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|----------|-------------------------------------|---|
| 문서번호 | QAE-EF02-150205-PKASM PN SB10F46464 | |
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UN Test Report

- ASM P/N SB10F46464(Nom.45Wh, 15.2V)-

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 LG Chem

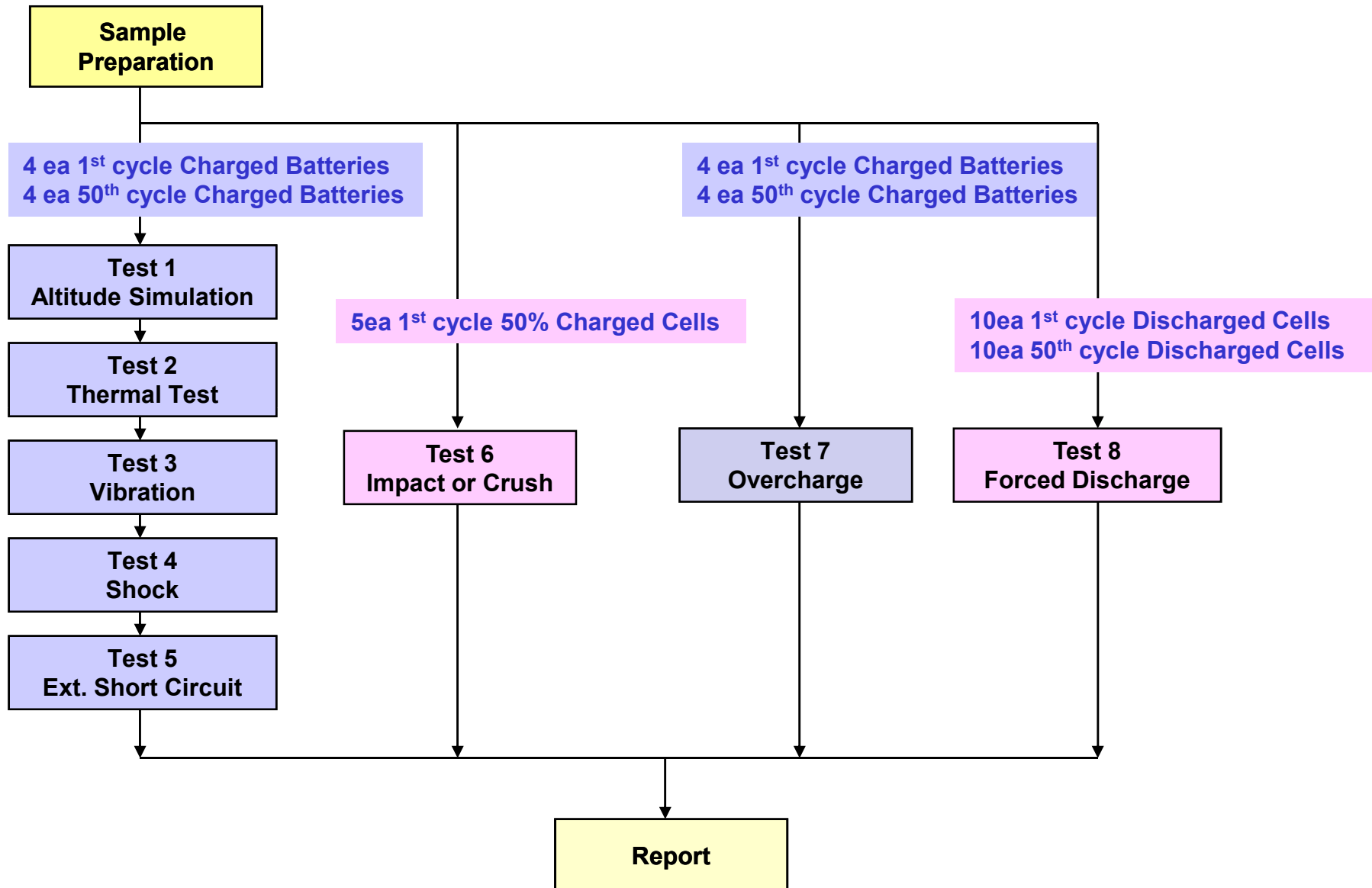
1. UN Transportation Regulation Test

| Test | Condition | Requirements | |
|---|---|---|---|
| Test 1. Altitude Simulation | Storing at (low pressure)11.6kPa for 6hr at 20+/-5℃ | - Measuring mass before/ after each test (If $M < 1g$, less than 0.5%, If $1g \leq M \leq 75g$, less than 0.2%, If $M > 75g$, less than 0.1%) - Measuring voltage before/ after each test (more than 90%) - No leakage, no venting, no disassembly, no rupture, no fire | |
| 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 1gn) 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℃ | | - 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, no fire within 6 hours after the test - Temp. monitoring (max. 170℃) |
| 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 | | |
| 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 charged state

