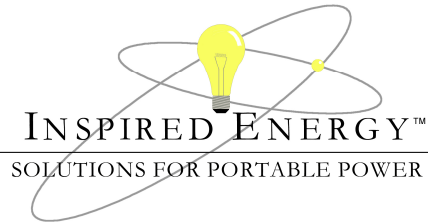


Test Report issued under the responsibility
of:





United Nations Transport of Dangerous Goods **Test Criteria and Test Report**

**This Section presents the procedures to be followed for the classification of
Lithium metal and Lithium Ion Cells and secondary battery packs.**

Report Number.....: 201706071
Date of issue: 2017-06-07
Total number of pages..... 11

Test specification:

Standard.....: UN38.3/ST/SG/AC.10/11/Rev.6 (Sixth Revised Edition)
Test procedure.....: T.1, T.2, T.3, T.4, T.5, and T.7.
Non-standard test method.....: N/A

Test Report Form No.....: UNDOT38.3-6
Test Report Form(s) Originator: Inspired Energy LLC
Master TRF: Dated 2016-06
Lab Manager.....: Mike Thompson
Approval.....: 
Lab Technician: Thomas Rush
Approval.....: 

Test item description: Rechargeable Lithium Ion Battery
Manufacturer: Inspired Energy LLC
25440 NW 8th Place
Newberry, FL 32669-2539
United States
Model/Type reference: NL2024HD222
Ratings: 14.4V, 6.7A, 97Wh

Summary of testing:	
<p>Tests performed (name of test and test clause):</p> <p>38.3.4.1. Test T.1 - Altitude Simulation 38.3.4.2. Test T.2 - Thermal Test 38.3.4.3. Test T.3 - Vibration 38.3.4.4. Test T.4 - Shock 38.3.4.5. Test T.5 - External Short Circuit 38.3.4.7. Test T.7 - Overcharge</p> <p>The following tests were performed at the cell level:</p> <p>38.3.4.6. Test T.6 - Impact 38.3.4.8. Test T.8 – Forced Discharge</p>	<p>Testing location:</p> <p>Inspired Energy LLC 25440 NW 8th Place Newberry, FL 32669-2539 United States</p> <p>**** BASED OF EXISTING TEST DATA NL2024HD22 UN DOT TEST REPORT DATED June 13, 2011*****</p>

Battery Parameters :	
Recommend charging method declared by the manufacturer..... :	CC/CV
Maximum Discharge current :	8A
Specified final voltage :	11.0 V
Chemistry :	<input type="checkbox"/> nickel systems <input checked="" type="checkbox"/> lithium systems
Recommend of charging limit for lithium system	
Upper limit charging voltage..... :	16.8V
Maximum charging current :	4A
Charging temperature upper limit..... :	45°C
Charging temperature lower limit :	0°C
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)

38.3.4	Procedure							-
	Test 1 to 5 must be conducted in sequence on the same cell or battery							
	Test 6 and Test 8 should be conducted using not otherwise tested cells or batteries.							N/A
	Test 7 may be conducted using undamaged batteries previously used in tests 1 to 5 for purposes of testing on cycled batteries.							
38.3.4.1	Test T.1: Altitude Simulation							
38.3.4.1.1	Purpose							-
	This test simulates air transport under low-pressure conditions							-
38.3.4.1.2	Test Procedure							
	Stored at a pressure				15.00kPa			
	Stored times (>= 6 Hours)				8 Hours			
38.3.4.1.3	Requirement							
	Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire and if 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. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.				No leakage, no venting no disassembly, no rupture and no fire. Battery after testing is not less than 90% if its voltage immediately prior to this procedure.			P
Group	No.	Mass M of Test Battery (g)			OCV (V)			
		M1 (Before the Test)	M2 (After the Test)	Mass Loss (.2% Limit)	OCV1 (Before the Test)	OCV2 (After the Test)	Final OCV (> 90%)	
1 Cycle Batteries	1	656 g	656 g	0%	16.58 VDC	16.57 VDC	99.9%	
	2	656 g	656 g	0%	16.57 VDC	16.56 VDC	99.9%	
	3	652 g	652 g	0%	16.60 VDC	16.58 VDC	99.9%	
	4	654 g	654 g	0%	16.58 VDC	16.56 VDC	99.9%	
50 Cycle Batteries	5	638 g	638 g	0%	16.60 VDC	16.59 VDC	99.9%	
	6	644 g	644 g	0%	16.58 VDC	16.57 VDC	99.9%	
	7	642 g	642 g	0%	16.61 VDC	16.60 VDC	99.9%	
	8	638 g	638 g	0%	16.60 VDC	16.58 VDC	99.9%	
Remarks: Mass Loss (%)= $M1-M2/M1 * 100\%$ (Where M1 is the mass before the test and M2 is the mass after the test) Final OCV (%)= $OCV1/OCV2*100\%$ (Where OCV1 is before the test and OCV2 is after the test)								
Final Conclusion: Lithium Ion Secondary Battery Assembly passed altitude simulation test. Test End Date: April 19, 2011 at 1520							P	

