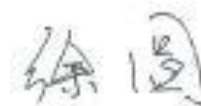


# UN38.3 Test Summary

The following product has been evaluated according to the 6th revised edition Amendment 1 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.

| Manufacture's contact information | LG Chem, Ltd.<br>128 Yeoui-Daero, Yeongdeungpo-gu, SEOUL, 150-721, REPUBLIC OF KOREA<br>Telephone : +86-10-7742-5427      E-mail : kkammy@lgchem.com      Website : <a href="http://www.lgchem.com">www.lgchem.com</a>   |                                |      |
|-----------------------------------|--|--------------------------------|------|
| Test Laboratory information       | LG Chem, Ltd. / RESEARCH PARK<br>188 Munjiro, Yuseong-gu, Daejeon, 305-738, REPUBLIC OF KOREA<br>Telephone : +82-10-3099-3724      E-mail : juhongpark@lgchem.com      Website : <a href="http://www.lgchem.com">www.lgchem.com</a>  |                                |      |
|                                   | LG Chem (Nanjing) I&E Materials Co., Ltd<br>NO.17 Hengyi Road, Nanjing Economic & Technological Development Zone, Nanjing, Jiangsu, China<br>Telephone : +86-025-85603000-8288      E-mail : xuyuannj@lgchem.com      Website : <a href="http://www.lgchem.com">www.lgchem.com</a> |                                |      |
| Description                       |  | List of Test Completed         |      |
| Test Report Number                | QDI-180803-B-L18L3P71  | Test 1. Altitude Simulation    | Pass |
| Date of test report               | 2018.08.03   | Test 2. Thermal Test           | Pass |
| Model name                        | L18L3P71   | Test 3. Vibration              | Pass |
| Type                              | Pouch  | Test 4. Shock                  | Pass |
| Nominal voltage                   | 11.58 V  | Test 5. External Short Circuit | Pass |
| Capacity                          | 57.00Wh  | Test 6. Impact or Crush        | Pass |
| Weight                            | 231.85g  | Test 7. Overcharge             | Pass |
| Dimensions                        | 271.20mmX92.60mmX5.45mm  | Test 8. Forced Discharge       | Pass |

Approved By: Yuan Xu  
 Part Leader  
 Cyl NPI&CE lab part DQA Team  
 LG Chem, Ltd.  
 E-mail: xuyuannj@lgchem.com



|                 |                       |     |
|-----------------|-----------------------|-----|
| Document Number | QDI-180803-B-L18L3P71 |     |
| Prepared        | qianjunli             | 钱俊丽 |
| Approved        | Xuyuan                | 徐园  |

