



<b>Prüfbericht-Nr.:</b> <i>Test Report No.:</i>	<b>50266079 001</b>	<b>Auftrags-Nr.:</b> <i>Order No.:</i>	<b>114085558</b>	Seite 1 von 15 Page 1 of 15	
<b>Kunden-Referenz-Nr.:</b> <i>Client Reference No.:</i>	N/A	<b>Auftragsdatum:</b> <i>Order date:</i>	2018-11-12		
<b>Auftraggeber:</b> <i>Client:</i>	MPS Energy Inc. 7F-5, 369, Fuxing N. Rd., Taipei 105 Taiwan				
<b>Prüfgegenstand:</b> <i>Test item:</i>	Rechargeable Lithium-ion Battery Pack				
<b>Bezeichnung / Typ-Nr.:</b> <i>Identification / Type No.:</i>	MBP-BR36S6M02.L4, MBP-BR36S6M03.L4, MBP-BR36S5M02.L4, MBP-BR36S5M03.L4				
<b>Auftrags-Inhalt:</b> <i>Order content:</i>	Service of test report				
<b>Prüfgrundlage:</b> <i>Test specification:</i>	United Nations Recommendations on the Transport of Dangerous Goods – Manual of Tests and Criteria, Sixth revised edition + Amendment 1, – Part III, Section 38.3				
<b>Wareneingangsdatum:</b> <i>Date of receipt:</i>	2019-05-06	See appendix to this report for photo documentation			
<b>Prüfmuster-Nr.:</b> <i>Test sample No.:</i>	A000901001-001 to 016				
<b>Prüfzeitraum:</b> <i>Testing period:</i>	2019-07-12 - 2019-08-07				
<b>Ort der Prüfung:</b> <i>Place of testing:</i>	See following pages				
<b>Prüflaboratorium:</b> <i>Testing laboratory:</i>	Taichung Testing Laboratories				
<b>Prüfergebnis*:</b> <i>Test result*:</i>	Pass				
<b>geprüft von / tested by:</b>		<b>kontrolliert von / reviewed by:</b>			
 <small>Project Engineer Signed by: Dennis H. P. Chiu</small>		 <small>Reviewer Signed by: Paul L. M. Lin</small>			
<b>Datum</b> <i>Date</i>	<b>Name / Stellung</b> <i>Name / Position</i>	<b>Unterschrift</b> <i>Signature</i>	<b>Datum</b> <i>Date</i>	<b>Name / Stellung</b> <i>Name / Position</i>	<b>Unterschrift</b> <i>Signature</i>
<b>Sonstiges / Other:</b>					
<b>Zustand des Prüfgegenstandes bei Anlieferung:</b> <i>Condition of the test item at delivery:</i>			Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
* Legende: 1 = sehr gut      2 = gut      3 = befriedigend      4 = ausreichend      5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n)      F(ail) = entspricht nicht o.g. Prüfgrundlage(n)      N/A = nicht anwendbar      N/T = nicht getestet Legend: 1 = very good      2 = good      3 = satisfactory      4 = sufficient      5 = poor P(ass) = passed a.m. test specification(s)      F(ail) = failed a.m. test specification(s)      N/A = not applicable      N/T = not tested					
<b>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.</b> <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>					

<b>Test item description .....</b>	Rechargeable Lithium-ion Battery Pack
<b>Trade Mark .....</b>	MPS
<b>Manufacturer .....</b>	Same as applicant.
<b>Model/Type reference .....</b>	MBP-BR36S6M02.L4, MBP-BR36S6M03.L4, MBP-BR36S5M02.L4, MBP-BR36S5M03.L4
<b>Ratings .....</b>	See General product information

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

- Photo Documentation

Total number of pages in each attachment is indicated in each individual attachment.