38.3.4.2	Test T.2: Thermal Test							-
38.3.4.2.1	Purpose							-
	This test assesses cell and battery seal integrity and internal electrical connections. The test is conducted using rapid and extreme temperature changes.							-
38.3.4.2.2	Test Procedure							P
	Test Temperature and Stored Hours				72°C +/- 2°C for > 6 Hours -40°C +/-2°C for > 6 Hours			-
	The maximum time interval				Between test temperature extremes is 30 minutes.			-
	Test Cycles				Repeated 10 Times			-
	After which all test cells and batteries are stored for 24 hours at ambient temperature (20°C +/- 5°C)							-
	For large cells and batteries, the duration of exposure to the test temperature extremes should be at least 12 hours.				<100Wh Small Battery			N/A
38.3.4.2.3	Requirement							-
	Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire and if 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. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.				No leakage No venting, no disassembly, no rupture, and no fire. 90% of starting voltage.			P
	Mass M of Test Battery (g)				OCV (V)			
Group	No.	M1 (Before the Test)	M2 (After the Test)	Mass Loss (.2% Limit)	OCV1 (Before the Test)	OCV2 (After the Test)	Final OCV (> 90%)	
1 Cycle Batteries	1	656 g	656 g	0%	16.57 VDC	16.49 VDC	P	
	2	656 g	656 g	0%	16.56 VDC	16.31 VDC	P	
	3	652 g	652 g	0%	16.58 VDC	16.32 VDC	P	
	4	654 g	654 g	0%	16.56 VDC	16.30 VDC	P	
50 Cycle Batteries	5	638 g	638 g	0%	16.59 VDC	16.32 VDC	P	
	6	644 g	644 g	0%	16.57 VDC	16.32 VDC	P	
	7	642 g	642 g	0%	16.60 VDC	16.33 VDC	P	
	8	638 g	638 g	0%	16.58 VDC	16.32 VDC	P	
Remarks: Mass Loss (%)= $M1-M2/M1 * 100\%$ (Where M1 is the mass before the test and M2 is the mass after the test) Final OCV (%)= $OCV1/OCV2*100\%$ (Where OCV1 is before the test and OCV2 is after the test)								
Final Conclusion: Lithium Ion Secondary Battery Assembly passed thermal test. Test End Date: May 25, 2017 Conducted by Timco Engineering TR: 899UT11								P

38.3.4.3	Test T.3: Vibration			-			
38.3.4.3.1	Purpose			-			
	This test simulates vibration during transportation.			-			
38.3.4.3.2	Test Procedure			-			
	Cells and Batteries 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.			-			
	Duration			15 Minutes			
	Frequency / Range			7Hz.....200Hz.....7Hz			
	Amplitude			0.8mm			
	Test cycle			12 Times for a total 3 hours.			
38.3.4.3.3	Requirement			-			
	Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire and if 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. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.			There is no leakage, no venting, no disassembly, no rupture and no fire.			
	Mass M of Test Battery (g)			OCV (V)			
Group	No.	M1 (Before the Test)	M2 (After the Test)	Mass Loss (.2% Limit)	OCV1 (Before the Test)	OCV2 (After the Test)	Final OCV (> 90%)
1 Cycle Batteries	1	656 g	656 g	0%	16.49 VDC	16.42 VDC	P
	2	656 g	656 g	0%	16.31 VDC	16.24 VDC	P
	3	652 g	652 g	0%	16.32 VDC	16.26 VDC	P
	4	654 g	654 g	0%	16.30 VDC	16.24 VDC	P
50 Cycle Batteries	5	638 g	638 g	0%	16.32 VDC	16.26 VDC	P
	6	644 g	644 g	0%	16.32 VDC	16.26 VDC	P
	7	642 g	642 g	0%	16.33 VDC	16.27 VDC	P
	8	638 g	638 g	0%	16.32 VDC	16.26 VDC	P
Remarks: $Mass\ Loss\ (\%) = \frac{M1 - M2}{M1} * 100\%$ (Where M1 is the mass before the test and M2 is the mass after the test) $Final\ OCV\ (\%) = \frac{OCV1}{OCV2} * 100\%$ (Where OCV1 is before the test and OCV2 is after the test)							
Final Conclusion: Lithium Ion Secondary Battery Assembly passed vibration test. Test End Date: May 25, 2017 Conducted by Timco Engineering TR: 899UT11							P