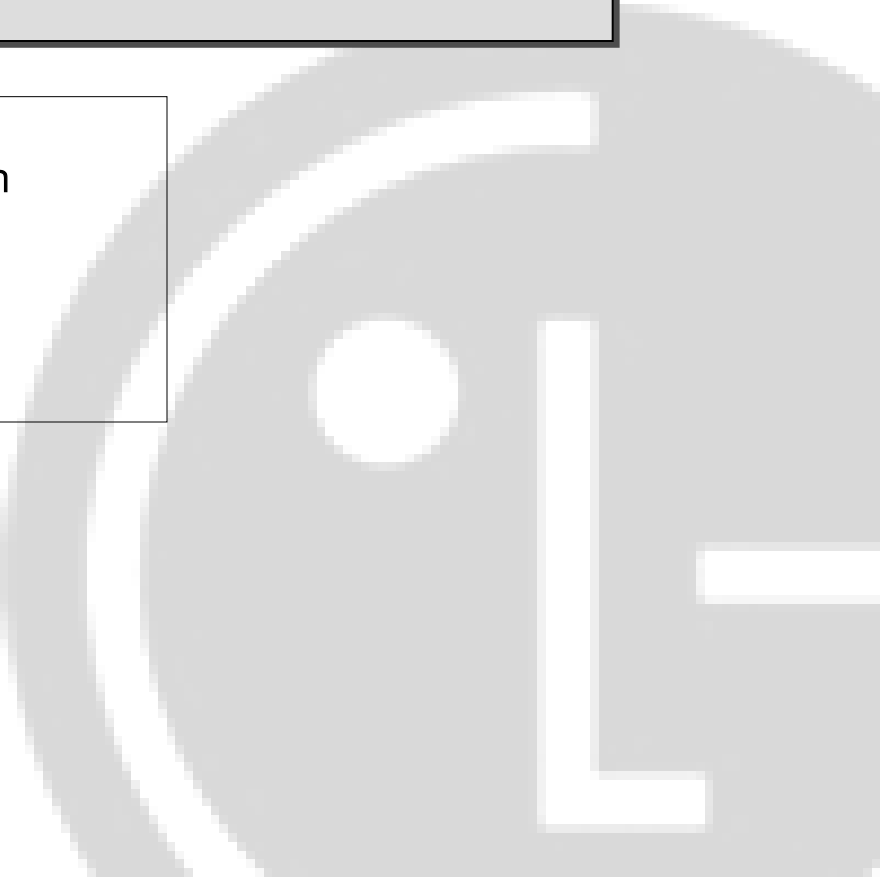
# UN38.3 Test Report

## - L18L3P71 (Nom. 57.00Wh, 11.58V) -

### Index

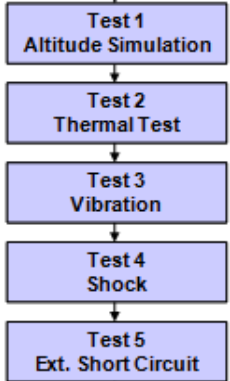
- 1. UN38.3 Test Condition
- 2. Test Result
- 3. Sample Image

2018. 08. 03



# 1. UN38.3 Test Condition

Rev.6 Amendment 1

| 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"> <li>- After OCV (%) ≥ 90%</li> <li>- No leakage, no venting, no disassembly, no rupture, no fire</li> <li>- Mass loss limit (leakage)               <ol style="list-style-type: none"> <li>1) If M&lt;1g, less than 0.5%,</li> <li>2) If 1g≤M≤75g, less than 0.2%,</li> <li>3) If M&gt;75g, less than 0.1%</li> </ol> </li> </ul> | T1~T5 : Sequence Tests<br><br> <pre>           graph TD             T1[Test 1<br/>Altitude Simulation] --&gt; T2[Test 2<br/>Thermal Test]             T2 --&gt; T3[Test 3<br/>Vibration]             T3 --&gt; T4[Test 4<br/>Shock]             T4 --&gt; T5[Test 5<br/>Ext. Short Circuit]           </pre> |
| Test 2. Thermal Test           | [72±2℃,6hr ↔ -40±2℃,6hr, interval max. 30min] x 10cycle<br>Storing at 20±5℃ for 24h   |  |   |
| Test 3. Vibration              | [7Hz↔200Hz↔7Hz, in 15min] x 12 times x 3 direction<br>1) sinusoidal waveform with a logarithmic sweep<br>2) 7Hz 18Hz (maintaining 1gn) app. 50Hz (until 8gn)<br>200Hz (maintaining 8gn), 1.6mm total excursion                                      |  |   |
| Test 4. Shock                  | Half sine shock<br>1) Peak acceleration<br>- For cells & single cell batteries : 150gn<br>- For batteries (whichever is smaller) : 150gn or $\sqrt{\frac{100850}{Mass(kg)}} gn$<br>2) Pulse duration : 6msec<br>3) 6 direction (±x, y, z) x 3 cycle |  |   |
| Test 5. External Short Circuit | 1) Samples to be heated to 57±4℃ in chamber (Measured on external case)<br>2) Less than 0.1Ω, ext. short-circuit at 57±4℃<br>3) 1hr continue after returning to 57±4℃   |  |   |
| Test 6. Impact                 | Φ=15.8±0.1mm bar, 9.1±0.1kg mass, 61±2.5cm height   | <ul style="list-style-type: none"> <li>- No disassembly, no fire within 6 hours after the test</li> <li>- Max. Temp ≤ 170℃</li> </ul>  | for cylindrical cells<br>(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<br>(less than 18mm diameter)<br>for prismatic, pouch,<br>coin/button cells  |
| Test 7. Overcharge             | Current = Manufacturer's recommended max. continuous charge current X 2<br>Voltage<br>1.If charge voltage ≤ 18V,<br>V (min.) = 2 x (max. charge voltage) or 22V.<br>2.If charge voltage > 18V,<br>V (min.) = 1.2 x (max. charge voltage)            | <ul style="list-style-type: none"> <li>- No disassembly, no fire within 7 days after the test</li> </ul>   | Only for<br>Single Cell Battery / Battery   |
| Test 8. Forced Discharge       | Discharge at max. discharge current<br>(connecting in series with 12V DC power supply),<br>Duration time = rated capacity/initial test current  | <ul style="list-style-type: none"> <li>- No disassembly, no fire within 7 days after the test</li> </ul>   | Resistance of Electric Loader<br>1/Ω = (max. discharge current)<br>/ (12 + Initial OCV)   |

