

TEST REPORT

Reliability Laboratory

Report No.:160217-10-9

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Date: Feb 17, 2016

E-ONE MOLI ENERGY CORP.

Tainan Science-Based Industry Park No.10 Dail 2nd Rd., Shan-Hwa, Tainan City, Taiwan R.O.C.

Tel: 886-6-505-0666, Fax: 886-6-505-0777

<http://www.molicel.com>.

The following merchandise was submitted and identified by the vendor as:

Item	Information	Comments
Product Description	Lithium-Ion Rechargeable Battery	
Battery Manufacturer	E-One Moli Energy Corp	
Model No.	IHR-18650C	
Typical Capacity	2000mAh	
Nominal Voltage	3.6V	
Charge Voltage	4.2V \pm 0.05V	
Maximum charging current	6A	
Maximum discharging current	20A	
Discharge Cutoff Voltage	2.0V	

We have tested the submitted sample(s) as requested and the following results were obtained:

Test Required : Section 38.3 Lithium metal and lithium ion batteries in UN ST/SG/AC.10/11/Rev.6

Recommendations on the TRANSPORT OF DANGEROUS GOODS Manual of

Tests and Criteria Fifth revised edition

Conclusion

Submitted samples comply with the requirement of Section 38.3 Lithium metal and lithium ion batteries in UN ST/SG/AC.10/11/Rev.6, Recommendations on the TRANSPORT OF DANGEROUS GOODS Manual of Tests and Criteria Fifth revised edition.

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Test Program:

ID	Test item	Test Conditions
T1	Altitude Simulation	Stored at a pressure of 11.6 kPa for 6 hrs at 20 ± 5 °C.
T2	Thermal Test	75 ± 2 °C(6hrs) \Leftrightarrow 40 ± 2 °C(6hrs) in 30 mins, 10 times.
T3	Vibration	7Hz \Leftrightarrow 200Hz \Leftrightarrow 7Hz in 15mins, 12 cycles for a total of 3hrs per direction, 3 directions.
T4	Shock	A half-sine shock of peak acceleration of 150g, pulse duration of 6ms, 3 shocks(+) and 3 shocks(-) per direction, 3 directions for a total of 18 shocks.
T5	External Short Circuit	External resistance of less than 0.1 ohm, case temp: 57 ± 4 °C, test time: 1hr or case temperature return, then deposit 6 hrs at 20 ± 5 °C.
T6	Impact	ψ 15.8 mm bar across the centre of the sample, 9.1 kg mass is to be dropped from 61 ± 2.5 cm height.
T7	Overcharge (Pack only)	Charge Current: 2 times I(max), two times V(max) or 22V, when $V(\max) < 18V$, 1.2 times V(max), when $V(\max) > 18V$, test time: 24hrs at 20 ± 5 °C.
T8	Forced Discharge	Discharge Current: I(max), 12V DC power supply and resistive load in series with cell, test time: rated capacity divided by I(max), then deposit 7 days at 20 ± 5 °C.

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Date of Tests:

Test Started	Test Completed
Mar 16, 2015	Apr 15, 2015

Lab Environmental Conditions:

Ambient temperature: $20\pm 5^{\circ}\text{C}$
Relative humidity: $55\pm 20\%\text{RH}$

Sample Condition:

Sample Status	Sample Size	Sample No.
1. First cycle in fully charged status	25pcs	No.1~No.25
2. After fifty cycles ending in fully charged status	10pcs	No.26~No.35

Test Equipment:

Name	Brand
Rechargeable Battery Testing System	MOLICEL
Vacuum-Temperature Cabinet	SINKU KIKO
Thermal Shock Tester	KSON
Vibration Test System	KING DESIGN
Controller Panel	KING DESIGN
Control Accelerometer	KING DESIGN
Shock Test System	KING DESIGN
Data Acquisition & Analysis System	KING DESIGN
ICP Accelerometer	KING DESIGN
Data Acquisition/ Switch Unit	HP
True RMS Multimeter	ADEX
Electronic Precision Balance	OHAUS
Impact Test System	AUTOLAND
DC Electronic Load	PRODIGT
DC Power Supply	Agilent