<b>Summary of testing:</b>	
<b>Tests performed (name of test and test clause):</b> <ul style="list-style-type: none"> <li>• The test samples were pre-production samples without serial number</li> <li>• Per the client's request to perform battery testing as described below:</li> </ul> <input checked="" type="checkbox"/> 38.3.4.1 Test T.1: Altitude simulation <input checked="" type="checkbox"/> 38.3.4.2 Test T.2: Thermal Test <input checked="" type="checkbox"/> 38.3.4.3 Test T.3: Vibration <input checked="" type="checkbox"/> 38.3.4.4 Test T.4: Shock <input checked="" type="checkbox"/> 38.3.4.5 Test T.5: External short circuit <input type="checkbox"/> 38.3.4.6 Test T-6: Impact / crush <input checked="" type="checkbox"/> 38.3.4.7 Test T-7: Overcharge <input type="checkbox"/> 38.3.4.8 Test T-8: Forced discharge	<b>Testing location:</b> All tests as described in Test Case and Measurement Sections were performed at the laboratory described as below: TÜV Rheinland Taiwan Ltd., Taichung Branch No. 9, Ln. 36, Sec. 3, Minsheng Road, Daya District, Taichung City 428, Taiwan Chinese Taipei

<b>Test item particulars .....</b>		<input checked="" type="checkbox"/> Lithium ion <input type="checkbox"/> Lithium polymer <input type="checkbox"/> Lithium metal <input type="checkbox"/> Large cell <input type="checkbox"/> Small cell <input type="checkbox"/> Large battery <input checked="" type="checkbox"/> Small battery <input type="checkbox"/> Single cell battery <input checked="" type="checkbox"/> Multi-cell battery <input type="checkbox"/> Battery assembly										
<b>Weight of cell or battery .....</b>												
<b>Lithium equivalent content .....</b>		<input checked="" type="checkbox"/> ≤ 500 g <input type="checkbox"/> more than 500 g										
<b>Nominal energy .....</b>		<input checked="" type="checkbox"/> ≤ 6200 Wh <input type="checkbox"/> more than 6200 Wh										
<b>Number of series connected cells .....</b>		See General product information for details										
<b>EODV .....</b>		See General product information for details										
<b>Possible test case verdicts:</b>												
- 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)										
<b>Testing .....</b>												
<b>Date of receipt of test item .....</b>		See cover page										
<b>Date (s) of performance of tests .....</b>		See cover page										
<b>General remarks:</b>												
<p>The test results presented in this report relate only to the object tested.  This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.  "(See Enclosure #)" refers to additional information appended to the report.  "(See appended table)" refers to a table appended to the report.</p> <p><b>Throughout this report a point is used as the decimal separator.</b></p> <p>Where statement of conformity is provided in this test report, if not otherwise indicated, "accuracy method" described in IEC GUIDE 115 has been taken to address uncertainty of measurement.</p>												
<b>Abbreviations used in the report:</b> <table border="0"> <tr> <td>ND: No disassembly</td> <td>NT: No excessive temperature rise, the external case temperature of the test cell or battery does not exceed 170°C</td> </tr> <tr> <td>NE: No explosion</td> <td>NV: No venting</td> </tr> <tr> <td>NF: No fire</td> <td>NC: 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.</td> </tr> <tr> <td>NL: No leakage and no mass loss</td> <td></td> </tr> <tr> <td>NR: No rupture</td> <td></td> </tr> </table>			ND: No disassembly	NT: No excessive temperature rise, the external case temperature of the test cell or battery does not exceed 170°C	NE: No explosion	NV: No venting	NF: No fire	NC: 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.	NL: No leakage and no mass loss		NR: No rupture	
ND: No disassembly	NT: No excessive temperature rise, the external case temperature of the test cell or battery does not exceed 170°C											
NE: No explosion	NV: No venting											
NF: No fire	NC: 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.											
NL: No leakage and no mass loss												
NR: No rupture												

**General product information:**

- The equipment under test (EUT) is a rechargeable Li-ion battery pack which is constructed with 10 series, 4 or 5 parallel cells and has over charge, over discharge and temperature protection.