| | | | | | | | | | | | | | | | | | | | | | | | |
|--------|------|--------|--------|--------|--------|--------|-------|------|--------|--------|-------|-------|------|--------|--------|-------|-------|------|--------|--------|--------|-------|------|
| Charge | 1 | 17.387 | 242.45 | 17.387 | 242.45 | 100.00 | 0.000 | Pass | 17.168 | 242.44 | 98.74 | 0.004 | Pass | 17.166 | 242.44 | 99.99 | 0.000 | Pass | 17.164 | 242.44 | 99.99 | 0.000 | Pass |
| | 2 | 17.348 | 242.34 | 17.345 | 242.34 | 99.98 | 0.000 | Pass | 17.146 | 242.33 | 98.85 | 0.004 | Pass | 17.137 | 242.32 | 99.95 | 0.004 | Pass | 17.137 | 242.31 | 100.00 | 0.004 | Pass |
| | 3 | 17.343 | 242.33 | 17.340 | 242.32 | 99.98 | 0.004 | Pass | 17.127 | 242.29 | 98.77 | 0.012 | Pass | 17.118 | 242.27 | 99.95 | 0.008 | Pass | 17.115 | 242.27 | 99.98 | 0.000 | Pass |
| | 4 | 17.353 | 242.46 | 17.351 | 242.45 | 99.99 | 0.004 | Pass | 17.127 | 242.42 | 98.71 | 0.012 | Pass | 17.124 | 242.41 | 99.98 | 0.004 | Pass | 17.122 | 242.41 | 99.99 | 0.000 | Pass |
| | Ave. | 17.358 | 242.40 | 17.356 | 242.39 | 99.99 | 0.002 | - | 17.142 | 242.37 | 98.77 | 0.008 | - | 17.136 | 242.36 | 99.97 | 0.004 | - | 17.135 | 242.36 | 99.99 | 0.001 | - |

B. 50th cycle fully charged state

| | | | | | | | | | | | | | | | | | | | | | | | |
|--------|------|--------|--------|--------|--------|--------|-------|------|--------|--------|-------|-------|------|--------|--------|--------|-------|------|--------|--------|-------|-------|------|
| Charge | 5 | 17.354 | 242.54 | 17.345 | 242.54 | 99.95 | 0.000 | Pass | 17.132 | 242.52 | 98.77 | 0.008 | Pass | 17.123 | 242.50 | 99.95 | 0.008 | Pass | 17.116 | 242.50 | 99.96 | 0.000 | Pass |
| | 6 | 17.359 | 242.15 | 17.359 | 242.14 | 100.00 | 0.004 | Pass | 17.144 | 242.11 | 98.76 | 0.012 | Pass | 17.141 | 242.09 | 99.98 | 0.008 | Pass | 17.139 | 242.08 | 99.99 | 0.004 | Pass |
| | 7 | 17.370 | 242.34 | 17.365 | 242.32 | 99.97 | 0.008 | Pass | 17.165 | 242.30 | 98.85 | 0.008 | Pass | 17.165 | 242.29 | 100.00 | 0.004 | Pass | 17.156 | 242.29 | 99.95 | 0.000 | Pass |
| | 8 | 17.361 | 241.99 | 17.356 | 241.97 | 99.97 | 0.008 | Pass | 17.127 | 241.97 | 98.68 | 0.000 | Pass | 17.118 | 241.96 | 99.95 | 0.004 | Pass | 17.115 | 241.96 | 99.98 | 0.000 | Pass |
| | Ave. | 17.361 | 242.26 | 17.356 | 242.24 | 99.97 | 0.005 | - | 17.142 | 242.23 | 98.77 | 0.007 | - | 17.137 | 242.21 | 99.97 | 0.006 | - | 17.132 | 242.21 | 99.97 | 0.001 | - |

| | |
|--------------------|---|
| Requirement | <ul style="list-style-type: none"> - Measuring mass before/after each test (If $M > 75g$, less than 0.1%, $1g \leq M \leq 75$, 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 |
|--------------------|---|

3-2. T5/T7 Test Result

| EXT.Short Circuit (T5) | | | | |
|------------------------|-----|----------------|----------------|--------|
| | NO. | Initial OCV(V) | Max. Temp (°C) | Result |