# 2-1. T1-T4 Test Result

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

## A. 1st cycle fully charged state

|   |         |        |         |        |       |       |      |         |        |       |       |      |         |        |       |       |      |         |        |        |       |      |
|---|---------|--------|---------|--------|-------|-------|------|---------|--------|-------|-------|------|---------|--------|-------|-------|------|---------|--------|--------|-------|------|
| 1 | 13.0271 | 231.60 | 13.0236 | 231.57 | 99.97 | 0.013 | Pass | 12.8062 | 231.52 | 98.33 | 0.022 | Pass | 12.8004 | 231.54 | 99.95 | 0.000 | Pass | 12.7995 | 231.53 | 99.99  | 0.004 | Pass |
| 2 | 13.0295 | 231.34 | 13.0257 | 231.30 | 99.97 | 0.017 | Pass | 12.8085 | 231.25 | 98.33 | 0.022 | Pass | 12.8025 | 231.27 | 99.95 | 0.000 | Pass | 12.8018 | 231.26 | 99.99  | 0.004 | Pass |
| 3 | 13.0281 | 231.38 | 13.0243 | 231.34 | 99.97 | 0.017 | Pass | 12.8049 | 231.30 | 98.32 | 0.017 | Pass | 12.7986 | 231.31 | 99.95 | 0.000 | Pass | 12.7980 | 231.30 | 100.00 | 0.004 | Pass |
| 4 | 13.0232 | 231.75 | 13.0200 | 231.73 | 99.98 | 0.009 | Pass | 12.8043 | 231.67 | 98.34 | 0.026 | Pass | 12.7981 | 231.69 | 99.95 | 0.000 | Pass | 12.7975 | 231.68 | 100.00 | 0.004 | Pass |

## B. 50th cycle fully charged state

|   |         |        |         |        |        |       |      |         |        |       |       |      |         |        |       |       |      |         |        |        |       |      |
|---|---------|--------|---------|--------|--------|-------|------|---------|--------|-------|-------|------|---------|--------|-------|-------|------|---------|--------|--------|-------|------|
| 5 | 12.9907 | 230.71 | 12.9907 | 230.70 | 100.00 | 0.004 | Pass | 12.7985 | 230.65 | 98.52 | 0.022 | Pass | 12.7924 | 230.67 | 99.95 | 0.000 | Pass | 12.7918 | 230.67 | 100.00 | 0.000 | Pass |
| 6 | 12.9928 | 231.85 | 12.9931 | 231.84 | 100.00 | 0.004 | Pass | 12.8033 | 231.79 | 98.54 | 0.022 | Pass | 12.7973 | 231.80 | 99.95 | 0.000 | Pass | 12.7966 | 231.80 | 99.99  | 0.000 | Pass |
| 7 | 12.9985 | 231.19 | 12.9984 | 231.17 | 100.00 | 0.009 | Pass | 12.8047 | 231.13 | 98.51 | 0.017 | Pass | 12.7988 | 231.15 | 99.95 | 0.000 | Pass | 12.7979 | 231.15 | 99.99  | 0.000 | Pass |
| 8 | 12.9973 | 231.12 | 12.9973 | 231.10 | 100.00 | 0.009 | Pass | 12.8032 | 231.05 | 98.51 | 0.022 | Pass | 12.7976 | 231.07 | 99.96 | 0.000 | Pass | 12.7966 | 231.06 | 99.99  | 0.004 | 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 | 12.7995 | 58.38 | Pass |
| 2 | 12.8018 | 58.14 | Pass |
| 3 | 12.7980 | 57.75 | Pass |
| 4 | 12.7975 | 57.45 | Pass |