**Product specification:**

Model Designation	MBP-BR36S6M02.L 4	MBP-BR36S5M02.L 4	MBP-BR36S6M03.L 4	MBP-BR36S5M03.L 4
BMS	BS6 (w/ Bluetooth)	BS5 (w/o Bluetooth)	BS6 (w/ Bluetooth)	BS5 (w/o Bluetooth)
Cell arrangement	10S5P	10S5P	10S4P	10S4P
Rated capacity(Ah)	13		10.4	
Standard charge current (A)	2.0		2.0	
Maximum charge current (A)	5.0		5.0	
Standard discharge current (A)	15		15	
Maximum discharge current (A)	--		--	
Nominal voltage(V)	36		36	
Max. Charge voltage(V)	42		42	
Final discharge voltage(V)	30		30	
Charging temperature upper limit	45°C		45°C	
Charging temperature lower limit	0°C		0°C	

**Model Differences**

- The additional model MBP-BR36S6M03.L4, which is similar to model MBP-BR36S6M02.L4 except for type designation, rating and Cell arrangement for 10S4P only.
- The additional model MBP-BR36S5M02.L4, which is similar to model MBP-BR36S6M02.L4 except for type designation and BMS PCB for remove related parts for Bluetooth only.
- The additional model MBP-BR36S5M03.L4, which is similar to model MBP-BR36S6M03.L4 except for type designation and BMS PCB for remove related parts for Bluetooth only.
- All tests were conducted on Model MBP-BR36S6M02.L4 was considered to be representative of other Models, since a change in nominal energy (in Wh) of not more than 20 %.
- See following table for details.

Model Name	Cell arrangement	Rating	BMS	Cell	Bluetooth
MBP-BR36S6M02.L4	10S5P	36Vdc, 13Ah, 468Wh	BS6	LG M26	O
MBP-BR36S6M03.L4	10S4P	36Vdc, 10.4Ah, 374Wh	BS6	LG M26	O
MBP-BR36S5M02.L4	10S5P	36Vdc, 13Ah, 468Wh	BS5	LG M26	X
MBP-BR36S5M03.L4	10S4P	36Vdc, 10.4Ah, 374Wh	BS5	LG M26	X

**Engineering Conditions:**

- The component cell below used within this product was tested and found in compliance with the the standard of **earlier version**. The suitability of use has been evaluated in this report. No further testing is necessary according to client's request, the component information as described below:

Object/part no.	Manufacturer/ trademark	Type/model	Technical data	Standard	Remark
Rechargeable Li-ion Cell	LG CHEM, LTD	INR18650M26	3.6Vdc, Rated Capacity: 2600mAh	UN Manual of Test and Criteria Part III, sub-section 38.3 ST/SG/AC.10/ 11/Rev.5/Amd.2	Test report issued by LG Chem, Ltd., Document no.: QAE-EF02- 150824- CY18650M26

UN Recommendations on the Transport of Dangerous Goods, Part III – Section 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
<b>38.3.3</b>	<b>TEST METHODS AND REQUIREMENTS</b>		P
	Pre-discharge and pre-cycling	See supplementary information in following appended tables for details.	P
<b>38.3.4</b>	<b>Procedure</b>		P
38.3.4.1	Test T-1: Altitude		P
	Cells or batteries are stored at a pressure of 11.6 kPa or less for at least 6 h at ambient temperature ( $20 \pm 5$ °C).	Test according to the requirement.	P
	Results: no mass loss, no leakage, no venting, no disassembly, no rupture and no fire during this test. 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.	See appended Table T.1 NL, NV, ND, NR, NF, NC.	P
38.3.4.2	Test T-2: Thermal cycling		P
	Cells or batteries previously subjected to altitude test.		P
	Cells or batteries are stored for at least 6 h at a test temperature of $72 \pm 2$ °C, followed by storage for at least 6 h at a test temperature of $-40 \pm 2$ °C. Maximum time for transfer is 30 minutes. This procedure is executed 10 times.		P
	For large cells or batteries the duration of exposure to the test temperatures is at least 12 h instead of 6 h.		N/A
	Storage for at least 24 h at ambient temperature ( $20 \pm 5$ °C).	Test according to the requirement.	P
	Results: no mass loss, no leakage, no venting, no disassembly, no rupture and no fire during this test. 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.	See appended Table T.2 NL, NV, ND, NR, NF, NC.	P
38.3.4.3	Test T-3: Vibration		P
	Cells or batteries previously subjected to thermal cycling test	Test according to the requirement.	P
	Cells or batteries are subjected to sinusoidal waveform of vibration with a logarithmic sweep between 7 Hz and 200 Hz and back to 7 Hz traversed in 15 minutes.	Test according to the requirement.	P
	Cycle is repeated 12 times for a total of 3 h for each of three mutually perpendicular mounting positions. One of the directions is perpendicular to the terminal face.	Test according to the requirement.	P

