| | | | |
|---|---|---|---|
| **Prüfbericht-Nr.:** Test Report No.: | **CN225NC1 001** | **Auftrags-Nr.:** Order No.: | **Seite 1 von 36** Page 1 of 36 |
| | N/A | Order date: | |
| | | | |
| **Prüfgegenstand:** Test item: | | | |
| **Bezeichnung / Typ-Nr.:** Identification / Type No.: | See table 4 on page 5 | | |
| **Auftrags-Inhalt:** Order content: | TÜVus mark approval | | |
| **Prüfgrundlage:** Test specification: | UL 1642:2020 | | |
| **Wareneingangsdatum:** Date of sample receipt: | | | |
| **Prüfmuster-Nr.:** Test sample No.: | | | |
| **Prüfzeitraum:** Testing period: | | | |
| **Ort der Prüfung:** Place of testing: | CMC Testing International | | |
| **Prüflaboratorium:** Testing laboratory: | | | |
| **Prüfergebnis*:** Test result*: | Pass | | |



| | | | |
|---|---|---|---|
| **erstellt von:** created by: | Revan Dai | **genehmigt von:** authorized by: | Jeffrey Qin |
| Date: | | Date: | |
| **Stellung** / Position | Project Engineer | **Stellung** / Position | Reviewer |

**Sonstiges** / Other: 1. The complete test report includes the following attachments:
- Attachment 1: Equipment list (3 pages);
- Attachment 2: Photo documents (3 pages).

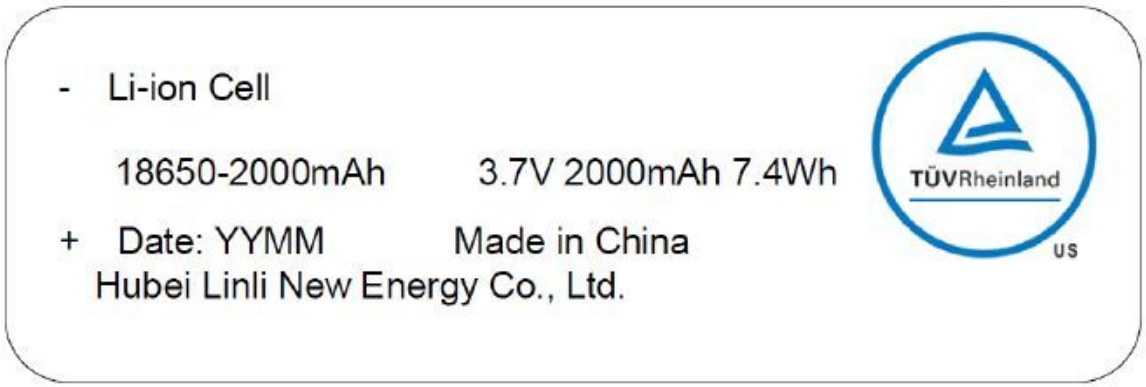
**Zustand des Prüfgegenstandes bei Anlieferung:** Prüfmuster vollständig und unbeschädigt
Condition of the test item at delivery: Test item complete and undamaged

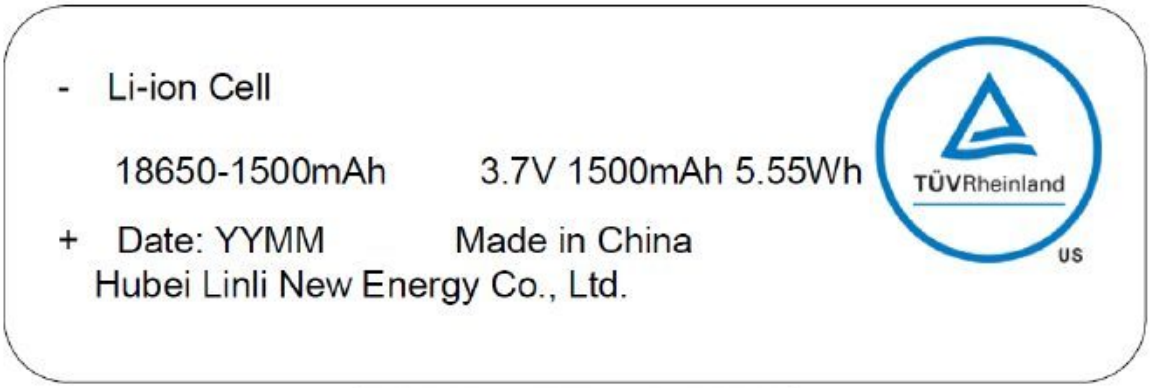
| | | | | |
|---|---|---|---|---|
| * Legende: | P(ass) = entspricht o.g. Prüfgrundlage(n) | F(ail) = entspricht nicht o.g. Prüfgrundlage(n) | N/A = nicht anwendbar | N/T = nicht getestet |
| * Legend: | P(ass) = passed a.m. test specification(s) | F(ail) = failed a.m. test specification(s) | N/A = not applicable | N/T = not tested |