38.3.4.4	Test T.4: Shock			-			
38.3.4.4.1	Purpose			-			
	This test simulates possible impacts during transportation.			-			
38.3.4.4.2	Test Procedure			-			
	Test cells and batteries shall be secured to the test machine by means of a rigid mount which will support all mounting surfaces of each test battery.			-			
	A Half-Sine shock of peak acceleration	150g		-			
	Pulse duration	6ms		-			
	The positive direction followed	3 Times		-			
	Each cell or battery 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 or battery for a total of 18 shocks.			-			
	Test cycle	6 Cycles of 3 Shocks (18)		-			
38.3.4.4.3	Requirement			-			
	Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire and if 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. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.		There is no leakage, no venting, no disassembly, no rupture and no fire.	-			
	Mass M of Test Battery (g)			OCV (V)			
Group	No.	M1 (Before the Test)	M2 (After the Test)	Mass Loss (.2% Limit)	OCV1 (Before the Test)	OCV2 (After the Test)	Final OCV (> 90%)
1 Cycle Batteries	1	656 g	656 g	0%	16.42 VDC	16.40 VDC	P
	2	656 g	656 g	0%	16.24 VDC	16.24 VDC	P
	3	652 g	652 g	0%	16.26 VDC	16.26 VDC	P
	4	654 g	654 g	0%	16.24 VDC	16.24 VDC	P
50 Cycle Batteries	5	638 g	638 g	0%	16.26 VDC	16.26 VDC	P
	6	644 g	644 g	0%	16.26 VDC	16.26 VDC	P
	7	642 g	642 g	0%	16.27 VDC	16.27 VDC	P
	8	638 g	638 g	0%	16.26 VDC	16.25 VDC	P
Remarks:							
Mass Loss (%)= $M1-M2/M1 * 100\%$ (Where M1 is the mass before the test and M2 is the mass after the test)							
Final OCV (%)= $OCV1/OCV2*100\%$ (Where OCV1 is before the test and OCV2 is after the test)							
Final Conclusion:							P
Lithium Ion Secondary Battery Assembly passed shock test.							
Test End Date: May 25, 2017 Conducted by Timco Engineering TR: 899UT11							

38.3.4.5	Test T.5: External Short Circuit		-	
38.3.4.5.1	Purpose		-	
	This test simulates an external short circuit.		-	
38.3.4.5.2	Test Procedure		-	
	The Cell or Battery to be tested shall be temperature stabilized so that its external case temperature reaches 55°C +/-2°C.		-	
	Short Circuit condition with a total external resistance of less than 0.1ohm.		-	
	The cell or battery must be observed for a further six hours for the test to be concluded.		-	
	This short circuit condition is continued for at least one hour after the cell or battery external temperature has returned to 55°C +/- 2°C.		-	
38.3.4.5.3	Requirement		-	
	Cells and batteries meet this requirement if their external temperature does not exceed 170°C and there is no disassembly, no rupture and no fire during the test and within six hours after the test.	Cells external temperature does not exceed 170°C, and there is no disassembly, no fire during the test and within six hours after this test.	-	
Group	No.	External Highest Temperature	Criteria:	Result
1 Cycle Batteries	1	51°C	Cells external temperature does not exceed 170°C and there is no disassembly, no rupture and no fire during the test and within six hours after this test.	P
	2	50°C		P
	3	50°C		P
	4	51°C		P
50 Cycle Batteries	5	50°C		P
	6	50°C		P
	7	49°C		P
	8	49°C		P
Remarks: Ambient temperature 24°C				
Final Conclusion: Lithium Ion Secondary Battery Assembly passed external short circuit test. Test End Date: May 31, 2011 at 1100				P

