

UN38.3 Test Summary


The following product has been evaluated according to the 5th revised edition Amendment 2 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, batteries and single cell batteries.




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| Description | | List of Test Completed | |
| Test Report Number | QAE-EF02-151124-B-L15L2PB4 | Test 1. Altitude Simulation | Pass |
| Date of test report | 2015.11.24 | Test 2. Thermal Test | Pass |
| Model name | L15L2PB4 | Test 3. Vibration | Pass |
| Type | Pouch | Test 4. Shock | Pass |
| Nominal voltage | 7.6 V | Test 5. External Short Circuit | Pass |
| Capacity | 30.0 Wh | Test 6. Impact or Crush | Pass |
| Weight | 156.0 g | Test 7. Overcharge | Pass |
| Dimensions | 203.00mm X 57.00mm X 6.60mm | Test 8. Forced Discharge | Pass |

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| | | |
|----------|----------------------------|---|
| 문서번호 | QAE-EF02-151124-B-L15L2PB4 | |
| Prepared | 남익현 |  |
| | 장승현 | |
| Reviewed | 남대호 |  |
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| | | |

UN38.3 Test Report

- L15L2PB4 (Nom.30Wh, 7.6V)-

목 차

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2015. 11. 24

1. UN38.3 Test Condition

Rev.5 / Amd.2

| Test item | Test Condition | Requirements | Etc. |
|--------------------------------|--|---|---|
| Test 1. Altitude Simulation | Storing at (low pressure)11.6kPa for 6hr at 20+/-5℃ | <ul style="list-style-type: none"> - After OCV (%) ≥ 90% - No leakage, no venting, no disassembly, no rupture, no fire - Mass loss limit (leakage) <ol style="list-style-type: none"> 1) If M<1g, less than 0.5%, 2) If 1g≤M≤75g, less than 0.2%, 3) If M>75g, less than 0.1%) | <p>T1~T5 : Sequence Tests</p> <pre> graph TD T1[Test 1 Altitude Simulation] --> T2[Test 2 Thermal Test] T2 --> T3[Test 3 Vibration] T3 --> T4[Test 4 Shock] T4 --> T5[Test 5 Ext. Short Circuit] </pre> |
| Test 2. Thermal Test | [72±2℃,6hr ↔ -40±2℃,6hr, interval max. 30min] x 10cycle Storing at 20±5℃ for 24h | | |
| 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 1g) app. 50Hz (until 8gn) 200Hz (maintaining 8gn), 1.6mm total excursion | | |
| Test 4. Shock | Half sine shock (peak acceleration : 150gn, pulse duration : 6msec) x 6 (±x, y, z), direction x 3 cycle | | |
| Test 5. External Short Circuit | 100mΩ ext. short-circuit at 55±2℃ 1hr continue after returning at 55±2℃ | | |
| Test 6. Impact | Φ=15.8±0.1mm bar, 9.1±0.1kg mass, 61±2.5cm height | <ul style="list-style-type: none"> - No disassembly, no fire within 6 hours after the test - Max. Temp ≤ 170℃ | for cylindrical cells (not less than 18mm diameter) |
| Test 6. Crush | Crushing rate :1.5cm/s, until 13kN±0.78kN or 100mV drop or 50% deformation | | for cylindrical cells (less than 18mm diameter) for prismatic, pouch, coin/button cells |
| 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 22V. 2.If charge voltage > 18V, V (min.) = 1.2 x (max. charge voltage) | <ul style="list-style-type: none"> - No disassembly, no fire within 7 days after the test | Only for Single Cell Battery / Battery |
| Test 8. Forced Discharge | Discharge at max. discharge current (connecting in series with 12V DC power supply), Duration time = rated capacity/initial test current | <ul style="list-style-type: none"> - No disassembly, no fire within 7 days after the test | Resistance of Electric Loader 1/Ω = (max. discharge current) / (12 + Initial OCV) |