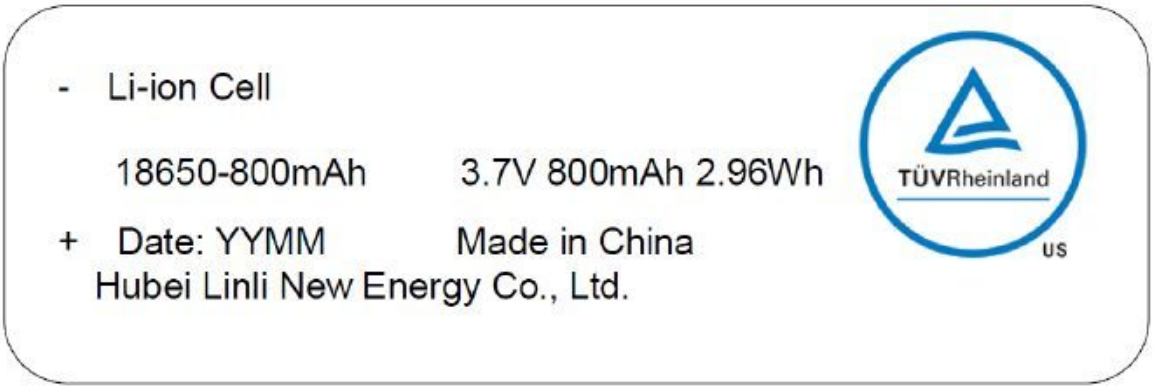
**Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.**
This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.

| **Test item particulars:** | |
|---|---|
| Information about the product needed to establish a correct test program, such as product mobility, type of power connections and similar. | (Test item particulars are selected by the TRF Originator base on the requirements in the standard) |
| Designation..... : | See table 4 on page 5 |
| Trademark..... : | N/A |
| Nominal voltage..... : | 3.7V |
| Rated capacity..... : | See table 4 on page 5 |
| Maximum charge voltage..... : | 4.2V |
| Maximum charge current..... : | 0.5C |
| Final voltage..... : | 2.75V |
| Ambient temperature range..... : | 0~45°C (charge), -20~60°C (discharge) |
| Recommend charging method declared by the | [redacted] |
| [redacted] | |
| **Testing:** | |
| **Test clauses and results:** | |
| cl.10 Short-Circuit Test..... : | P |
| cl.11 Abnormal Charging Test..... : | P |
| cl.12 Forced-Discharge Test..... : | N/A |
| cl.13 Crush Test..... : | P |
| cl.14 Impact Test..... : | P |
| cl.15 Shock Test..... : | P |
| cl.16 Vibration Test..... : | P |
| cl.17 Heating Test..... : | P |
| cl.18 Temperature Cycling Test..... : | P |
| cl.19 Low Pressure (Altitude Simulation) Test..... : | P |
| cl.20 Projectile Test..... : | P |
| **Testing location:** | |
| [redacted] | |
| **General remarks:** | |
| This report shall not be reproduced, except in full, without the written approval of the testing laboratory.<br>The test results presented in this report relate only to the object tested.<br>"(see remark #)" refers to a remark appended to the report.<br>"(see appended table)" refers to a table appended to the report.<br>Throughout this report a point is used as the decimal separator. | |

**Copy of marking plate:**




Remark: 1. YYMM represents the date of manufacture. "YY" represents the year, "MM" represents the month.
2. Due to similarity of the marking plate, only label of three representative models listed.

**General product information:**

and negative electrode plates are housed in the case in the state being separated by the separator.

1) These tested cells have not been evaluated in combination with charger(s) or host product(s). Additional evaluation to determine compliance may be required on the combination(s) in the end product evaluation.

2) The tested cells were evaluated for a maximum charge current and maximum voltage limit outlined in the Table below. The end product evaluation shall ensure that current and voltage limits noted are maintained.

representatives of all models.