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Images:



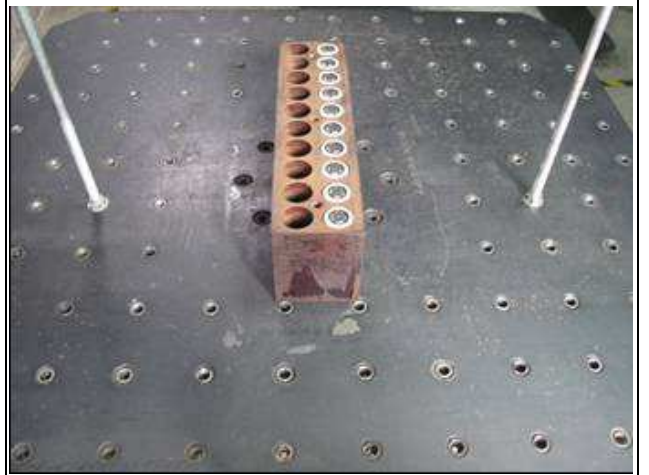
**Appearance of sample:
(2000mAh)**



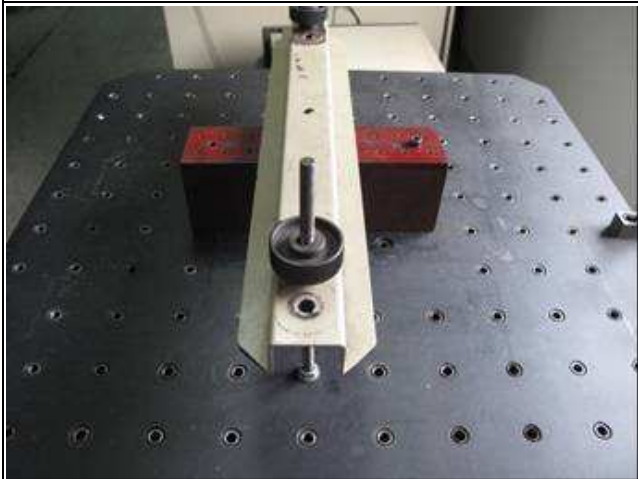
T1: Altitude Simulation



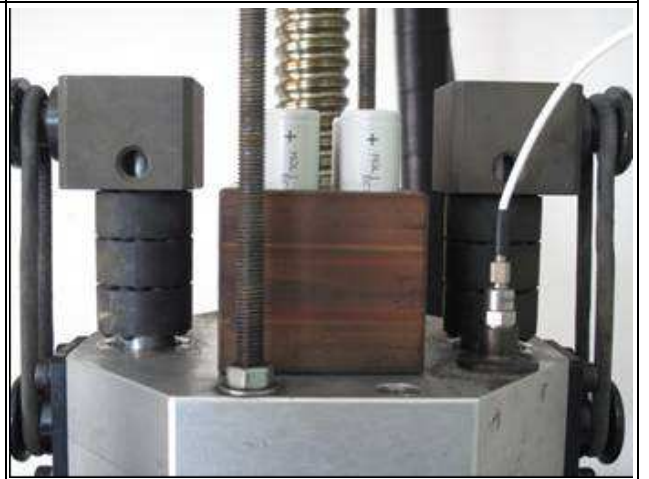
T2: Thermal Test



T3: Vibration Test



T3: Vibration Test



T4: Shock Test

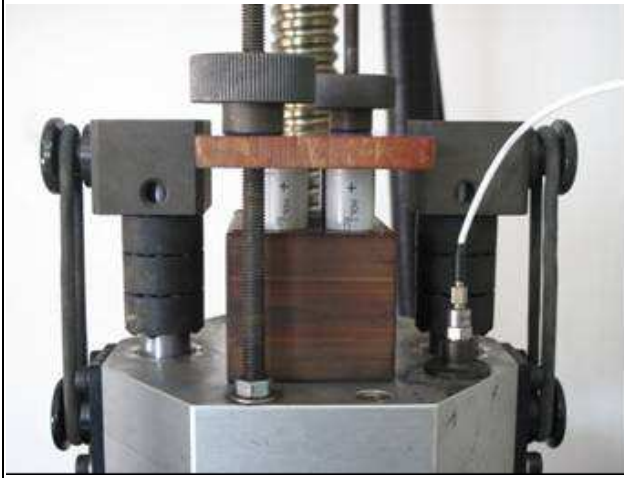
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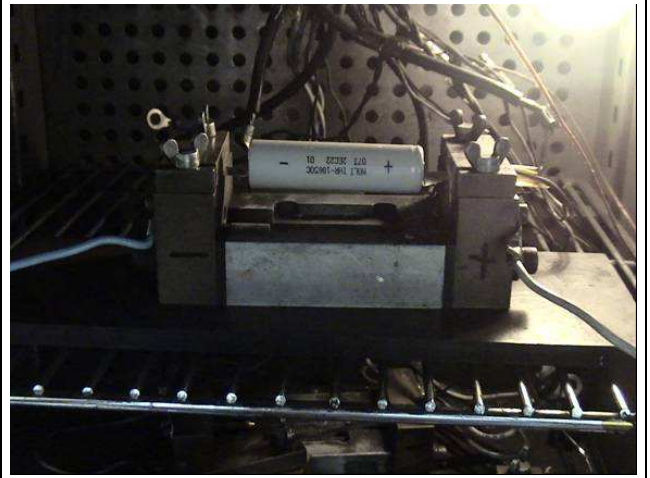
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Images--Continued:



T4: Shock Test



T5: External Short Circuit Test



T6: Impact Test



T8: Forced discharge Test

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Test Result:

T1 Altitude Simulation

Model: IHR-18650C									
Sample No.	Weight Measurement Unit:gram				Voltage Measurement Unit:Volt				Appearance Check