UN Recommendations on the Transport of Dangerous Goods, Part III – Section 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
	Results: no mass loss, no leakage, no venting, no disassembly, no rupture and no fire during this test. 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.	See appended Table T.3 NL, NV, ND, NR, NF, NC.	P
38.3.4.4	Test T-4: Shock		P
	Cells or batteries previously subjected to vibration test.	Test according to the requirement.	P
	Each cell or battery is subjected to three shocks in each direction of three mutually perpendicular mounting positions of the cell or battery for a total of 18 shocks. For each shock, the parameters are according to the specified table.	Test according to the requirement.	P
	Results: no mass loss, no leakage, no venting, no disassembly, no rupture and no fire during this test. 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.	See appended Table T.4 NL, NV, ND, NR, NF, NC.	P
38.3.4.5	Test T-5: External short-circuit		P
	Cells or batteries previously subjected to shock test.	Test according to the requirement.	P
	Each cell or battery is stabilized at an external case temperature of $57 \pm 4$ °C. This period of time depends on the size and design of the cell or battery and is assessed and documented. If this assessment is not feasible, the exposure time shall be at least 6 hours for small cells and small batteries, and 12 hours for large cells and large batteries.	Test according to the requirement.	P
	Then the cell or battery at $57 \pm 4$ °C is subjected to a short-circuit condition with a total external resistance of less than 0.1 ohm. Short-circuit condition is continued for at least 1 h after the cell or battery external case temperature has returned to $57 \pm 4$ °C.	Test according to the requirement.	P
	The temperature of large multi-cell batteries decreased by half of the maximum temperature increase.		N/A
	The short circuit and cooling down phases is conducted at least at ambient temperature.		P
	The test sample is observed for a further 6 h.	Test according to the requirement.	P
	Results: The external temperature dose not exceed 170 °C, no rupture, no disassembly and no fire during this test and within the 6 h of observation.	See appended Table T.5 NT, ND, NR, NF.	P
38.3.4.6	Test T-6: Impact / crush		N/A

UN Recommendations on the Transport of Dangerous Goods, Part III – Section 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
	The test is conducted using test cells or component cells that have not been previously subjected to other transport tests.	Evaluated in the separate test report of the cell. See General product information - Engineering Conditions for details.	N/A
	Each test cell or component cell shall be subjected to one impact / crush only.		N/A
	Cylindrical cells not less than 18.0 mm in diameter is tested with impact test procedure. <i>NOTE: Diameter here refers to the design parameter (for example the diameter of 18 650 cells is 18.0 mm).</i>		N/A
	Test cell or component cell is placed on a flat smooth surface. A stainless steel bar with a diameter of 15.8 mm $\pm$ 0.1 mm and a length of at least 60 mm or of the longest dimension of the cell, whichever is greater, is placed across the centre of the test sample. A mass of 9.1 kg $\pm$ 0.1 kg is dropped from a height of 61 cm $\pm$ 2.5 cm at the intersection of the bar and the test sample using a vertical sliding track or channel. The vertical track is oriented 90 degrees from the horizontal supporting surface.		N/A
	The test sample is impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the steel bar lying across the centre of the test sample.		N/A
	Prismatic, pouch, coin/button cells and cylindrical cells less than 18.0 mm in diameter is tested with crush test procedure. <i>NOTE: Diameter here refers to the design parameter (for example the diameter of 18 650 cells is 18.0 mm).</i>		N/A
	A cell or component cell is crushed between two flat surfaces. The crushing is to be gradual with a speed of approximately 1,5 cm/s at the first point of contact.		N/A
	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.		N/A



