

TEST REPORT

Reliability Laboratory

Report No.:160217-10-1

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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.

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<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.	ICP103450DA	
Rated Capacity	2200mAh	
Nominal Voltage	3.7V	
Charge Current	Less than 2.2A	
Charge Voltage	4.2V \pm 0.05V	
Discharge Current	2.5A (\leq 45 °C), 1.5A (\leq 60°C)	
Discharge Cutoff Voltage	3.0V	

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 detections.
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	Crush	A cell or component cell is to be crushed between two flat surfaces. The crushing is to be with a speed of 1.5 cm/s at the first point of contact. The crushing is to be continued until the three options below is reached. (a) The applied force reaches $13\text{kN} \pm 0.78\text{kN}$ (b) The voltage for the cell drop by least 100 mV; or (c) The cell is deformed by 50% or more of its original
T7	Overcharge (Pack only)	Charge Current: 2 times $I(\text{max})$, two times $V(\text{max})$ or 22V, when $V(\text{max}) < 18\text{V}$, 1.2 times $V(\text{max})$, when $V(\text{max}) > 18\text{V}$, test time: 24hrs at 20 ± 5 °C.
T8	Forced Discharge	Discharge Current: $I(\text{max})$, 12V DC power supply and resistive load in series with cell, test time: rated capacity divided by $I(\text{max})$, then deposit 7 days at 20 ± 5 °C.

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Date of Tests:

Test Started	Test Completed
Jan 10, 2014	Jan 24, 2014

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.30
2. After fifty cycles ending in fully charged status	10pcs	No.31~No.40

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:
(2200mAh)



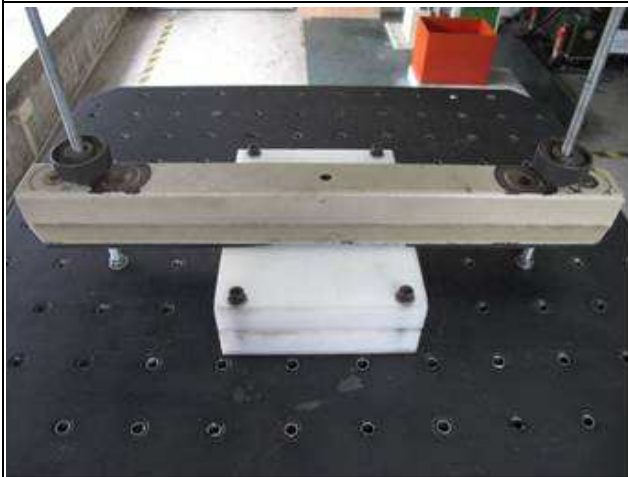
T1: Altitude Simulation



T2: Thermal Test



T3: Vibration Test



T3: Vibration Test



T4: Shock Test

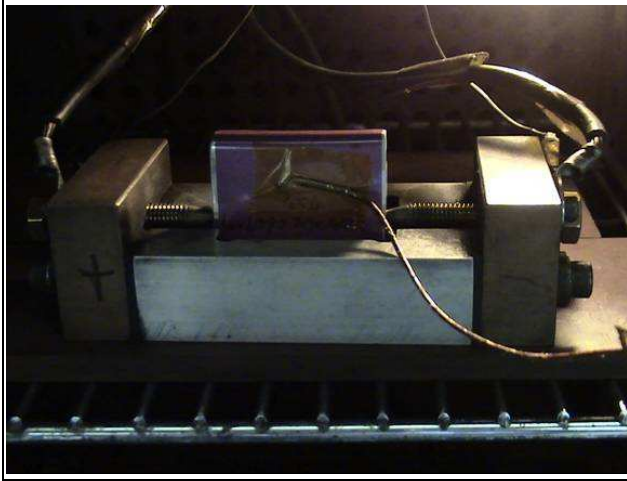
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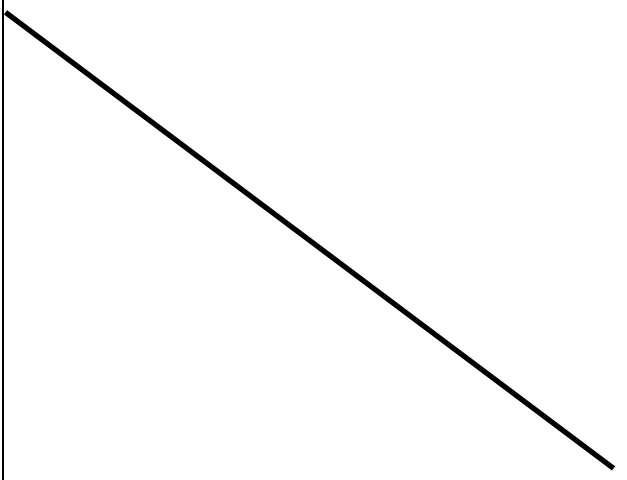
Images--Continued:



T5: External Short Circuit Test



T6: Crush Test



T7: Over charge



T8: Forced discharge Test

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Test Result:

T1 Altitude Simulation

Model: ICP-103450DA									
Sample No.	Weight Measurement				Voltage Measurement				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%	
				Unit:gram				Unit:Volt	No leakage, No venting, No disassembly, No rupture and No fire
1	41.0649	41.0645	0.0000	0.0%	4.172	4.172	1.000	100.0%	PASS
2	41.0964	41.0968	0.0000	0.0%	4.172	4.171	1.000	100.0%	PASS
3	40.9462	40.9460	0.0000	0.0%	4.173	4.173	1.000	100.0%	PASS
4	41.2925	41.2932	0.0000	0.0%	4.174	4.173	1.000	100.0%	PASS
5	41.3451	41.3455	0.0000	0.0%	4.170	4.170	1.000	100.0%	PASS
6	41.3098	41.3102	0.0000	0.0%	4.173	4.172	1.000	100.0%	PASS
7	40.9952	40.9948	0.0000	0.0%	4.179	4.178	1.000	100.0%	PASS
8	41.0600	41.0592	0.0000	0.0%	4.178	4.177	1.000	100.0%	PASS
9	40.9508	40.9491	0.0000	0.0%	4.177	4.176	1.000	100.0%	PASS
10	41.2868	41.2863	0.0000	0.0%	4.176	4.175	1.000	100.0%	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: ICP-103450DA									
Sample No.	Weight Measurement				Voltage Measurement				Appearance Check
	Unit:gram				Unit:Volt				
	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	41.0645	41.0636	0.0000	0.0%	4.172	4.131	0.990	99.0%	PASS
2	41.0968	41.0947	0.0001	0.0%	4.171	4.130	0.990	99.0%	PASS
3	40.9460	40.9447	0.0000	0.0%	4.173	4.131	0.990	99.0%	PASS
4	41.2932	41.2914	0.0000	0.0%	4.173	4.132	0.990	99.0%	PASS
5	41.3455	41.3437	0.0000	0.0%	4.170	4.130	0.990	99.0%	PASS
6	41.3102	41.3089	0.0000	0.0%	4.172	4.131	0.990	99.0%	PASS
7	40.9948	40.9932	0.0000	0.0%	4.178	4.134	0.989	98.9%	PASS
8	41.0592	41.0585	0.0000	0.0%	4.177	4.134	0.990	99.0%	PASS
9	40.9491	40.9494	0.0000	0.0%	4.176	4.134	0.990	99.0%	PASS
10	41.2863	41.2855	0.0000	0.0%	4.175	4.132	0.990	99.0%	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: ICP-103450DA									
Sample No.	Weight Measurement				Voltage Measurement				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%	
				Unit:gram				Unit:Volt	No leakage, No venting, No disassembly, No rupture and No fire
1	41.0636	41.0634	0.0000	0.0%	4.131	4.132	1.000	100.0%	PASS
2	41.0947	41.0954	0.0000	0.0%	4.130	4.131	1.000	100.0%	PASS
3	40.9447	40.9451	0.0000	0.0%	4.131	4.132	1.000	100.0%	PASS
4	41.2914	41.2920	0.0000	0.0%	4.132	4.132	1.000	100.0%	PASS
5	41.3437	41.3446	0.0000	0.0%	4.130	4.131	1.000	100.0%	PASS
6	41.3089	41.3094	0.0000	0.0%	4.131	4.132	1.000	100.0%	PASS
7	40.9932	40.9943	0.0000	0.0%	4.134	4.135	1.000	100.0%	PASS
8	41.0585	41.0595	0.0000	0.0%	4.134	4.134	1.000	100.0%	PASS
9	40.9494	40.9504	0.0000	0.0%	4.134	4.135	1.000	100.0%	PASS
10	41.2855	41.2862	0.0000	0.0%	4.132	4.133	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: ICP-103450DA									
Sample No.	Weight Measurement Unit:gram				Voltage Measurement Unit:Volt				Appearance Check No leakage, No venting, No disassembly, No rupture and No fire
	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%	
1	41.0634	41.0636	0.0000	0.0%	4.132	4.131	1.000	100.0%	PASS
2	41.0954	41.0956	0.0000	0.0%	4.131	4.131	1.000	100.0%	PASS
3	40.9451	40.9448	0.0000	0.0%	4.132	4.132	1.000	100.0%	PASS
4	41.2920	41.2917	0.0000	0.0%	4.132	4.132	1.000	100.0%	PASS
5	41.3446	41.3442	0.0000	0.0%	4.131	4.131	1.000	100.0%	PASS
6	41.3094	41.3095	0.0000	0.0%	4.132	4.132	1.000	100.0%	PASS
7	40.9943	40.9938	0.0000	0.0%	4.135	4.134	1.000	100.0%	PASS
8	41.0595	41.0590	0.0000	0.0%	4.134	4.134	1.000	100.0%	PASS
9	40.9504	40.9499	0.0000	0.0%	4.135	4.135	1.000	100.0%	PASS
10	41.2862	41.2856	0.0000	0.0%	4.133	4.133	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: ICP-103450DA			
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	57	57	PASS
2	57	57	PASS
3	57	57	PASS
4	57	57	PASS
5	57	57	PASS
6	56	56	PASS
7	58	58	PASS
8	57	57	PASS
9	57	57	PASS
10	56	56	PASS
Conclusion	Meet the requirement of section 38.3.4.5 Test T5: External short circuit.		