2-1. T1-T4 Test Result

| Before | | | Altitude (T1) | | | | | Thermal (T2) | | | | | Vibration (T3) | | | | | Shock (T4) | | | | |
|--------|-----|----------|---------------|----------|--------------|--------------|--------|---------------|----------|--------------|--------------|--------|----------------|----------|--------------|--------------|--------|---------------|----------|--------------|--------------|--------|
| NO. | OCV | Mass (g) | After OCV (V) | Mass (g) | After OCV(%) | Mass Loss(%) | Result | After OCV (V) | Mass (g) | After OCV(%) | Mass Loss(%) | Result | After OCV (V) | Mass (g) | After OCV(%) | Mass Loss(%) | Result | After OCV (V) | Mass (g) | After OCV(%) | Mass Loss(%) | Result |

A. 1st cycle fully charged state

| | | | | | | | | | | | | | | | | | | | | | | |
|---|-------|--------|-------|--------|--------|-------|------|-------|--------|-------|-------|------|-------|--------|-------|-------|------|-------|--------|--------|-------|------|
| 1 | 8.657 | 155.20 | 8.657 | 155.20 | 100.00 | 0.000 | Pass | 8.539 | 155.20 | 98.64 | 0.000 | Pass | 8.538 | 155.19 | 99.99 | 0.006 | Pass | 8.538 | 155.19 | 100.00 | 0.000 | Pass |
| 2 | 8.673 | 155.31 | 8.672 | 155.31 | 99.99 | 0.000 | Pass | 8.566 | 155.29 | 98.78 | 0.013 | Pass | 8.563 | 155.28 | 99.96 | 0.006 | Pass | 8.559 | 155.28 | 99.95 | 0.000 | Pass |
| 3 | 8.664 | 155.28 | 8.661 | 155.28 | 99.97 | 0.000 | Pass | 8.559 | 155.28 | 98.82 | 0.000 | Pass | 8.558 | 155.27 | 99.99 | 0.006 | Pass | 8.555 | 155.27 | 99.96 | 0.000 | Pass |
| 4 | 8.671 | 155.28 | 8.670 | 155.28 | 99.99 | 0.000 | Pass | 8.552 | 155.27 | 98.64 | 0.006 | Pass | 8.550 | 155.27 | 99.98 | 0.000 | Pass | 8.547 | 155.26 | 99.96 | 0.006 | Pass |

B. 50th cycle fully charged state

| | | | | | | | | | | | | | | | | | | | | | | |
|---|-------|--------|-------|--------|--------|-------|------|-------|--------|-------|-------|------|-------|--------|-------|-------|------|-------|--------|-------|-------|------|
| 5 | 8.665 | 155.05 | 8.661 | 155.04 | 99.95 | 0.006 | Pass | 8.560 | 155.02 | 98.83 | 0.013 | Pass | 8.557 | 155.00 | 99.96 | 0.013 | Pass | 8.554 | 155.00 | 99.96 | 0.000 | Pass |
| 6 | 8.653 | 155.36 | 8.651 | 155.36 | 99.98 | 0.000 | Pass | 8.539 | 155.35 | 98.71 | 0.006 | Pass | 8.535 | 155.35 | 99.95 | 0.000 | Pass | 8.532 | 155.35 | 99.96 | 0.000 | Pass |
| 7 | 8.662 | 155.27 | 8.662 | 155.27 | 100.00 | 0.000 | Pass | 8.557 | 155.26 | 98.79 | 0.006 | Pass | 8.556 | 155.25 | 99.99 | 0.006 | Pass | 8.553 | 155.25 | 99.96 | 0.000 | Pass |
| 8 | 8.668 | 154.96 | 8.668 | 154.95 | 100.00 | 0.006 | Pass | 8.554 | 154.94 | 98.68 | 0.006 | Pass | 8.553 | 154.92 | 99.99 | 0.013 | Pass | 8.552 | 154.91 | 99.99 | 0.006 | Pass |