UN Recommendations on the Transport of Dangerous Goods, Part III – Section 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
	<p>The crushing is to be continued until one of the three conditions below is reached:</p> <ul style="list-style-type: none"> <li>- the applied force reaches 13 kN <math>\pm</math> 0.78 kN;</li> <li>- the voltage of the cell drops by at least 100 mV;</li> <li>- the cell is deformed by 50 % or more of its original thickness.</li> </ul> <p>As soon as one of the above conditions has been obtained, the pressure shall be released.</p>		N/A
	The test sample is observed for a further 6 h.		N/A
	Results: The external temperature dose not exceed 170 °C, no disassembly and no fire during this test and within the 6 h of observation.		N/A
38.3.4.7	Test T-7: Overcharge		P
	The charge current of the rechargeable battery or the single cell rechargeable battery is twice the manufacturer's recommended maximum continuous charge current.	Test according to the requirement.	P
	The manufacturer's recommended charge voltage is not more than 18 V, the minimum voltage of the test is the lesser of two times the maximum charge voltage of the battery or 22 V.		N/A
	The manufacturer's recommended charge voltage is more than 18 V. The voltage of the test is not less than 1.2 times the maximum charge voltage.		P
	The test is conducted at ambient temperature. The charging condition is maintained for at least 24 h.		P
	The test sample is observed for a further 7 days.		P
	Results: no disassembly and no fire during this test and within the 7 days of observation.	See appended Table T.7 ND, NF.	P
38.3.4.8	Test T-8: Forced discharge		N/A
	Each cell is forced discharged at ambient temperature by connecting it in series with a 12 V direct current power supply at an initial current equal to the maximum continuous discharge current specified by the manufacturer. Time interval for discharging equals to rated capacity divided by the initial test current.	<p>Evaluated in the separate test report of the cell.</p> <p>See General product information - Engineering Conditions for details.</p>	N/A
	The test sample is observed for a further 7 days.		N/A
	Results: no disassembly and no fire during this test, nor within the 7 days of observation.		N/A

UN Recommendations on the Transport of Dangerous Goods, Part III – Section 38.3			
Clause	Requirement + Test	Result - Remark	Verdict

T.1		TABLE: Altitude						P
Sample No.	Precondition	Open circuit voltage before test (V)	Mass before test (g)	Open circuit voltage after test (V)	Mass after test (g)	Mass loss (%)	Mass loss limit (%)	Results
1	A	42.0	3208	42.0	3208	0	0.1	P
2	A	42.0	3188	42.0	3188	0	0.1	P
3	A	42.0	3208	42.0	3208	0	0.1	P
4	A	42.0	3192	42.0	3192	0	0.1	P
5	B	42.0	3220	42.0	3220	0	0.1	P
6	B	42.0	3220	42.0	3220	0	0.1	P
7	B	42.0	3224	42.0	3224	0	0.1	P
8	B	42.0	3204	42.0	3204	0	0.1	P
Supplementary information:								
1. Precondition:								
A = test sample at first cycle, in fully charged states.								
B = test sample after 25 cycles, in fully charged states								

