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CERTIFICATE OF COMPLIANCE

The following product has been evaluated according to the 5^{th} revised edition Amendment2 of the UN Manual of Tests and Criteria.

We, LG Chem. Ltd hereby certify that this battery meets the requirements of the regulation for transportation of lithium-ion cells and batteries and single cell batteries.

□ Lithium-ion cell ☑ Lithium-ion bat	tery D Lithium-ion single cell battery
Model name	L14L2P21
Cell Model name	ICP595490L1
Nominal voltage	7.4 V
Electric power capacity	30 Wh
Lithium Content	1.215g

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SolutionPartner

UN Test Report - L14L2P21(Nom.30Wh, 7.4V)-

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2016.09.23



1. UN Transportation Regulation Test

Test	Condition	Requirements		
Test 1. Altitude Simulation	Storing at (low pressure)11.6kPa for 6hr at 20+/-5 ີ ເ	- Measuring mass before/		
Test 2. Thermal Test	[72±2℃,6hr ↔ -40±2℃,6hr,interval max. 30min] x 10cycle Storing at 20±5℃ for 24h	after each test (If M<1g, less than 0.5%, If 1ɑ≤M≤75ɑ, less than 0.2%, If		
Test 3. Vibration	 [7Hz↔200Hz↔7Hz, in 15min] x 12 times x 3 direction 1) sinusoidal waveform with a logarithmic sweep 2) 7Hz 18Hz (maintaining 1gn) app. 50Hz (until 8gn) 200Hz (maintaining 8gn), 1.6mm total excursion 	M>75g, less than 0.1%) - Measuring voltage before/ after each test (more than 90%) - No leakage, no venting,		
Test 4. Shock	Half sine shock (peak acceleration : 150gn, pulse duration : 6msec) x 6 (\pm x, y, z), direction x 3 cycle	no disassembly, no rupture, no fire		
Test 5. External Short Circuit	100mΩ ext. short-circuit at 55±2℃ 1hr continue after returning at 55±2℃	- No disassembly, no rupture, no fire within 6 hours after the test - Temp. monitoring (max. 170℃)		
Test 6. Impact for cylindrical cells (> 18mm diameter)	Φ=15.8mm bar, 9.1kg mass, 61±2.5cm height	- No disassembly,		
Test 6. Crush for cylindrical cells (≤ 18mm diameter) for prismatic, pouch, coin/button cells	Crushing rate :1.5cm/s, until 13kN±0.78kN or 100mV drop or 50% deformation	no fire within 6 hours after the test - Temp. monitoring (max. 170 ℃)		
Test 7. Overcharge	Current = Manufacturer's recommended max. continuous charge current X 2 Voltage 1.If charge voltage ≤ 18V, V (min.) = 2 x (max. charge voltage) or V (min.) = 22V. 2.If charge voltage > 18V, V (min.) = 1.2 x (max. charge voltage)	- No disassembly, no fire within 7 days after the test		
Test 8. Forced Discharge	Discharge at max. discharge current (with 12V DC power supply), Duration time = rated capacity/initial test current			

* Tests through T1-T5 shall be conducted in sequence with the same samples.

* We declare that the above-mentioned test is the result of being checked according to UN Test

(Manual of Test and Criteria ST/SG/AC.10/11/Rev.5/Amd.2)



2. Test Procedure



3-1. T1-T4 Test Result

Before				Altitude (T1)				Thermal (T2)			Vibration (T3)				Shock (T4)									
		NO.	OCV	Mass	OCV	Mass	Residual OCV(%)	Mass Loss(%)	Result	OCV	Mass	Residual OCV(%)	Mass Loss(%)	Result	OCV	Mass	Residual OCV(%)	Mass Loss(%)	Result	OCV	Mass	Residual OCV(%)	Mass Loss(%)	Result

A. 1st cycle fully state

	1	8.381	160.190	8.370	160.180	99.87	0.007	Pass	8.261	160.162	98.70	0.011	Pass	8.258	160.160	99.96	0.001	Pass	8.258	160.155	100.00	0.003	Pass
	2	8.340	160.778	8.326	160.761	99.84	0.011	Pass	8.216	160.759	98.67	0.001	Pass	8.216	160.757	100.00	0.001	Pass	8.214	160.751	99.98	0.004	Pass
Charge	3	8.350	160.346	8.336	160.329	99.83	0.010	Pass	8.229	160.327	98.72	0.001	Pass	8.227	160.325	99.98	0.001	Pass	8.225	160.314	99.98	0.007	Pass
	4	8.341	160.274	8.327	160.261	99.83	0.008	Pass	8.224	160.257	98.76	0.003	Pass	8.222	160.257	99.98	0.000	Pass	8.220	160.244	99.98	0.008	Pass
	Ave.	8.353	160.397	8.340	160.383	99.84	0.009	-	8.233	160.376	98.71	0.004	-	8.231	160.375	99.98	0.001	-	8.229	160.366	99.98	0.005	-