38.3.4.6	Test T.6: Impact		N/A
38.3.4.6.1	Purpose		N/A
	These test simulate mechanical abuse from impact.		N/A
38.3.4.6.2	Test Procedure – Impact		N/A
	The sample cell or component cell is to be placed on a flat smooth surface. A 15.8mm diameter bar is to be placed across the centre of the sample. A 9.1 kg Mass is to be dropped from the height of 61+/-2.5cm from the sample.		N/A
	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 15.8mm 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 used for each impact.		N/A
	A coin or button cell is to be impacted with the flat surface of the sample parallel to the flat surface and the 15.8mm diameter curved surface laying across the centre.		N/A
38.3.4.6.3	Requirement		N/A
	Cells and component cells meet this requirement if their requirement if their external temperature does not exceed 170°C and there is no disassembly and no fire within six hours of this test.		N/A
	Cell Manufacture.....:	Confidential	-
	Cell Model.....:	Confidential	-
	Test Date.....:	January 9, 2009	-
	Test Results.....:	Passed	P

38.3.4.7	Test 7: Overcharge		-	
38.3.4.7.1	Purpose		-	
	This test evaluates the ability of a rechargeable battery to withstand an overcharge condition.		-	
38.3.4.7.2	Test Procedure		-	
	The minimum voltage of the test:		-	
	The minimum voltage of the test		-	
	Charge at current that is twice the manufacturers recommended maximum continuous charge current. The minimum voltage shall be the lesser of two times the maximum charge voltage of the battery or 22V. Tests are to be conducted at ambient temperature and test duration shall be 24 hours.		-	
38.3.4.7.3	Requirement		-	
	Rechargeable batteries meet this requirement if there is no disassembly and no fire during the test and within seven days after the test	There is no disassembly and no fire during the test and within seven days after the test.	-	
Group	No.	Disassembly or Fire within seven days.	Criteria:	Result
1 Cycle Batteries	1	No	There is no disassembly and no fire during the test and within seven days after the test.	P
	2	No		P
	3	No		P
	4	No		P
50 Cycle Batteries	5	No		P
	6	No		P
	7	No		P
	8	No		P
Remarks: Ambient temperature 24°C				
Final Conclusion: Lithium Ion Secondary Battery Assembly passed external short circuit test. 7- Day Hold Ends: June 10, 2011 at 12:35			P	

38.3.4.8	Test T.8: Forced Discharge		N/A
38.3.4.8.1	Purpose		N/A
	This test evaluates the ability of a primary or a rechargeable cell to withstand a forced discharge condition.		N/A
38.3.4.8.2	Test Procedure – Forced Discharge		N/A
	Each cell shall be forced discharged at ambient temperature by connecting it in series with a 12V DC power supply at an initial current equal to the maximum discharge current specified by the manufacturer.		N/A
	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 the rated capacity divided by the initial test current (in ampere)		N/A
38.3.4.8.3	Requirement		N/A
	Primary or rechargeable cells meet this requirement if there is no disassembly and no fire within seven days of the test.		N/A
	Cell Manufacture.....:	Confidential	-
	Cell Model.....:	Confidential	-
	Test Date.....:	January 9, 2009	-
	Test Results.....:	Passed	P



Declaration of Conformance

PRODUCT: Smart Rechargeable Secondary Battery

Inspired Energy Part Number: NL2024HD22

SECTION I - MANUFACTURER INFORMATION

Inspired Energy, LLC.
25440 NW 8th Place, Newberry FL 32669, USA

Telephone: +1 352 472 4855
Date Prepared: June 7th, 2017

SECTION II - CONFORMANCE INFORMATION

The listed products have been tested in accordance with the UN document ST/SG/AC.10/11/Rev.6: *"Amendments to the Sixth Revised Edition of the Recommendations on the Transport of Dangerous Goods, Manual of Tests & Criteria"* and found to comply with the stated criteria.

Test #	Description	Date Tested	Test result
T1	Altitude Simulation	April 19, 2011	PASSED
T2	Thermal Cycling	May 25, 2011	PASSED
T3	Vibration	May 25, 2011	PASSED
T4	Shock	May 25, 2011	PASSED
T5	Short Circuit	June 1, 2011	PASSED
T6	Impact (Cell-Level test)	January 9, 2009	PASSED
T7	Overcharge	June 10, 2011	PASSED
T8	Forced Discharge (Cell-level test)	January 9, 2009	PASSED

Signed:

Thomas J. Rush
Product Compliance Engineer
Inspired Energy LLC.

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