T.2		TABLE: Thermal cycling						P
Sample No.	Precondition	Open circuit voltage before test (V)	Mass before test (g)	Open circuit voltage after test (V)	Mass after test (g)	Mass loss (%)	Mass loss limit (%)	Results
1	A	41.9	3208	41.4	3208	0	0.1	P
2	A	41.9	3188	41.3	3188	0	0.1	P
3	A	41.9	3208	41.3	3208	0	0.1	P
4	A	41.9	3192	41.2	3192	0	0.1	P
5	B	41.9	3220	41.6	3220	0	0.1	P
6	B	41.9	3220	41.6	3220	0	0.1	P
7	B	41.9	3224	41.4	3224	0	0.1	P
8	B	41.9	3204	41.4	3204	0	0.1	P
Supplementary information:								
1. Precondition:								
A = test sample at first cycle, in fully charged states.								
B = test sample after 25 cycles, in fully charged states								

UN Recommendations on the Transport of Dangerous Goods, Part III – Section 38.3			
Clause	Requirement + Test	Result - Remark	Verdict

T.3		TABLE: Vibration						P
Sample No.	Precondition	Open circuit voltage before test (V)	Mass before test (g)	Open circuit voltage after test (V)	Mass after test (g)	Mass loss (%)	Mass loss limit (%)	Results
1	A	41.4	3208	41.4	3208	0	0.1	P
2	A	41.3	3188	41.3	3188	0	0.1	P
3	A	41.3	3208	41.3	3208	0	0.1	P
4	A	41.2	3192	41.2	3192	0	0.1	P
5	B	41.6	3220	41.6	3220	0	0.1	P
6	B	41.6	3220	41.6	3220	0	0.1	P
7	B	41.4	3224	41.4	3224	0	0.1	P
8	B	41.4	3204	41.4	3204	0	0.1	P

Supplementary information:

1. Precondition:

A = test sample at first cycle, in fully charged states.

B = test sample after 25 cycles, in fully charged states

2. Test condition:.

Frequency range		Amplitudes (a: acceleration, s: displacement)	Duration of logarithmic sweep cycle (7 Hz – 200 Hz – 7 Hz)	Axis	Number of cycles
From	To				
$f_1 = 7 \text{ Hz}$	$f_2$	$a_1 = 1 \text{ gn}$	15 min	X	12
$f_2$	$f_3$	$s = 0.8 \text{ mm}$		Y	12
$f_3$	$f_4 = 200 \text{ Hz}$	$a_2$		Z	12
and back to $f_1 = 7 \text{ Hz}$				Total	36
Key:					
	Type:	$f_2$	$f_3$	$a_2$	
<input checked="" type="checkbox"/>	Cell & small battery	18 Hz	50 Hz	8 gn	
<input type="checkbox"/>	Large battery	18 Hz	25 Hz	1 gn	

T.4		TABLE: Shock						P
Sample No.	Precondition	Open circuit voltage before test (V)	Mass before test (g)	Open circuit voltage after test (V)	Mass after test (g)	Mass loss (%)	Mass loss limit (%)	Results
1	A	41.4	3208	41.4	3208	0	0.1	P
2	A	41.3	3188	41.3	3188	0	0.1	P
3	A	41.3	3208	41.3	3208	0	0.1	P
4	A	41.2	3192	41.2	3192	0	0.1	P

UN Recommendations on the Transport of Dangerous Goods, Part III – Section 38.3								
Clause	Requirement + Test				Result - Remark			Verdict
5	B	41.6	3220	41.6	3220	0	0.1	P
6	B	41.6	3220	41.6	3220	0	0.1	P
7	B	41.4	3224	41.4	3224	0	0.1	P
8	B	41.4	3204	41.4	3204	0	0.1	P

Supplementary information:

1. Precondition:

A = test sample at first cycle, in fully charged states.

B = test sample after 25 cycles, in fully charged states

2. Test condition:

Type		Minimum peak acceleration		Pulse duration
<input type="checkbox"/>	All cells	<input type="checkbox"/>	150 gn	6 ms
<input type="checkbox"/>	Large cells	50 gn		11 ms
<input checked="" type="checkbox"/>	Small batteries	<input checked="" type="checkbox"/>	150 gn	6 ms
		<input type="checkbox"/>	____ gn , result of formula as below: $Acceleration(g_n) = \sqrt{\left(\frac{100850}{mass^*}\right)}$	
<input type="checkbox"/>	Large batteries	<input type="checkbox"/>	50 gn	11 ms
		<input type="checkbox"/>	____ gn , result of formula as below: $Acceleration(g_n) = \sqrt{\left(\frac{30000}{mass^*}\right)}$	