B. 50th cycle fully state

	5	8.368	160.428	8.359	160.418	99.89	0.006	Pass	8.247	160.398	98.66	0.012	Pass	8.247	160.395	100.00	0.002	Pass	8.245	160.382	99.98	0.008	Pass
	6	8.353	160.884	8.338	160.875	99.82	0.006	Pass	8.225	160.864	98.65	0.007	Pass	8.224	160.856	99.99	0.005	Pass	8.223	160.851	99.99	0.003	Pass
Charge	7	8.358	160.389	8.347	160.376	99.87	0.008	Pass	8.247	160.364	98.80	0.008	Pass	8.244	160.351	99.96	0.008	Pass	8.242	160.341	99.98	0.006	Pass
	8	8.368	160.588	8.356	160.569	99.86	0.012	Pass	8.251	160.555	98.74	0.009	Pass	8.250	160.552	99.99	0.002	Pass	8.249	160.546	99.99	0.004	Pass
	Ave.	8.362	160.572	8.350	160.560	99.86	0.008	-	8.243	160.545	98.71	0.009	-	8.241	160.539	99.98	0.004	-	8.240	160.530	99.98	0.005	-

 Measuring mass before/after each test (If M>75g, less than 0.1%, 1g≤Ms less than 0.2%, M<1g, less than 0.5%) Measuring voltage before/after each test (more than 90%, only charged samples) No leakage, no venting, no disassembly, no rupture, no fire 	575,
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3-2. T5/T7 Test Result

EXT.Short Circuit (T5)											
	NO.	Initial OCV(V)	Max. Temp (℃)	Result							
A. 1st cyc	A. <u>1st cycle fully state</u>										
	1	8.258	55.38	Pass							
	2	8.214	55.05	Pass							
Charge	3	8.225	56.53	Pass							
	4	8.220	55.05	Pass							
	MAX.	8.258	56.53	-							

Test Condition	
- 100m Ω ext. short-circuit at 55± 2 $^\circ C$	

	Over Charge (T7)											
	NO.	Initial OCV(V)	Max. Temp (℃)	Result								
A. <u>1st cycle fully state</u>												

	9	8.349	23.38	Pass
	10	8.344	25.25	Pass
Charge	11	8.347	24.62	Pass
	12	8.348	23.52	Pass
	MAX.	8.349	25.25	-

Test Condition

- Max. Charge Current : 2100mA

- CC/CV 2Imax(4200mA) 16.8V cut-off 24Hr

	E	XT.Short Circu	it (T5)	
	NO.	Initial OCV(V)	Max. Temp (℃)	Result
B. <u>50th cy</u>	<u>cle fully state</u>	-		
	5	8.245	55.18	Pass
	6	8.223	56.13	Pass
Charge	7	8.242	54.80	Pass
	8	8.249	55.30	Pass
	MAX.	8.249	56.13	-

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Requirement
- Temperature ≤ 170 (℃)
- No disassembly, no rupture, no fire within 6 hours after the test

Over Charge (T7)					
	NO.	Initial OCV(V)	Max. Temp (℃)	Result	
B. <u>50th cy</u>	B. 50th cycle fully state				
	13	8.328	24.58	Pass	
	14	8.326	24.23	Pass	
Charge	15	8.321	24.79	Pass	
	16	8.327	23.76	Pass	

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24.79

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8.328

- No disassembly, no fire within 7 day after the test

MAX.



3-3. T6/T8 Test Result (ICP595490L1)

Crush (T6)					
Direction	NO.	Initial OCV(V)	Max. Temp (℃)	Result	
A. 1st cycl	A. 1st cycle 50% charged state (Direction : Flat)				
	C-1	3.772	22.67	Pass	
	C-2	3.771	22.71	Pass	
Flat	C-3	3.776	23.15	Pass	
	C-4	3.774	23.26	Pass	
	C-5	3.771	23.35	Pass	
MAX	X .	3.776	23.71	-	

Test Condition	
- Crushing rate :1.5cm/s, until 13kN±0.78kN or 100mV	
drop or 50% deformation	

Requirement

- Temperature ≤ 170 (°C)
- No disassembly, no fire within 6 hours after the test

Forced Discharge (T8)			
NO.	Initial OCV(V)	Max. Temp (℃)	Result
A. 1st cycle fu	Ily Discharged	state	
C-6	3.012	46.32	Pass
C-7	3.010	45.74	Pass
C-8	3.009	44.21	Pass
C-9	3.015	47.13	Pass
C-10	3.009	48.21	Pass
C-11	3.014	47.56	Pass
C-12	3.008	47.46	Pass
C-13	3.014	47.20	Pass
C-14	3.010	46.49	Pass
C-15	3.014	47.32	Pass
MAX.	3.015	48.21	-
B. 50th cycle f	ully discharged	<u>state</u>	
C-16	3.121	44.84	Pass
C-17	3.122	44.26	Pass
C-18	3.118	43.21	Pass
C-19	3.120	44.56	Pass
C-20	3.117	45.26	Pass
C-21	3.123	45.52	Pass
C-22	3.119	46.79	Pass
C-23	3.120	44.52	Pass
C-24	3.122	44.62	Pass
C-25	3.116	42.69	Pass
MAX.	3.123	46.79	-

Test Condition- Discharge at max. discharge current
(with 12V DC power supply) : 3980mA
Duration time: rated capacity (60.5min)

Requirement

- No disassembly, no fire within 7 days after the test



4. Sample Image