### B. 50th cycle fully charged state

|   |         |       |      |
|---|---------|-------|------|
| 5 | 12.7918 | 58.31 | Pass |
| 6 | 12.7966 | 58.17 | Pass |
| 7 | 12.7979 | 57.72 | Pass |
| 8 | 12.7966 | 57.51 | Pass |

## Overcharge (T7)

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

### A. 1st cycle fully charged state

|    |         |       |      |
|----|---------|-------|------|
| 9  | 13.0248 | 21.80 | Pass |
| 10 | 13.0259 | 21.59 | Pass |
| 11 | 13.0307 | 21.59 | Pass |
| 12 | 13.0286 | 21.84 | Pass |

### B. 50th cycle fully charged state

|    |         |       |      |
|----|---------|-------|------|
| 13 | 12.9988 | 21.59 | Pass |
| 14 | 12.9729 | 21.19 | Pass |
| 15 | 12.9999 | 21.45 | Pass |
| 16 | 12.9880 | 21.19 | Pass |

# 2-3. T6/T8 Test Result (ICP478873L1)

|                             |                                 |
|-----------------------------|---------------------------------|
| <b>Cell Document Number</b> | <b>QDI-160908-C-ICP478873L1</b> |
|-----------------------------|---------------------------------|

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

**A. 1st cycle 50% charged state**

|            |       |       |             |
|------------|-------|-------|-------------|
| <b>C-1</b> | 3.864 | 22.06 | <b>Pass</b> |
| <b>C-2</b> | 3.861 | 22.98 | <b>Pass</b> |
| <b>C-3</b> | 3.860 | 22.79 | <b>Pass</b> |
| <b>C-4</b> | 3.864 | 22.06 | <b>Pass</b> |
| <b>C-5</b> | 3.863 | 22.34 | <b>Pass</b> |

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

**A. 1st cycle fully discharged state**

|             |       |       |             |
|-------------|-------|-------|-------------|
| <b>C-6</b>  | 3.017 | 41.15 | <b>Pass</b> |
| <b>C-7</b>  | 3.027 | 42.45 | <b>Pass</b> |
| <b>C-8</b>  | 3.045 | 44.61 | <b>Pass</b> |
| <b>C-9</b>  | 3.050 | 44.41 | <b>Pass</b> |
| <b>C-10</b> | 3.013 | 43.02 | <b>Pass</b> |
| <b>C-11</b> | 3.025 | 41.41 | <b>Pass</b> |
| <b>C-12</b> | 3.023 | 43.56 | <b>Pass</b> |
| <b>C-13</b> | 3.018 | 43.82 | <b>Pass</b> |
| <b>C-14</b> | 3.010 | 40.69 | <b>Pass</b> |
| <b>C-15</b> | 3.035 | 43.95 | <b>Pass</b> |

**B. 50th cycle fully discharged state**

|             |       |       |             |
|-------------|-------|-------|-------------|
| <b>C-16</b> | 3.080 | 41.19 | <b>Pass</b> |
| <b>C-17</b> | 3.077 | 40.98 | <b>Pass</b> |
| <b>C-18</b> | 3.057 | 44.85 | <b>Pass</b> |
| <b>C-19</b> | 3.062 | 43.64 | <b>Pass</b> |
| <b>C-20</b> | 3.100 | 44.92 | <b>Pass</b> |
| <b>C-21</b> | 3.099 | 44.23 | <b>Pass</b> |
| <b>C-22</b> | 3.068 | 40.18 | <b>Pass</b> |
| <b>C-23</b> | 3.097 | 40.41 | <b>Pass</b> |
| <b>C-24</b> | 3.081 | 44.53 | <b>Pass</b> |
| <b>C-25</b> | 3.067 | 40.82 | <b>Pass</b> |