T.5	TABLE: External short-circuit					P
Sample No.	Precondition	Open circuit voltage before test (V)	Open circuit voltage after test (V)	Maximum case temperature (°C)	Total external resistance (mΩ)	Results
1	A	41.4	0	58.1	81.0	P
2	A	41.3	0	58.3	76.0	P
3	A	41.3	0	57.8	81.8	P
4	A	41.2	0	57.7	72.1	P
5	B	41.6	0	57.8	81.0	P
6	B	41.6	0	58.0	76.0	P
7	B	41.4	0	57.7	81.8	P
8	B	41.4	0	58.0	72.1	P

UN Recommendations on the Transport of Dangerous Goods, Part III – Section 38.3			
Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:

1. Precondition:

A = test sample at first cycle, in fully charged states.

B = test sample after 25 cycles, in fully charged states

2. Prior to short circuit condition, the case temperature of cell is reached to a steady state temperature of 57 °C, and this condition is continued for additional 6 hours.

3. The short circuit and cooling down phases were conducted at ambient temperature 57 °C.

T.6a	TABLE: Impact			N/A
Sample No.	Precondition	Open circuit voltage before test (V)	Maximum case temperature (°C)	Results
1	A			
2	A			
3	A			
4	A			
5	A			
6	B			
7	B			
8	B			
9	B			
10	B			

Supplementary information:

1. Shape of cell: Cylindrical (diameter is not less than 18.0 mm)

2. Precondition:

A = test sample at first cycle, at 50% charged states.

B = test sample after 25 cycles, at 50% charged states.

T.6b	TABLE: Crush							N/A
Sample No.	Precondition	Open circuit voltage before test (V)	Voltage drop of the cell (mV)	Applied force (kN)	Thickness before test (mm)	Thickness after test (mm)	Maximum case temperature (°C)	Results
1	A							
2	A							
3	A							
4	A							
5	A							
6	B							

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7	B						
8	B						
9	B						
10	B						

Supplementary information:

1. Shape of cell: ☐ Cylindrical (diameter less than 18.0 mm), ☐ Prismatic, ☐ Pouch

2. Precondition:

A = test sample at first cycle, at 50% charged states.

B = test sample after 25 cycles, at 50% charged states.

T.7		TABLE: Overcharge				P
Sample No.	Precondition	Open circuit voltage before test (V)	Maximum charging current (A)	Maximum charging voltage (V)	Total charging time (h)	Results
9	A	42.0	10	50.4	24	P
10	A	42.0	10	50.4	24	P
11	A	42.0	10	50.4	24	P
12	A	42.0	10	50.4	24	P
13	B	42.0	10	50.4	24	P
14	B	42.0	10	50.4	24	P
15	B	42.0	10	50.4	24	P
16	B	42.0	10	50.4	24	P

Supplementary information:

1. Precondition:

A = test sample at first cycle, in fully charged states.

B = test sample after 25 cycles, in fully charged states

T.8		TABLE: Forced discharge				N/A
Sample No.	Precondition	Open circuit voltage before test (V)	Measured reverse charging current (mA)	Total time for reversed charging application (min)	Results	
1	A					
2	A					
3	A					
4	A					
5	A					
6	A					

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Clause	Requirement + Test			Result - Remark	Verdict
7	A				
8	A				
9	A				
10	A				
11	B				
12	B				
13	B				
14	B				
15	B				
16	B				
17	B				
18	B				
19	B				
20	B				
Supplementary information: 1. Precondition: A = test sample at first cycle, in fully discharged states. B = test sample after 25 cycles, in fully discharged states 2. Test condition: - Test voltage: 12V, - Initial supply current = maximum continuous discharge current = _____ mA - Time interval (h) = rated capacity divided by the initial test current = _____ h					