_n$  is maintained until 18 Hz is reached. The amplitude is then maintained at 0.8 mm (1.6 mm total excursion) and the frequency increased until a peak acceleration of 8  $g_n$  occurs (approximately 50 Hz). A peak acceleration of 8  $g_n$  is then maintained until the frequency is increased to 200 Hz.

**Criteria**

There is no mass loss, no leakage, no venting, no disassembly, no rupture and no fire. The open circuit voltage of each test cell after testing is not less than 90% of its voltage immediately prior to this procedure. (Undischarged status only)

$$*1: \text{Voltage change}[\%]=V_2/V_1 \times 100$$

$$*2: \text{Mass loss}[\%]=(M_1-M_2)/M_1 \times 100$$

Status **Undischarged**

Number of test specimen: 10

**Test result**

No.		1	2	3	4	5	6	7	8	9	10
Initial	Voltage( $V_1$ ) [V]	3.262	3.265	3.264	3.261	3.260	3.260	3.263	3.270	3.262	3.271
	Mass( $M_1$ ) [g]	2.464	2.468	2.465	2.464	2.478	2.459	2.463	2.472	2.473	2.475
After Test	Voltage( $V_2$ ) [V]	3.278	3.281	3.282	3.278	3.280	3.276	3.278	3.286	3.277	3.288
	Voltage change <sup>*1</sup> [%]	100	100	101	101	101	100	100	100	100	101
	Mass( $M_2$ ) [g]	2.464	2.468	2.465	2.464	2.478	2.459	2.463	2.472	2.474	2.475
	Mass loss <sup>*2</sup> [%]	0	0	0	0	0	0	0	0	0	0
	Leakage	No	No	No	No	No	No	No	No	No	No
	Venting	No	No	No	No	No	No	No	No	No	No
	Disassembly	No	No	No	No	No	No	No	No	No	No
	Rupture	No	No	No	No	No	No	No	No	No	No
	Fire	No	No	No	No	No	No	No	No	No	No

Status **Fully discharged**

Number of test specimen: 10

**Test result**

No.		1	2	3	4	5	6	7	8	9	10
Initial	Voltage( $V_1$ ) [V]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Mass( $M_1$ ) [g]	2.460	2.473	2.482	2.501	2.481	2.457	2.493	2.462	2.474	2.441
After Test	Voltage( $V_2$ ) [V]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Voltage change <sup>*1</sup> [%]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Mass( $M_2$ ) [g]	2.460	2.473	2.482	2.501	2.480	2.457	2.494	2.462	2.474	2.441
	Mass loss <sup>*2</sup> [%]	0	0	0	0	0	0	0	0	0	0
	Leakage	No	No	No	No	No	No	No	No	No	No
	Venting	No	No	No	No	No	No	No	No	No	No
	Disassembly	No	No	No	No	No	No	No	No	No	No
	Rupture	No	No	No	No	No	No	No	No	No	No
	Fire	No	No	No	No	No	No	No	No	No	No

N/A: Not Applicable





Test	T.4: Shock										
Test procedure											
<p>Test cells 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 shall be subjected to a half-sine shock of peak acceleration of 150 g<sub>n</sub> and pulse duration of 6 milliseconds. Each cell 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 for a total of 18 shocks.</p>											
Criteria											
<p>There is no mass loss, no leakage, no venting, no disassembly, no rupture and no fire. The open circuit voltage of each test cell after testing is not less than 90% of its voltage immediately prior to this procedure. (Undischarged status only)</p>											
*1: Voltage change[%]= $V_2/V_1 \times 100$											
*2: Mass loss[%]= $(M_1-M_2)/M_1 \times 100$											
Status	Undischarged										Number of test specimen: 10
Test result											
No.		1	2	3	4	5	6	7	8	9	10
Initial	Voltage(V <sub>1</sub> ) [V]	3.278	3.281	3.282	3.278	3.280	3.276	3.278	3.286	3.277	3.288
	Mass(M <sub>1</sub> ) [g]	2.464	2.468	2.465	2.464	2.478	2.459	2.463	2.472	2.474	2.475
After Test	Voltage(V <sub>2</sub> ) [V]	3.283	3.286	3.285	3.282	3.283	3.280	3.285	3.291	3.281	3.290
	Voltage change <sup>1</sup> [%]	100	100	100	100	100	100	100	100	100	100
	Mass(M <sub>2</sub> ) [g]	2.464	2.468	2.465	2.465	2.478	2.459	2.463	2.472	2.473	2.475
	Mass loss <sup>2</sup> [%]	0	0	0	0	0	0	0	0	0	0
	Leakage	No	No	No	No	No	No	No	No	No	No
	Venting	No	No	No	No	No	No	No	No	No	No
	Disassembly	No	No	No	No	No	No	No	No	No	No
	Rupture	No	No	No	No	No	No	No	No	No	No
	Fire	No	No	No	No	No	No	No	No	No	No
Status	Fully discharged										Number of test specimen: 10
Test result											
No.		1	2	3	4	5	6	7	8	9	10
Initial	Voltage(V <sub>1</sub> ) [V]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Mass(M <sub>1</sub> ) [g]	2.460	2.473	2.482	2.501	2.480	2.457	2.494	2.462	2.474	2.441
After Test	Voltage(V <sub>2</sub> ) [V]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Voltage change <sup>1</sup> [%]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Mass(M <sub>2</sub> ) [g]	2.460	2.473	2.481	2.501	2.480	2.457	2.493	2.462	2.474	2.441
	Mass loss <sup>2</sup> [%]	0	0	0	0	0	0	0	0	0	0
	Leakage	No	No	No	No	No	No	No	No	No	No
	Venting	No	No	No	No	No	No	No	No	No	No
	Disassembly	No	No	No	No	No	No	No	No	No	No
	Rupture	No	No	No	No	No	No	No	No	No	No
	Fire	No	No	No	No	No	No	No	No	No	No
N/A: Not Applicable											



