



Test Report No.: UNT181031C15

Client
Name : **E-ONE MOLI ENERGY CORP.**
Address : **10, Dali 2nd Rd., Tainan Science-Based Industrial Park, Shanhua Dist., Tainan City, 74144, Taiwan**

Test Item : Rechargeable Lithium-ion Battery Cell

Identification : IHR-18650C

Testing laboratory
Name : **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**
Address : **No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan**



Test specification
Standard : **United Nations, Recommendations on the Transport of Dangerous Goods, Manual of Test and Criteria (Rev. 6th +Amend.1), Section 38.3**

Test Result : The test item passed.

Prepared By :

Signature
Anson Wang
Assistant Manager

Date

Approved By:

Signature
Ted Wu
Senior Manager

Date

This report should not be used by the client to claim product certification, approval, or endorsement by TAF, NVLAP, NIST or any government agencies.



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TEST SUMMARY	
United Nations, Recommendations on the Transport of Dangerous Goods, Manual of Test and Criteria (Rev. 6 th +Amend.1), Section 38.3	
Report Reference No.	UNT181031C15
Compiled by	See cover sheet
Title.....	See cover sheet
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Date of issue	2018-12-11
Total number of pages	26
Testing Laboratory	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Address	No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City, TAIWAN
Website :	http://ee.bureauveritas.com.tw
Manufacturer's name	E-ONE MOLI ENERGY CORP.
Address	10, Dali 2nd Rd., Tainan Science-Based Industrial Park, Shanhua Dist., Tainan City, 74144, Taiwan
Contact information	
Name	Yu Feng Hsu
Phone number	+886-6-505-0666
E-Mail address	yfhsu@molicel.com
Website	http://molicel.com.tw
Test specification:	
Standard.....	United Nations, Recommendations on the Transport of Dangerous Goods, Manual of Test and Criteria (Rev. 6 th +Amend.1), Section 38.3.
Product description	Rechargeable Lithium-ion Battery Cell
Trade Mark	MOLICELI or 
Model number.....	IHR-18650C
Ratings	3.6Vdc, 2.0Ah
Mass.....	47 g (Max)
Physical description.....	Cylindrical battery cell
Reference to assembled battery testing requirement.....	N/A

Summary of testing:

List of tests conducted		
Clause	Name of test item	Result
38.3.4.1	Altitude simulation	P
38.3.4.2	Thermal test	P
38.3.4.3	Vibration	P
38.3.4.4	Shock	P
38.3.4.5	External short circuit	P
38.3.4.6	Impact	P
38.3.4.7	Overcharge	N/A
38.3.4.8	Forced discharge	P

The load conditions used during testing: The battery cell is charged and discharged according to its rating.

Nominal capacity (Ah):	2.0
Nominal voltage (Vdc):	3.6
Minimum end voltage of discharge (Vdc)	2.0
Max. charge voltage (Vdc):	4.25
Max. charge current (A):	6
Max. continue discharge current (A)	20

Copy of marking plate:



Explanation of date Code:

Cell Date Code: YMDDSS

Y: indicates calendar year, 9=2009, A=2010, B=2011, C=2012, D=2013, E=2014, etc.

M: indicates calendar month, 1~9, 10=A, 11=B, 12=C.

DD: indicates calendar date of a month, 01~31.

SS: indicates the sequence number in a day, 01, 02, etc..



Test item particulars	
Classification of installation and use	Built-in
Supply Connection	Customized terminal
.....	
.....	
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)
Testing	
Date of receipt of test item	2018-10-31
Date (s) of performance of tests	2018-11-09 to 2018-11-22
General remarks:	
<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>Throughout this report a point is used as the decimal separator.</p>	



General product information:

- (1) The equipment under test (EUT) model IHR-18650C is a Rechargeable Lithium-ion Battery Cell.
- (2) The battery cell maximum ambient temperature is specified as 45°C for Charging and 60°C for Discharging.
- (3) The product was investigated to the following additional 1.2m Drop test, details test result see "Attachment 1".
- (4) Dimension of the battery cell: (D) 18.6 mm by (H) 65.2 mm max.
- (5) Battery Cell Weight: 47 g max.

Test condition:

Temperature: 20±5°C

Relative humidity: 60%

Air pressure: 950 mbar

The test samples were pre-production samples without serial number.



United Nations, Recommendations on the Transport of Dangerous Goods,
Manual of Test and Criteria (Rev. 6th +Amend.1), Section 38.3

Clause	Requirement + Test	Result - Remark	Verdict
38.3	Lithium batteries		P
38.3.1	Purpose		P
38.3.2	Scope		P
38.3.2.1	Lithium cells or batteries which differ from a tested type by: (a) A change of more than 0.1 g or 20% by mass, whichever is greater, to the cathode, to the anode, or to the electrolyte; or (b) A change that would materially affect the test results.	This a new product (new application)	N/A
38.3.2.2	Classification	The EUT is a Rechargeable Lithium-ion Battery Cell.	P
38.3.3	The number and condition of cells and batteries		P
	Cells (Primary/Rechargeable)	The EUT is a Rechargeable Lithium-ion Battery Cell.	P
	Batteries (Primary/Rechargeable)	The EUT is a Rechargeable Lithium-ion Battery Cell.	P
38.3.4	Procedure		P
	Each cell and battery type must be subjected to tests 1 to 8. Tests 1 to 5 must be conducted in sequence on the same cell or battery. Tests 6 and 8 should be conducted using not otherwise tested cells or batteries. Test 7 may be conducted using undamaged batteries previously used in Tests 1 to 5 for purposes of testing on cycled batteries.	The sequence Test 1 to Test 5 tests were conducted on the same samples. Test 6 was conducted on the new component cell samples. Test 8 was conducted on the new component cell samples.	P
38.3.4.1	Altitude simulation	The cells were no mass loss, no leakage, no venting, no disassembly, no rupture and no fire and the OCV of batteries after testing was not less than 90% of its voltage before testing.	P
38.3.4.2	Thermal test	The cells were no mass loss, no leakage, no venting, no disassembly, no rupture and no fire and the OCV of batteries after testing was not less than 90% of its voltage before testing.	P