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Test Result:

T6

Crush

Model: ICP-103450CA			
Sample No.	Impact Temperature Unit: °C		Appearance Check
	Temperature (T1)	T1 < 170°C	No disassembly, No rupture and No fire
11	22	22	PASS
12	22	22	PASS
13	22	22	PASS
14	22	22	PASS
15	22	22	PASS
Conclusion	Meet the requirement of section 38.3.4.6 Test T6: Crush		

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Test Result:

T8 **Forced Discharge**

Model: ICP-103450DA		
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
21	39	PASS
22	41	PASS
23	39	PASS
24	41	PASS
25	40	PASS
26	42	PASS
27	39	PASS
28	41	PASS
29	42	PASS
30	42	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
31	41	PASS
32	42	PASS
33	41	PASS
34	37	PASS
35	41	PASS
36	41	PASS
37	41	PASS
38	46	PASS
39	43	PASS
40	45	PASS
Conclusion	Meet the requirement of section 38.3.4.8 Test T.8: Forced Discharge	

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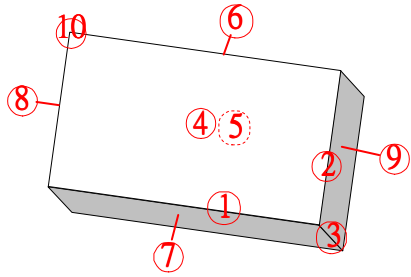
Test Summary:

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: Crush Test	Pass	
Test T.8: Forced discharge Test	Pass	

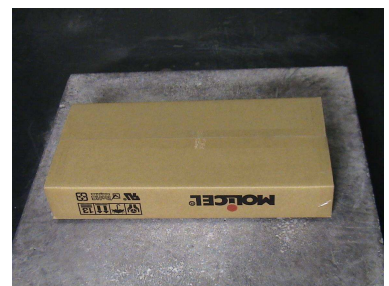
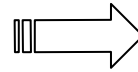
— — — The End of Test Report — — —

ICP103450DA 1.2m Drop test

(Pass, without damage and shifting of contents)



After drop



Certificate of Compliance

Issue 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.tw>

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	ICP-103450DA	2.2Ah

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

Sincerely,



2016/2/17

Product Evaluation Engineer, QA