Test	<b>T.5: External short circuit</b>										
<b>Test procedure</b>											
The cell to be tested shall be temperature stabilized so that its external case temperature reaches $55 \pm 2$ °C and then the cell shall be subjected to a short circuit condition with a total external resistance of less than 0.1 ohm at $55 \pm 2$ °C. This short circuit condition is continued for at least one hour after the cell external case temperature has returned to $55 \pm 2$ °C. The cell must be observed for a further six hours for the test to be concluded.											
<b>Criteria</b>											
Cells' external temperature does not exceed 170 °C and there is no disassembly, no rupture and no fire within six hours of this test.											
Status	Undischarged										Number of test specimen: 10
<b>Test result</b>											
No.		1	2	3	4	5	6	7	8	9	10
Initial	Voltage [V]	3.283	3.286	3.285	3.282	3.283	3.280	3.285	3.291	3.281	3.290
	Mass [g]	2.464	2.468	2.465	2.465	2.478	2.459	2.463	2.472	2.473	2.475
Max. Temperature [°C]		55.0	55.0	55.0	54.8	54.8	55.4	55.2	55.4	54.9	55.8
After Test	Leakage	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Venting	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Disassembly	No	No	No	No	No	No	No	No	No	No
	Rupture	No	No	No	No	No	No	No	No	No	No
	Fire	No	No	No	No	No	No	No	No	No	No
Status	Fully discharged										Number of test specimen: 10
<b>Test result</b>											
No.		1	2	3	4	5	6	7	8	9	10
Initial	Voltage [V]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Mass [g]	2.460	2.473	2.481	2.501	2.480	2.457	2.493	2.462	2.474	2.441
Max. Temperature [°C]		54.6	54.6	54.3	54.2	54.4	54.8	53.8	54.2	54.6	55.2
After Test	Leakage	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Venting	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Disassembly	No	No	No	No	No	No	No	No	No	No
	Rupture	No	No	No	No	No	No	No	No	No	No
	Fire	No	No	No	No	No	No	No	No	No	No
N/A: Not Applicable											





Test	T.6: Impact										
<b>Test procedure</b>											
<p>The test sample cell is to be placed on a flat surface. A 15.8 mm diameter bar is to be placed across the centre of the sample. A 9.1 kg mass is to be dropped from a height of <math>61 \pm 2.5</math> cm onto the sample.</p> <p>A cylindrical or prismatic cell is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8 mm diameter curved surface lying across the centre of the test sample. A prismatic cell is also to be rotated 90 degrees around its longitudinal axis so that both the wide and narrow sides will be subjected to the impact. Each sample is to be subjected to only a single impact. Separate samples are to be</p>											
<b>Criteria</b>											
Cells' external temperature does not exceed 170 °C and there is no disassembly and no fire within six hours of this test.											
Status	Undischarged										Number of test specimen: 5
<b>Test result</b>											
No.		1	2	3	4	5	6	7	8	9	10
Initial	Voltage [V]	3.257	3.262	3.263	3.256	3.268	-	-	-	-	-
	Mass [g]	2.472	2.464	2.473	2.456	2.474	-	-	-	-	-
Max. Temperature [°C]		90°C>	90°C>	90°C>	90°C>	90°C>	-	-	-	-	-
After Test	Leakage	N/A	N/A	N/A	N/A	N/A	-	-	-	-	-
	Venting	N/A	N/A	N/A	N/A	N/A	-	-	-	-	-
	Disassembly	No	No	No	No	No	-	-	-	-	-
	Rupture	N/A	N/A	N/A	N/A	N/A	-	-	-	-	-
	Fire	No	No	No	No	No	-	-	-	-	-
Status	Fully discharged										Number of test specimen: 5
<b>Test result</b>											
No.		1	2	3	4	5	6	7	8	9	10
Initial	Voltage [V]	N/A	N/A	N/A	N/A	N/A	-	-	-	-	-
	Mass [g]	2.466	2.464	2.474	2.481	2.493	-	-	-	-	-
Max. Temperature [°C]		90°C>	90°C>	90°C>	90°C>	90°C>	-	-	-	-	-
After Test	Leakage	N/A	N/A	N/A	N/A	N/A	-	-	-	-	-
	Venting	N/A	N/A	N/A	N/A	N/A	-	-	-	-	-
	Disassembly	No	No	No	No	No	-	-	-	-	-
	Rupture	N/A	N/A	N/A	N/A	N/A	-	-	-	-	-
	Fire	No	No	No	No	No	-	-	-	-	-
N/A: Not Applicable											



Test	<b>T.8: Forced discharge</b>										
<b>Test procedure</b>											
<p>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.</p> <p>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</p>											
<b>Criteria</b>											
There is no disassembly and no fire within seven days of the test.											
<b>Status</b>		Fully discharged							Number of test specimen: 10		
<b>Test result</b>											
<b>No.</b>		1	2	3	4	5	6	7	8	9	10
<b>Initial</b>	Voltage [V]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Mass [g]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>After Test</b>	Leakage	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Venting	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Disassembly	No	No	No	No	No	No	No	No	No	No
	Rupture	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Fire	No	No	No	No	No	No	No	No	No	No
N/A: Not Applicable											