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Clause	Requirement + Test	Result - Remark	Verdict
38.3.4.3	Vibration	The cells were no mass loss, no leakage, no venting, no disassembly, no rupture and no fire and the OCV of batteries after testing was not less than 90% of its voltage before testing.	P
38.3.4.4	Shock	The cells were no mass loss, no leakage, no venting, no disassembly, no rupture and no fire and the OCV of batteries after testing was not less than 90% of its voltage before testing.	P
38.3.4.5	External short test	The cells were no disassembly, no fire and no rupture, and the external temperature did not exceed 170 °C.	P
38.3.4.6	Impact	The cells were no disassembly, no fire and no rupture, and the external temperature did not exceed 170 °C.	P
	Crush	The cell is a cylindrical type which diameter is 18mm.	N/A
38.3.4.7	Overcharge	The EUT is a Rechargeable Lithium-ion Battery Cell.	N/A
38.3.4.8	Forced discharge	The cells were no disassembly and no fire.	P



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Clause	Requirement + Test	Result - Remark	Verdict
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38.3.2.2 TABLE: List of critical Components					P
Object/part No.	Manufacturer/ trademark	Type/Model	Technical Data	Standard	Marks of Conformity
Positive Electrode	Interchangeable	Interchangeable	Lithium Nickel Manganese Cobalt Oxide	--	--
Negative Electrode	Interchangeable	Interchangeable	Carbon	--	--
Speparator	UBE	UP3074	PP/PE/PP Thinckness:20um	--	--
Speparator (Alt.)	Celard	H2010	PP/PE/PP Thinckness:20um	--	--
Electrolyte	Interchangeable	Interchangeable	LiPF6 in organic solvents	--	--
Cell Case	Interchangeable	Interchangeable	Ni plating mild steel	--	--
Positive Tab	Interchangeable	Interchangeable	Material: AL	--	--
Negative Tab	Interchangeable	Interchangeable	Material: Cu or Cu/Ni	--	--
supplementary information: --					



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Manual of Test and Criteria (Rev. 6th +Amend.1), Section 38.3

Clause	Requirement + Test	Result - Remark	Verdict
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38.3.4.1	Altitude simulation							P
Model / Sample No.	Sample Status	Before test		After test		Mass loss (%)	Residual OCV (%)	Other Event
		Weight (g)	OCV (V)	Weight (g)	OCV (V)			
IHR-18650C / 001	After 1 cycle	43.91	4.25	43.91	4.25	0.00	100	OK
IHR-18650C / 002	After 1 cycle	43.62	4.25	43.62	4.25	0.00	100	OK
IHR-18650C / 003	After 1 cycle	43.91	4.25	43.91	4.24	0.00	99.8	OK
IHR-18650C / 004	After 1 cycle	43.33	4.25	43.33	4.25	0.00	100	OK
IHR-18650C / 005	After 1 cycle	43.83	4.25	43.83	4.24	0.00	99.8	OK
IHR-18650C / 006	After 25 cycle	44.25	4.25	44.25	4.25	0.00	100	OK
IHR-18650C / 007	After 25 cycle	44.20	4.24	44.20	4.24	0.00	100	OK
IHR-18650C / 008	After 25 cycle	44.21	4.25	44.21	4.25	0.00	100	OK
IHR-18650C / 009	After 25 cycle	44.04	4.24	44.04	4.24	0.00	100	OK
IHR-18650C / 010	After 25 cycle	44.04	4.24	44.04	4.24	0.00	100	OK

Note(s):

Mass loss limit:

Mass M of cell or battery [⊕]	Mass loss limit [⊕]
M<1g [⊕]	0.5% [⊕]
1g<M<75g [⊕]	0.2% [⊕]
M>75g [⊕]	0.1% [⊕]

L-Leakage

V-Venting

D-Disassembly

R-Rupture

F-Fire

OK-No Leakage, No Venting, No Disassembly, No Rupture, No Fire



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Manual of Test and Criteria (Rev. 6th +Amend.1), Section 38.3

Clause	Requirement + Test	Result - Remark	Verdict
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38.3.4.2 Thermal test							P	
Model / Sample No.	Sample Status	Before test		After test		Mass loss (%)	Residual OCV (%)	Other Event
		Weight (g)	OCV (V)	Weight (g)	OCV (V)			
IHR-18650C / 001	After 1 cycle	43.91	4.25	43.91	4.20	0.00	98.9	OK
IHR-18650C / 002	After 1 cycle	43.62	4.25	43.62	4.21	0.00	99.0	OK
IHR-18650C / 003	After 1 cycle	43.91	4.24	43.91	4.19	0.00	99.0	OK
IHR-18650C / 004	After 1 cycle	43.33	4.25	43.33	4.20	0.00	98.9	OK
IHR-18650C / 005	After 1 cycle	43.83	4.24	43.83	4.19	0.00	99.0	OK
IHR-18650C / 006	After 25 cycle	44.25	4.25	44.23	4.18	0.04	98.4	OK
IHR-18650C / 007	After 25 cycle	44.20	4.24	44.18	4.19	0.04	98.8	OK
IHR-18650C / 008	After 25 cycle	44.21	4.25	44.20	4.20	0.02	98.8	OK
IHR-18650C / 009	After 25 cycle	44.04	4.24	44.01	4.17	0.06	98.3	OK
IHR-18650C / 010	After 25 cycle	44.04	4.24	44.02	4.18	0.04	98.6	OK