2-2. T5/T7 Test Result

EXT.Short Circuit (T5)

| NO. | Initial OCV(V) | Max. Temp (°C) | Result |
|-----|----------------|----------------|--------|
|-----|----------------|----------------|--------|

A. 1st cycle fully charged state

| | | | |
|---|-------|-------|------|
| 1 | 8.538 | 55.60 | Pass |
| 2 | 8.559 | 56.27 | Pass |
| 3 | 8.555 | 54.94 | Pass |
| 4 | 8.547 | 55.94 | Pass |

B. 50th cycle fully charged state

| | | | |
|---|-------|-------|------|
| 5 | 8.554 | 56.32 | Pass |
| 6 | 8.532 | 56.66 | Pass |
| 7 | 8.553 | 55.99 | Pass |
| 8 | 8.552 | 55.89 | Pass |

Over Charge (T7)

| NO. | Initial OCV(V) | Max. Temp (°C) | Result |
|-----|----------------|----------------|--------|
|-----|----------------|----------------|--------|

A. 1st cycle fully charged state

| | | | |
|----|-------|-------|------|
| 9 | 8.645 | 23.91 | Pass |
| 10 | 8.649 | 24.99 | Pass |
| 11 | 8.646 | 24.77 | Pass |
| 12 | 8.650 | 24.48 | Pass |

Over Charge (T7)

| NO. | Initial OCV(V) | Max. Temp (°C) | Result |
|-----|----------------|----------------|--------|
|-----|----------------|----------------|--------|

B. 50th cycle fully charged state

| | | | |
|----|-------|-------|------|
| 13 | 8.621 | 23.53 | Pass |
| 14 | 8.623 | 25.08 | Pass |
| 15 | 8.625 | 25.14 | Pass |
| 16 | 8.630 | 24.20 | Pass |

2-3. T6/T8 Test Result (ICP595490L2)

| Crush (T6) | | | |
|------------|----------------|----------------|--------|
| NO. | Initial OCV(V) | Max. Temp (°C) | Result |

A. 1st cycle 50% charged state

| | | | |
|-----|-------|-------|------|
| C-1 | 3.876 | 23.25 | Pass |
| C-2 | 3.874 | 23.56 | Pass |
| C-3 | 3.871 | 23.53 | Pass |
| C-4 | 3.872 | 23.44 | Pass |
| C-5 | 3.878 | 23.49 | Pass |

| Forced Discharge (T8) | | | | | | | |
|-----------------------|----------------|----------------|--------|-----|----------------|----------------|--------|
| NO. | Initial OCV(V) | Max. Temp (°C) | Result | NO. | Initial OCV(V) | Max. Temp (°C) | Result |

A. 1st cycle fully discharged state

| | | | |
|------|-------|-------|------|
| C-6 | 3.013 | 46.75 | Pass |
| C-7 | 3.011 | 46.78 | Pass |
| C-8 | 3.010 | 45.55 | Pass |
| C-9 | 3.014 | 46.43 | Pass |
| C-10 | 3.007 | 47.37 | Pass |
| C-11 | 3.013 | 46.68 | Pass |
| C-12 | 3.017 | 46.57 | Pass |
| C-13 | 3.007 | 47.53 | Pass |
| C-14 | 3.008 | 46.66 | Pass |
| C-15 | 3.016 | 45.41 | Pass |

B. 50th cycle fully discharged state

| | | | |
|------|-------|-------|------|
| C-16 | 3.114 | 44.75 | Pass |
| C-17 | 3.124 | 44.34 | Pass |
| C-18 | 3.121 | 43.87 | Pass |
| C-19 | 3.119 | 44.27 | Pass |
| C-20 | 3.118 | 45.87 | Pass |
| C-21 | 3.128 | 45.99 | Pass |
| C-22 | 3.121 | 46.84 | Pass |
| C-23 | 3.119 | 44.93 | Pass |
| C-24 | 3.117 | 44.98 | Pass |
| C-25 | 3.120 | 43.78 | Pass |

3. Sample Image