	Initial (W ₀)	Final (W _i)	Mass loss (W ₀ -W _i)/W ₀	Mass loss < 0.1%	Initial (V ₀)	Final (V _i)	(V _i /V ₀)	(V _i /V ₀) >90%	No leakage, No venting, No disassembly, No rupture and No fire
1	44.1643	44.1653	0.0000	0.0%	4.179	4.176	0.999	100.1%	PASS
2	44.1737	44.1740	0.0000	0.0%	4.179	4.176	0.999	100.1%	PASS
3	44.2262	44.2270	0.0000	0.0%	4.180	4.176	0.999	100.1%	PASS
4	44.2464	44.2462	0.0000	0.0%	4.182	4.178	0.999	100.1%	PASS
5	44.1778	44.1782	0.0000	0.0%	4.178	4.175	0.999	100.1%	PASS
6	44.2080	44.2083	0.0000	0.0%	4.181	4.178	0.999	100.1%	PASS
7	44.3004	44.3013	0.0000	0.0%	4.182	4.179	0.999	100.1%	PASS
8	44.2025	44.2021	0.0000	0.0%	4.186	4.182	0.999	100.1%	PASS
9	44.0747	44.0765	0.0000	0.0%	4.187	4.184	0.999	100.1%	PASS
10	44.0481	44.0474	0.0000	0.0%	4.185	4.182	0.999	100.1%	PASS
Conclusion	Meet the requirement of section 38.3.4.1 Test T.1: Altitude Simulation.								

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Test Result:

T2 Thermal Test

Model: IHR-18650C									
Sample No.	Weight Measurement Unit:gram				Voltage Measurement Unit:Volt				Appearance Check
	Initial (W ₀)	Final (W _i)	Mass loss (W ₀ -W _i)/W ₀	Mass loss < 0.1%	Initial (V ₀)	Final (V _i)	(V _i /V ₀)	(V _i /V ₀) >90%	No leakage, No venting, No disassembly, No rupture and No fire
1	44.1649	44.1653	0.0000	0.0%	4.176	4.122	0.987	98.7%	PASS
2	44.1700	44.1740	-0.0001	0.0%	4.176	4.123	0.987	98.7%	PASS
3	44.2278	44.2270	0.0000	0.0%	4.176	4.121	0.987	98.7%	PASS
4	44.2447	44.2462	0.0000	0.0%	4.178	4.125	0.987	98.7%	PASS
5	44.1792	44.1782	0.0000	0.0%	4.175	4.120	0.987	98.7%	PASS
6	44.2034	44.2083	-0.0001	0.0%	4.178	4.122	0.987	98.7%	PASS
7	44.2972	44.3013	-0.0001	0.0%	4.179	4.123	0.987	98.7%	PASS
8	44.2025	44.2021	0.0000	0.0%	4.182	4.125	0.986	98.6%	PASS
9	44.0770	44.0765	0.0000	0.0%	4.184	4.130	0.987	98.7%	PASS
10	44.0431	44.0474	-0.0001	0.0%	4.182	4.128	0.987	98.7%	PASS
Conclusion	Meet the requirement of section 38.3.4.2 Test T.2: Thermal test.								

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Test Result:

T3 Vibration

Model: IHR-18650C									
Sample No.	Weight Measurement Unit:gram				Voltage Measurement Unit:Volt				Appearance Check
	Initial (W ₀)	Final (W _i)	Mass loss (W ₀ -W _i)/W ₀	Mass loss < 0.1%	Initial (V ₀)	Final (V _i)	(V _i /V ₀)	(V _i /V ₀) >90%	No leakage, No venting, No disassembly, No rupture and No fire
1	44.1649	44.1616	0.0001	0.0%	4.122	4.122	1.000	100.0%	PASS
2	44.1700	44.1672	0.0001	0.0%	4.123	4.122	1.000	100.0%	PASS
3	44.2278	44.2252	0.0001	0.0%	4.121	4.121	1.000	100.0%	PASS
4	44.2447	44.2424	0.0001	0.0%	4.125	4.125	1.000	100.0%	PASS
5	44.1792	44.1764	0.0001	0.0%	4.120	4.120	1.000	100.0%	PASS
6	44.2034	44.2014	0.0000	0.0%	4.122	4.122	1.000	100.0%	PASS
7	44.2972	44.2948	0.0001	0.0%	4.123	4.123	1.000	100.0%	PASS
8	44.2025	44.2002	0.0001	0.0%	4.125	4.124	1.000	100.0%	PASS
9	44.0770	44.0751	0.0000	0.0%	4.130	4.129	1.000	100.0%	PASS
10	44.0431	44.0405	0.0001	0.0%	4.128	4.128	1.000	100.0%	PASS
Conclusion	Meet the requirement of section 38.3.4.3 Test T.3: Vibration Test.								

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Test Result:

T4

Shock

Model: IHR-18650C									
Sample No.	Weight Measurement Unit:gram				Voltage Measurement Unit:Volt				Appearance Check
	Initial (W ₀)	Final (W ₁)	Mass loss (W ₀ -W ₁)/W ₀	Mass loss < 0.1%	Initial (V ₀)	Final (V ₁)	(V ₁ /V ₀)	(V ₁ /V ₀) >90%	No leakage, No venting, No disassembly, No rupture and No fire
1	44.1616	44.1624	0.0000	0.0%	4.122	4.122	1.000	100.0%	PASS
2	44.1672	44.1657	0.0000	0.0%	4.122	4.122	1.000	100.0%	PASS
3	44.2252	44.2246	0.0000	0.0%	4.121	4.121	1.000	100.0%	PASS
4	44.2424	44.2426	0.0000	0.0%	4.125	4.125	1.000	100.0%	PASS
5	44.1764	44.1771	0.0000	0.0%	4.120	4.120	1.000	100.0%	PASS
6	44.2014	44.2007	0.0000	0.0%	4.122	4.122	1.000	100.0%	PASS
7	44.2948	44.2945	0.0000	0.0%	4.123	4.122	1.000	100.0%	PASS
8	44.2002	44.2000	0.0000	0.0%	4.124	4.124	1.000	100.0%	PASS
9	44.0751	44.0752	0.0000	0.0%	4.129	4.129	1.000	100.0%	PASS
10	44.0405	44.0409	0.0000	0.0%	4.128	4.128	1.000	100.0%	PASS
Conclusion	Meet the requirement of section 38.3.4.4 Test T.4: Shock Test.								