Note(s):

Mass loss limit:

Mass M of cell or battery [⊕]	Mass loss limit [⊕]
M<1g [⊕]	0.5% [⊕]
1g<M<75g [⊕]	0.2% [⊕]
M>75g [⊕]	0.1% [⊕]

L-Leakage

V-Venting

D-Disassembly

R-Rupture

F-Fire

OK-No Leakage, No Venting, No Disassembly, No Rupture, No Fire



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Manual of Test and Criteria (Rev. 6th +Amend.1), Section 38.3

Clause	Requirement + Test	Result - Remark	Verdict
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38.3.4.3		Vibration						P	
Model / Sample No.	Sample Status	Before test		After test		Mass loss (%)	Residual OCV (%)	Other Event	
		Weight (g)	OCV (V)	Weight (g)	OCV (V)				
IHR-18650C / 001	After 1 cycle	43.91	4.20	43.91	4.19	0	99.9	OK	
IHR-18650C / 002	After 1 cycle	43.62	4.21	43.62	4.19	0	99.8	OK	
IHR-18650C / 003	After 1 cycle	43.91	4.19	43.91	4.19	0	100	OK	
IHR-18650C / 004	After 1 cycle	43.33	4.20	43.33	4.20	0	100	OK	
IHR-18650C / 005	After 1 cycle	43.83	4.19	43.83	4.18	0	99.9	OK	
IHR-18650C / 006	After 25 cycle	44.23	4.18	44.23	4.18	0	100	OK	
IHR-18650C / 007	After 25 cycle	44.18	4.19	44.18	4.19	0	100	OK	
IHR-18650C / 008	After 25 cycle	44.20	4.20	44.20	4.20	0	100	OK	
IHR-18650C / 009	After 25 cycle	44.01	4.17	44.01	4.17	0	100	OK	
IHR-18650C / 010	After 25 cycle	44.02	4.18	44.02	4.18	0	100	OK	

Note(s):

Mass loss limit:

Mass M of cell or battery ^g	Mass loss limit [%]
M<1g ^g	0.5% [%]
1g<M<75g ^g	0.2% [%]
M>75g ^g	0.1% [%]

L-Leakage

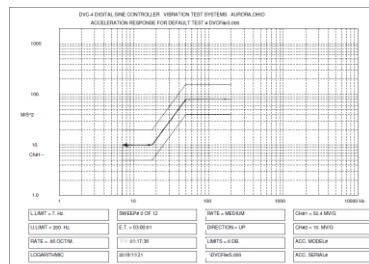
V-Venting

D-Disassembly

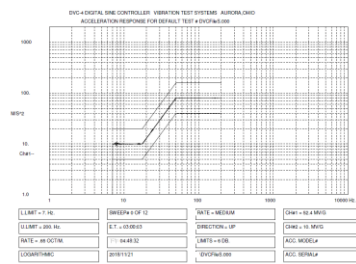
R-Rupture

F-Fire

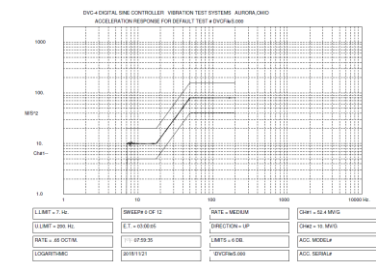
OK-No Leakage, No Venting, No Disassembly, No Rupture, No Fire



X axis



Y axis



Z axis



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Clause	Requirement + Test	Result - Remark	Verdict
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38.3.4.4 Shock								P
Model / Sample No.	Sample Status	Before test		After test		Mass loss (%)	Residual OCV (%)	Other Event
		Weight (g)	OCV (V)	Weight (g)	OCV (V)			
IHR-18650C / 001	After 1 cycle	43.91	4.19	43.91	4.19	0	100	OK
IHR-18650C / 002	After 1 cycle	43.62	4.19	43.62	4.19	0	100	OK
IHR-18650C / 003	After 1 cycle	43.91	4.19	43.91	4.19	0	100	OK
IHR-18650C / 004	After 1 cycle	43.33	4.20	43.33	4.20	0	100	OK
IHR-18650C / 005	After 1 cycle	43.83	4.18	43.83	4.18	0	100	OK
IHR-18650C / 006	After 25 cycle	44.23	4.18	44.23	4.18	0	100	OK
IHR-18650C / 007	After 25 cycle	44.18	4.19	44.18	4.19	0	100	OK
IHR-18650C / 008	After 25 cycle	44.20	4.20	44.20	4.20	0	100	OK
IHR-18650C / 009	After 25 cycle	44.01	4.17	44.01	4.17	0	100	OK
IHR-18650C / 010	After 25 cycle	44.02	4.18	44.02	4.18	0	100	OK

Note(s):

Mass loss limit:

Mass M of cell or battery ^g	Mass loss limit [%]
M<1g ^g	0.5% [%]
1g<M<75g ^g	0.2% [%]
M>75g ^g	0.1% [%]