A. 1st cycle fully charged state

| | | | | |
|--------|------|--------|-------|------|
| Charge | 1 | 17.164 | 55.32 | Pass |
| | 2 | 17.137 | 55.09 | Pass |
| | 3 | 17.115 | 55.57 | Pass |
| | 4 | 17.122 | 55.32 | Pass |
| | MAX. | 17.164 | 55.57 | - |

| Test Condition |
|--------------------------------------|
| - 100mΩ ext. short-circuit at 55±2°C |

| Over Charge (T7) | | | | |
|------------------|-----|----------------|----------------|--------|
| | NO. | Initial OCV(V) | Max. Temp (°C) | Result |

A. 1st cycle fully charged state

| | | | | |
|--------|------|--------|-------|------|
| Charge | 9 | 17.347 | 24.70 | Pass |
| | 10 | 17.343 | 25.10 | Pass |
| | 11 | 17.347 | 24.52 | Pass |
| | 12 | 17.350 | 24.82 | Pass |
| | MAX. | 17.350 | 25.10 | - |

| Test Condition |
|--|
| - Max. Charge Current : 2900mA - CC/CV 2Imax(5800mA) 22V cut-off 24Hr |

| EXT.Short Circuit (T5) | | | | |
|------------------------|-----|----------------|----------------|--------|
| | NO. | Initial OCV(V) | Max. Temp (°C) | Result |

B. 50th cycle fully charged state

| | | | | |
|--------|------|--------|-------|------|
| Charge | 5 | 17.116 | 56.29 | Pass |
| | 6 | 17.139 | 54.74 | Pass |
| | 7 | 17.156 | 55.45 | Pass |
| | 8 | 17.115 | 56.27 | Pass |
| | MAX. | 17.156 | 56.29 | - |

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

| Over Charge (T7) | | | | |
|------------------|-----|----------------|----------------|--------|
| | NO. | Initial OCV(V) | Max. Temp (°C) | Result |

B. 50th cycle fully charged state

| | | | | |
|--------|------|--------|-------|------|
| Charge | 13 | 17.327 | 23.64 | Pass |
| | 14 | 17.329 | 25.11 | Pass |
| | 15 | 17.325 | 23.62 | Pass |
| | 16 | 17.323 | 23.83 | Pass |
| | MAX. | 17.329 | 25.11 | - |

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

3-3. T6/T8 Test Result (ICP445388L1)

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

A. 1st cycle 50% charged state

| | | | | |
|-------------|-----|-------|-------|------|
| Flat | C-1 | 3.849 | 23.15 | Pass |
| | C-2 | 3.852 | 23.34 | Pass |
| | C-3 | 3.851 | 23.25 | Pass |
| | C-4 | 3.851 | 23.17 | Pass |
| | C-5 | 3.851 | 23.16 | Pass |
| MAX. | | 3.852 | 23.34 | - |

| 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 (°C) | Result |

A. 1st cycle fully discharged state

| | | | |
|-------------|-------|-------|------|
| C-6 | 3.347 | 47.82 | Pass |
| C-7 | 3.321 | 48.23 | Pass |
| C-8 | 3.330 | 43.56 | Pass |
| C-9 | 3.341 | 47.13 | Pass |
| C-10 | 3.353 | 48.47 | Pass |
| C-11 | 3.323 | 46.25 | Pass |
| C-12 | 3.342 | 46.89 | Pass |
| C-13 | 3.323 | 47.44 | Pass |
| C-14 | 3.348 | 48.09 | Pass |
| C-15 | 3.347 | 45.96 | Pass |
| MAX. | 3.353 | 48.47 | - |

B. 50th cycle fully discharged state

| | | | |
|-------------|-------|-------|------|
| C-16 | 3.526 | 44.95 | Pass |
| C-17 | 3.541 | 46.72 | Pass |
| C-18 | 3.530 | 40.21 | Pass |
| C-19 | 3.514 | 45.98 | Pass |
| C-20 | 3.532 | 42.11 | Pass |
| C-21 | 3.528 | 45.52 | Pass |
| C-22 | 3.518 | 47.03 | Pass |
| C-23 | 3.549 | 46.89 | Pass |
| C-24 | 3.539 | 41.52 | Pass |
| C-25 | 3.559 | 40.67 | Pass |
| MAX. | 3.559 | 46.72 | - |

| Test Condition |
|--|
| - Discharge at max. discharge current (with 12V DC power supply) : 2900mA Duration time: rated capacity (60min) |

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

4. Sample Image