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Test Result:

T5 **External Short Circuit**

Model: IHR-18650C			
Sample No.	External Temperature Unit:°C		Appearance Check
	Temperature (T1)	T1 < 170°C	No disassembly, No rupture and No fire with in six hours
1	84	84	PASS
2	84	84	PASS
3	86	86	PASS
4	78	78	PASS
5	85	85	PASS
6	83	83	PASS
7	87	87	PASS
8	86	86	PASS
9	81	81	PASS
10	83	83	PASS
Conclusion	Meet the requirement of section 38.3.4.5 Test T5: External short circuit.		

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Test Result:

T6 Impact

Model: IHR-18650C			
Sample No.	Impact Temperature Unit:°C		Appearance Check
	Temperature (T1)	T1 < 170°C	No disassembly, No rupture and No fire
11	79	79	PASS
12	81	81	PASS
13	81	81	PASS
14	92	92	PASS
15	69	69	PASS
Conclusion	Meet the requirement of section 38.3.4.6Test T6: Impact		

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Test Result:

T8 **Forced Discharge**

Model: IHR-18650C		
Fresh cell (SOC:0%)		
Sample No.	Forced Discharge Temperature Unit:°C	Appearance Check
	Temperature (T1)	No disassembly and No fire within seven days of the test
16	42	PASS
17	37	PASS
18	50	PASS
19	42	PASS
20	36	PASS
21	43	PASS
22	42	PASS
23	35	PASS
24	41	PASS
25	37	PASS
50 Cycled cell (SOC:0%)		
Sample No.	Forced Discharge Temperature Unit:°C	Appearance Check
	Temperature (T1)	No disassembly and No fire within seven days of the test
26	48	PASS
27	37	PASS
28	38	PASS
29	43	PASS
30	40	PASS
31	41	PASS
32	33	PASS
33	39	PASS
34	43	PASS
35	39	PASS
Conclusion	Meet the requirement of section 38.3.4.8 Test T.8: Forced Discharge	

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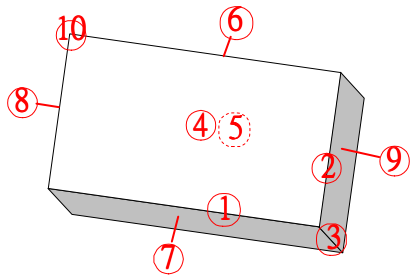
Test Summary:

Test Item	Test Result	Note
Test T.1: Altitude simulation	Pass	
Test T.2: Thermal test	Pass	
Test T.3: Vibration	Pass	
Test T.4: Shock	Pass	
Test T.5: External short circuit	Pass	
Test T.6: Impact Test	Pass	
Test T.8: Forced discharge Test	Pass	

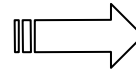
— — — The End of Test Report — — —

IHR-18650C 1.2m Drop test

(Pass, without damage and shifting of contents)



After drop



Certificate of Compliance

E-ONE MOLI ENERGY CORP.

Tainan Science-Based Industry Park
No.10 Dail 2nd Rd., Shan-Hwa, Tainan City,
Taiwan R.O.C.
Tel: 886-6-505-0666, Fax: 886-6-505-0777
<http://www.molicel.com>.

Issue Date: Feb 17, 2016

The following products have been tested in accordance with the UN document titled 'AMENDMENTS TO THE FIFTH REVISED EDITION OF THE RECOMMENDATIONS ON THE TRANSPORT OF DANGEROUS GOODS, MANUAL OF TESTS AND CRITERIA (Refer to UN ST/SG/AC.10/11/Rev.6)' and found to comply with the stated criteria:

<u>Item</u>	<u>Product Part No</u>	<u>Rated Capacity</u>
1	IHR-18650C	2.0Ah

All test records are maintained on file at E-One Moli Energy Corp.

Sincerely,



2016/2/17

Product Evaluation Engineer, QA