L-Leakage

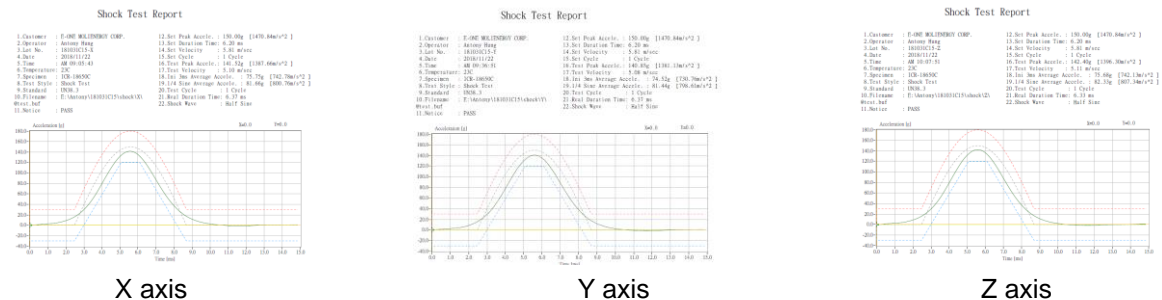
V-Venting

D-Disassembly

R-Rupture

F-Fire

OK-No Leakage, No Venting, No Disassembly, No Rupture, No Fire





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Manual of Test and Criteria (Rev. 6th +Amend.1), Section 38.3

Clause	Requirement + Test	Result - Remark	Verdict
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38.3.4.5	External short circuit			P
Model / Sample No.	Sample Status	Max. External temperature of EUT surface(°C)	Other Event	
IHR-18650C / 001	After 1 cycle	100.1	OK	
IHR-18650C / 002	After 1 cycle	97.0	OK	
IHR-18650C / 003	After 1 cycle	99.4	OK	
IHR-18650C / 004	After 1 cycle	95.2	OK	
IHR-18650C / 005	After 1 cycle	94.8	OK	
IHR-18650C / 006	After 25 cycle	86.7	OK	
IHR-18650C / 007	After 25 cycle	87.9	OK	
IHR-18650C / 008	After 25 cycle	85.1	OK	
IHR-18650C / 009	After 25 cycle	87.1	OK	
IHR-18650C / 010	After 25 cycle	87.4	OK	

Note(s):

D-Disassembly

R-Rupture

F-Fire

OK- No Disassembly, No Fire, The external temperature of cell not exceeds 170°C.



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Manual of Test and Criteria (Rev. 6th +Amend.1), Section 38.3

Clause	Requirement + Test	Result - Remark	Verdict
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38.3.4.6		Impact	P	
Model / Sample No.	Sample Status	Max. External temperature of EUT surface(°C)	Other Event	
IHR-18650C / A011	At first cycle at 50 % of the designed capacity	83.6	OK	
IHR-18650C / A012	At first cycle at 50 % of the designed capacity	63.4	OK	
IHR-18650C / A013	At first cycle at 50 % of the designed capacity	77.5	OK	
IHR-18650C / A014	At first cycle at 50 % of the designed capacity	68.7	OK	
IHR-18650C / A015	At first cycle at 50 % of the designed capacity	47.3	OK	
IHR-18650C / 016	At 25 cycle at 50 % of the designed capacity	65.3	OK	
IHR-18650C / 017	At 25 cycle at 50 % of the designed capacity	66.9	OK	
IHR-18650C / 018	At 25 cycle at 50 % of the designed capacity	64.2	OK	
IHR-18650C / 019	At 25 cycle at 50 % of the designed capacity	59.8	OK	
IHR-18650C / 020	At 25 cycle at 50 % of the designed capacity	65.2	OK	
Note(s): D-Disassembly F-Fire OK- No Disassembly, No Fire, The external temperature of cell not exceeds 170°C.				



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Clause	Requirement + Test	Result - Remark	Verdict

38.3.4.6	Crush			N/A
Model / Sample No.	Sample Status	Max. External temperature of EUT surface(°C)	Other Event	
--	--	--	--	
Note(s):				



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Clause	Requirement + Test	Result - Remark	Verdict

38.3.4.7	Overcharge		N/A
Model / Sample No.	Sample Status	Other Event	
--	--	--	
Note(s): EUT is a lithium ion battery cell			



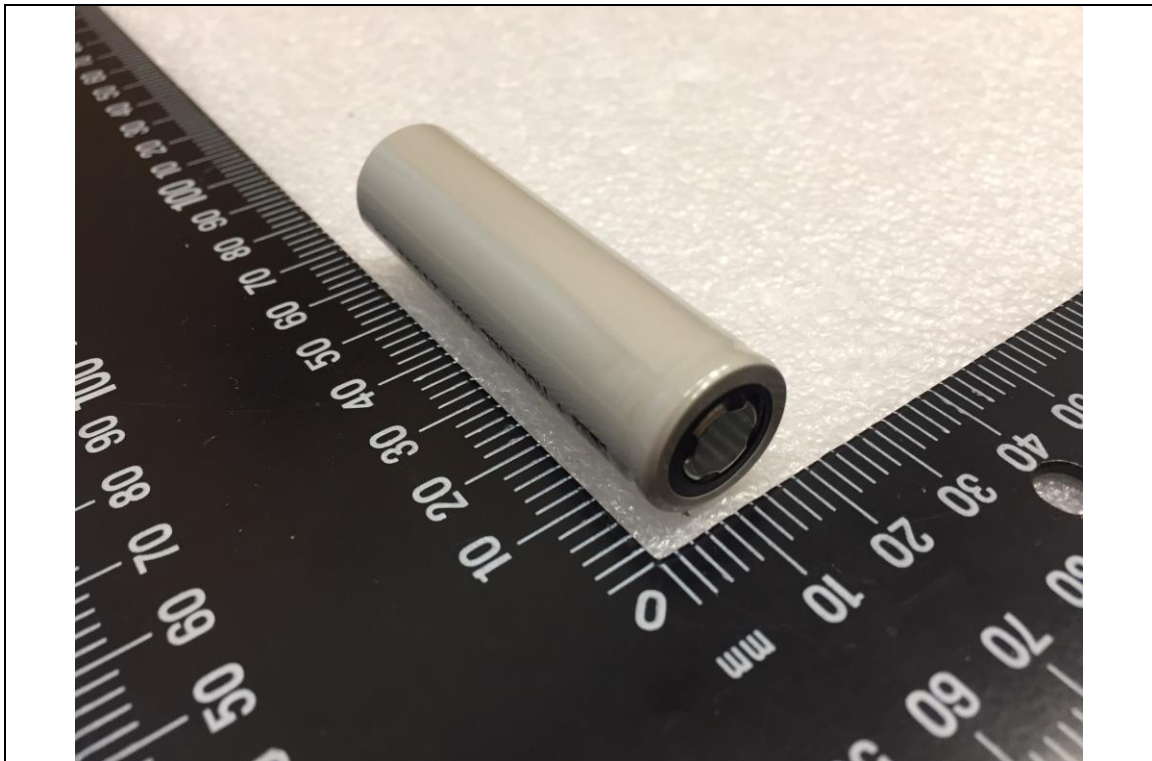
38.3.4.8		Forced discharge		P
Model / Sample No.		Sample Status		Other Event
IHR-18650C / 021		After 1 cycle		OK
IHR-18650C / 022		After 1 cycle		OK
IHR-18650C / 023		After 1 cycle		OK
IHR-18650C / 024		After 1 cycle		OK
IHR-18650C / 025		After 1 cycle		OK
IHR-18650C / 026		After 1 cycle		OK
IHR-18650C / 027		After 1 cycle		OK
IHR-18650C / 028		After 1 cycle		OK
IHR-18650C / 029		After 1 cycle		OK
IHR-18650C / 030		After 1 cycle		OK
IHR-18650C / 031		After 25 cycle		OK
IHR-18650C / 032		After 25 cycle		OK
IHR-18650C / 033		After 25 cycle		OK
IHR-18650C / 034		After 25 cycle		OK
IHR-18650C / 035		After 25 cycle		OK
IHR-18650C / 036		After 25 cycle		OK
IHR-18650C / 037		After 25 cycle		OK
IHR-18650C / 038		After 25 cycle		OK
IHR-18650C / 039		After 25 cycle		OK
IHR-18650C / 040		After 25 cycle		OK
Note(s): D-Disassembly F-Fire OK- No Disassembly, No Fire				

List of test equipment used:

(Note: This is an example of the required attachment. Other forms with a different layout but containing similar information are also acceptable.)

Clause	Measurement / testing	Testing / measuring equipment / material used	Range used	Calibration date

Photos:



Top view for the cell



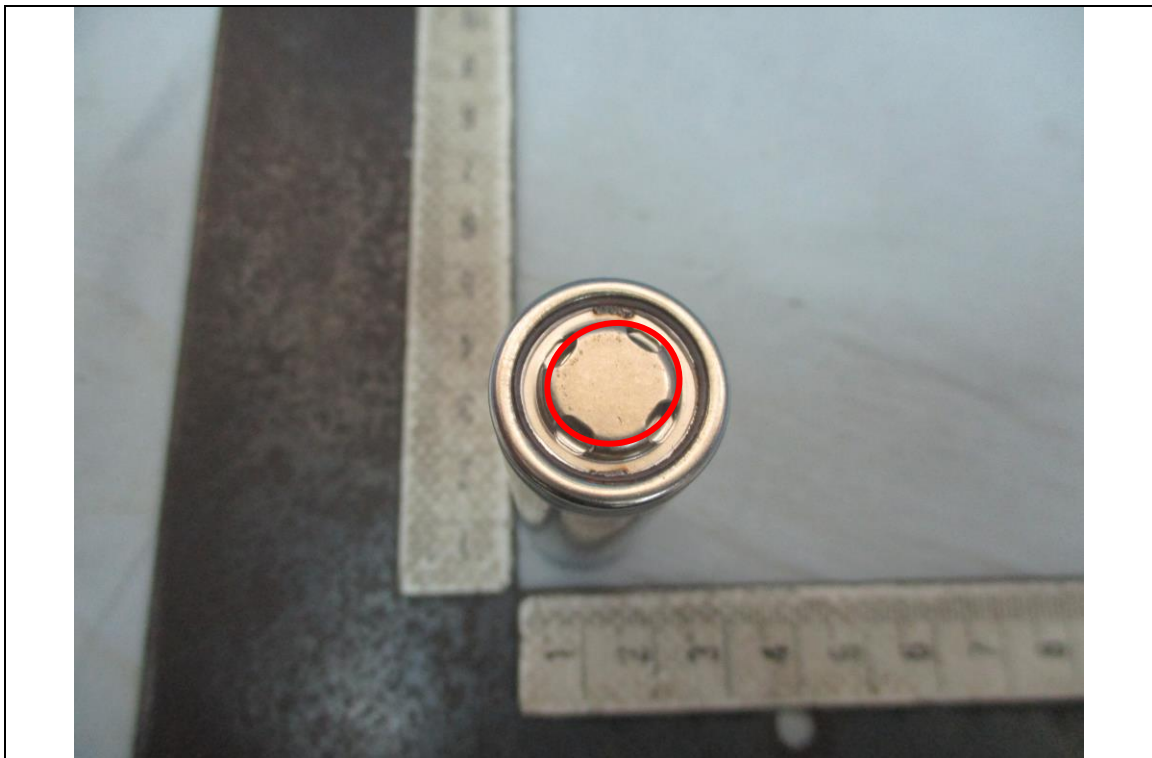
Bottom view for the cell



Top view for the cell without film



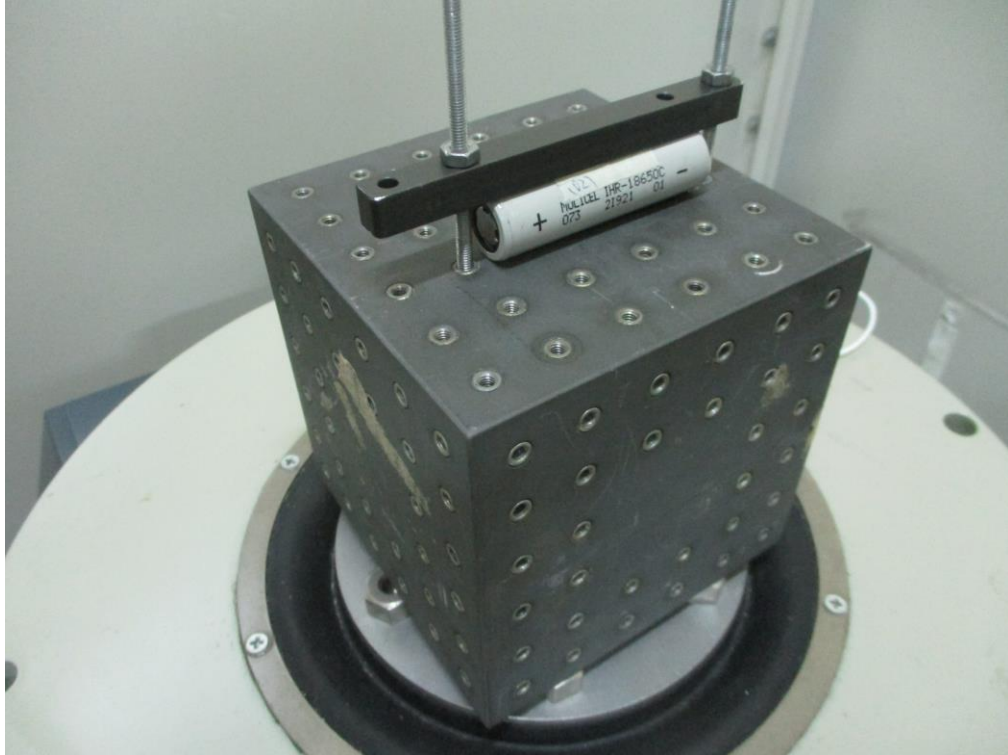
Bottom view for the cell without film



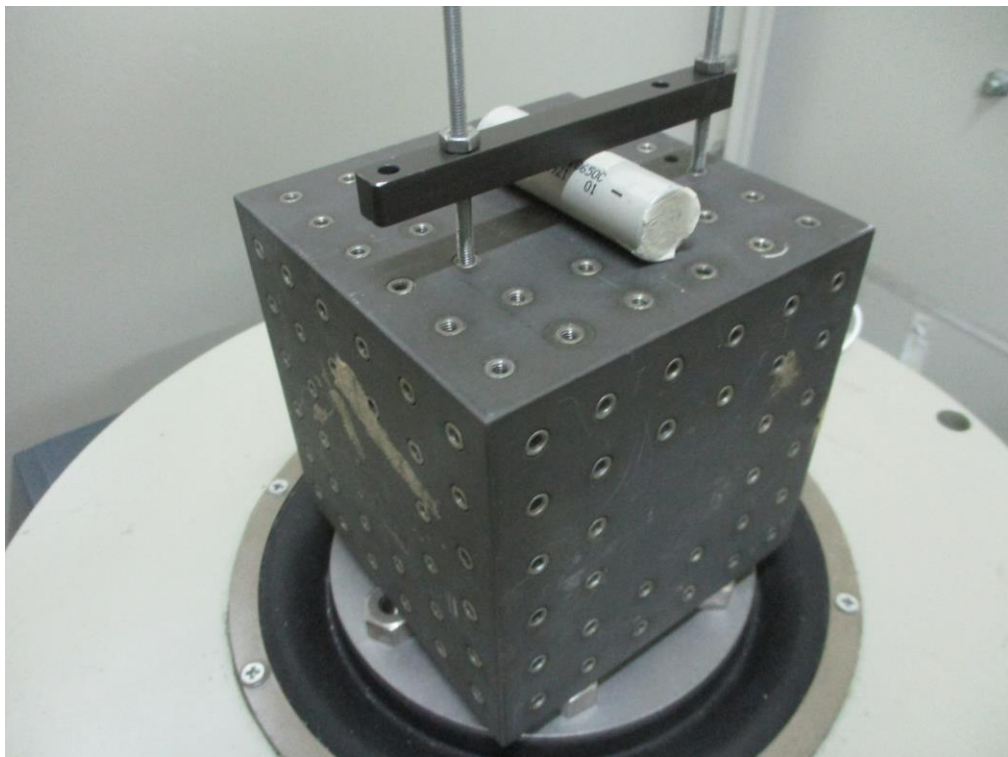
Front view for the cell (“+” terminal)



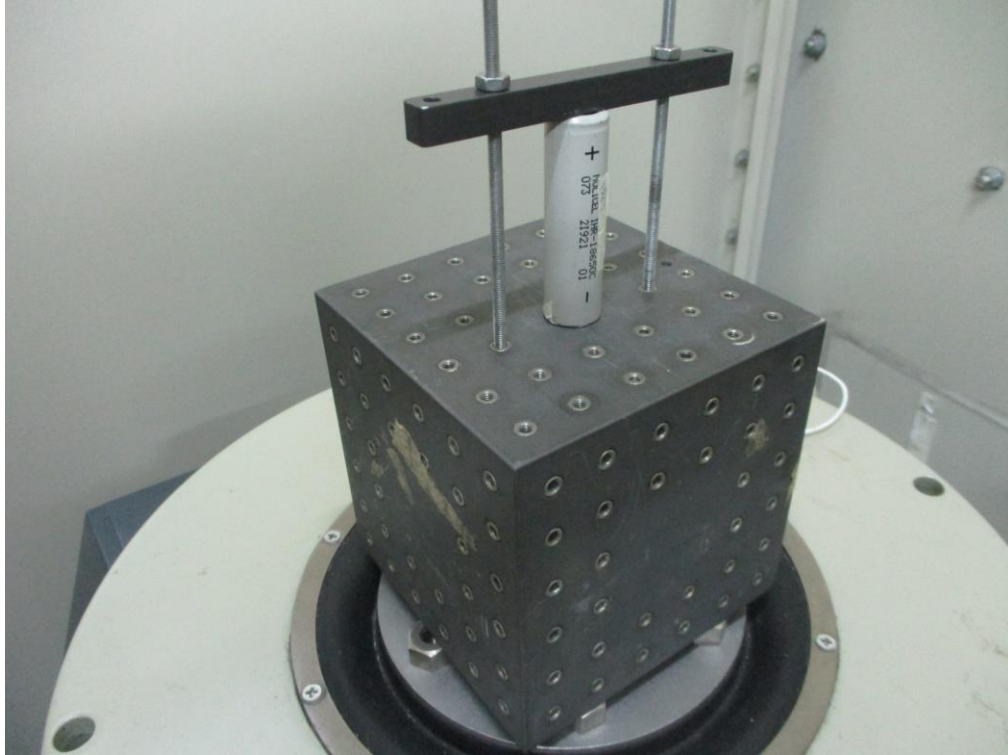
Bottom view for the cell (“-” terminal)



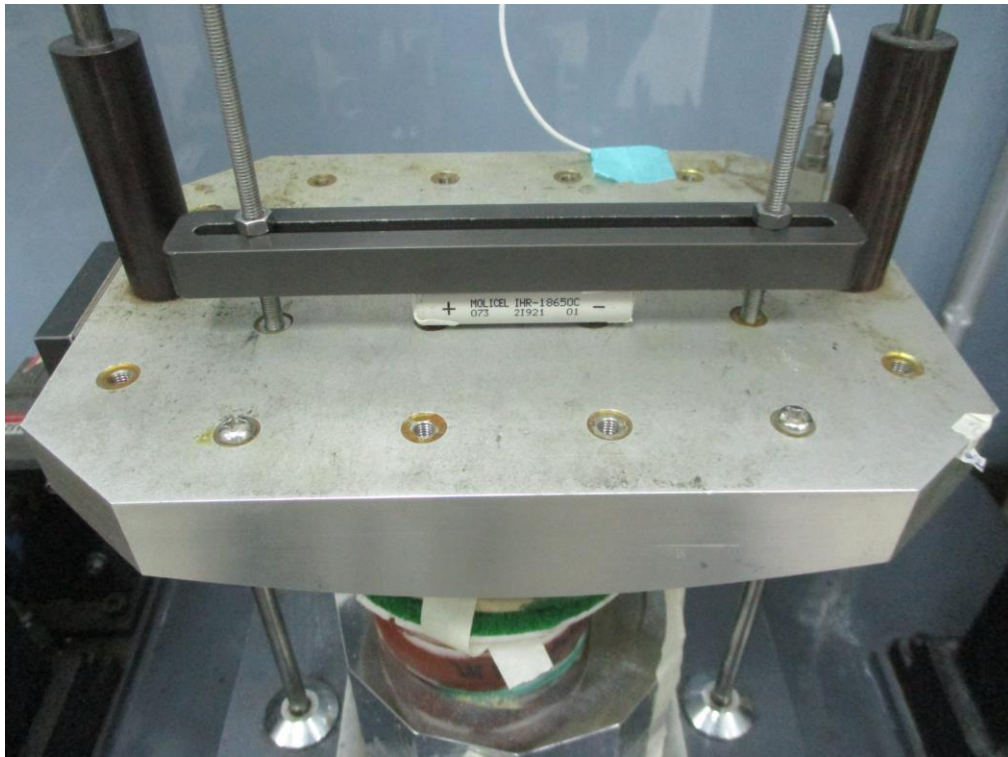
Vibration test condition -1 (X axis direction)



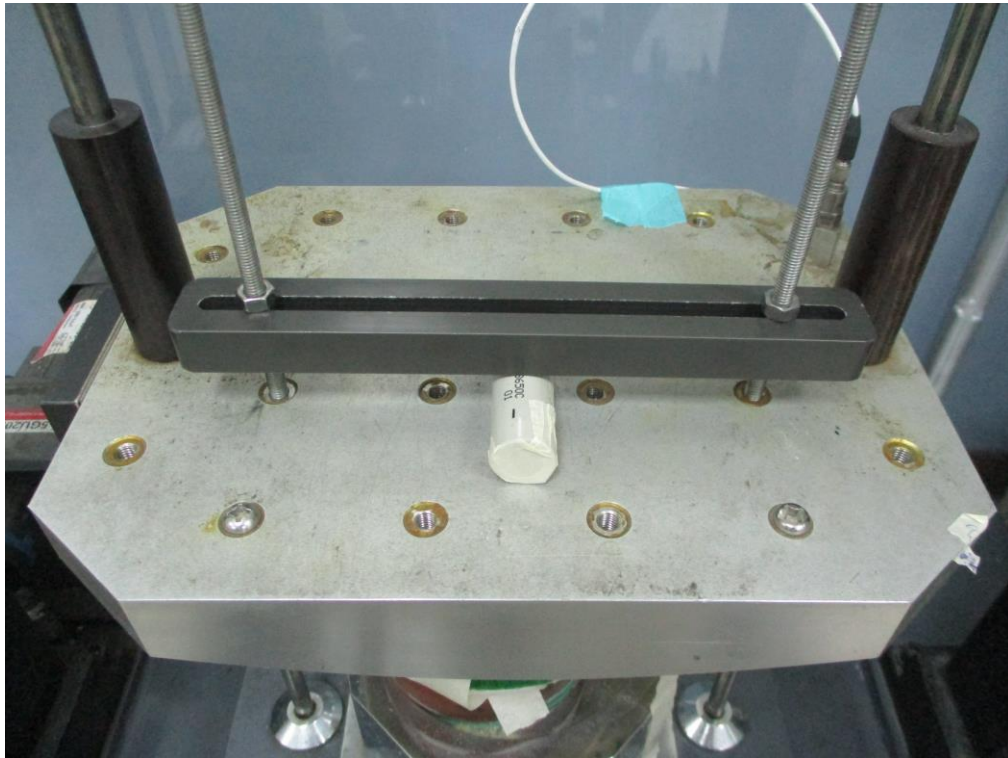
Vibration test condition -2 (Y axis direction)



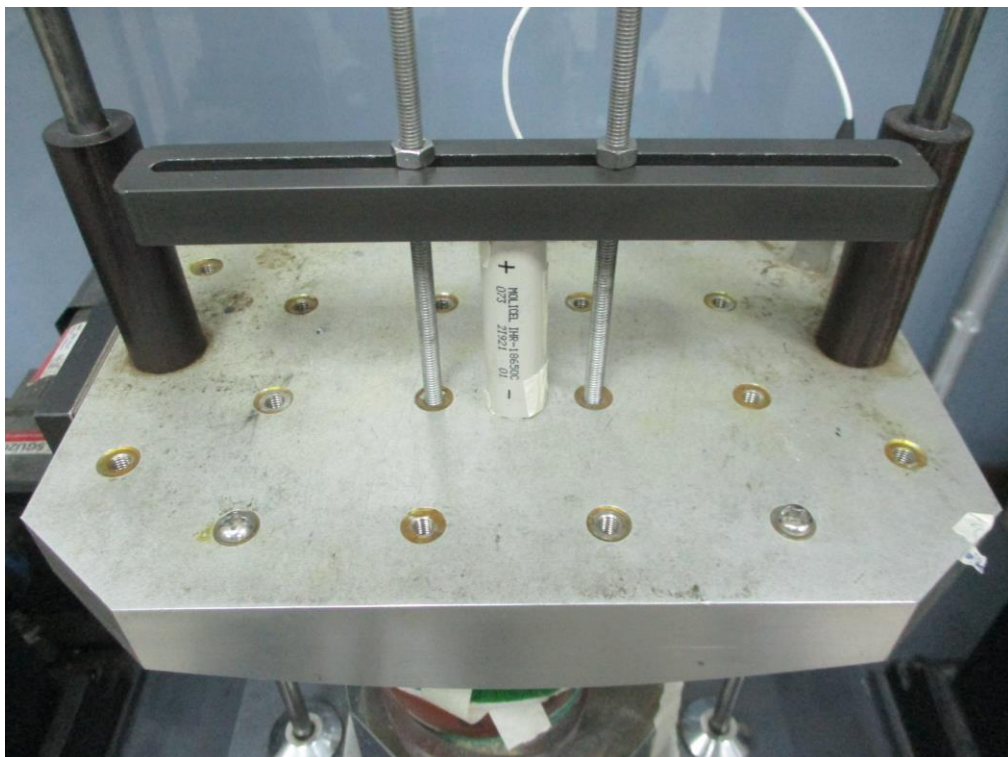
Vibration test condition -3 (Z axis direction)



Shock test condition -1 (X axis direction)



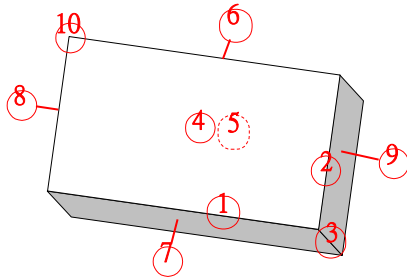
Shock test condition -2 (Y axis direction)



Shock test condition -3 (Z axis direction)

Attachment 1

IHR-18650C 1.2m Drop test (Pass, without damage and shifting of contents)



After drop