0.05CmA (5pcs at 45°C and 5pcs at -5°C)

| Model | Rated capacity | Nominal voltage | Nominal Charge current | Nominal discharge current | Max. charge current | Max. discharge current | Max. charge voltage | End discharge voltage |
|---|---|---|---|---|---|---|---|---|
| 18650-800mAh | 800mAh | 3.7V | 400mA | 400mA | 400mA | 400mA | 4.2V | 2.75V |

| Model | Rated capacity | Nominal voltage | Nominal Charge current | Nominal discharge current | Max. charge current | Max. discharge current | Max. charge voltage | End discharge voltage |
|---|---|---|---|---|---|---|---|---|
| 18650-1500mAh | 1500mAh | 3.7V | 750mA | 750mA | 750mA | 750mA | 4.2V | 2.75V |

| Model | Rated capacity | Nominal voltage | Nominal Charge current | Nominal discharge current | Max. charge current | Max. discharge current | Max. charge voltage | End discharge voltage |
|---|---|---|---|---|---|---|---|---|
| 18650-2000mAh | 2000mAh | 3.7V | 1000mA | 1000mA | 1000mA | 1000mA | 4.2V | 2.75V |

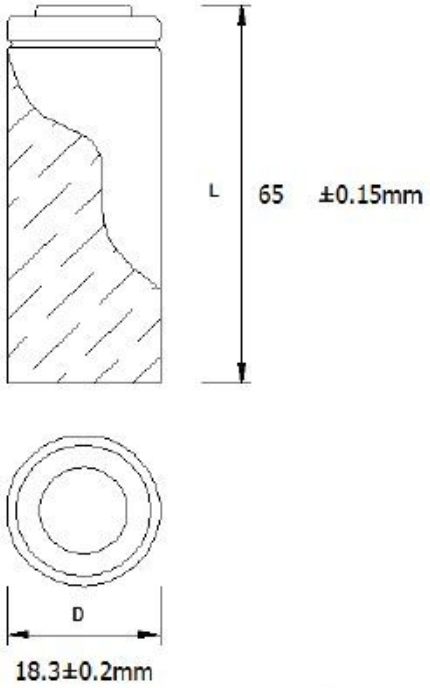
Remark: other models feature, see Table 4.

- Table 4: All of the models:

| Model | Energy density (Wh/L) | Rated capacity (mAh) | Max. Dia. (mm) | Max. Length (mm) | Nominal charge current (mA) | Nominal discharge current (mA) | Max. charge current (mA) | Max. discharge current (mA) |
|---|---|---|---|---|---|---|---|---|
| **18650-800mAh** | 169.02 | 800 | 18.5 | 65.15 | 400 | 400 | 400 | 400 |
| 18650-1200mAh | 253.53 | 1200 | 18.5 | 65.15 | 600 | 600 | 600 | 600 |
| 18650-1300mAh | 274.66 | 1300 | 18.5 | 65.15 | 650 | 650 | 650 | 650 |
| **18650-1500mAh** | 316.92 | 1500 | 18.5 | 65.15 | 750 | 750 | 750 | 750 |
| 18650-1800mAh | 380.30 | 1800 | 18.5 | 65.15 | 900 | 900 | 900 | 900 |
| **18650-2000mAh** | 422.56 | 2000 | 18.5 | 65.15 | 1000 | 1000 | 1000 | 1000 |

Remark: All the models have the same nominal voltage 3.7V and the same end discharge voltage 2.75V, and have the same Max. charge voltage 4.2V.

**Construction:**




D: Diameter, L: Length

(Dimensions value refer to Table 4)

| UL 1642:2020 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| **INTRODUCTION** | | | |
| **1** | **Scope** | | P |
| **2** | **General** | | P |
| **3** | **Glossary** | | P |
| **CONSTRUCTION** | | | |
| **4** | **General** | | N/A |
| 4.1 | Casing | | N/A |
| 4.1.1 | and rigidity necessary to resist the abuses to which it may be subjected, without resulting in a risk of fire. The casing of a user-replaceable lithium battery shall have the strength and rigidity necessary to resist the abuses to which it may be subjected without resulting in a risk of injury to persons. | without enclosure. | N/A |
| 4.1.2 | casing of sufficient strength to prevent flexing. A tool providing the mechanical advantage of a pliers, screwdriver, or hacksaw shall be the minimum opening of the casing will expose metallic lithium. | | N/A |
| 4.2 | Electrolyte | | N/A |
| 4.2.1 | A user-replaceable battery shall not contain pressurized vapor or liquid that could spray materials into the eyes or leak more than 5 mL of liquid when the battery casing is punctured under normal laboratory conditions, 23 ±2°C (73 ±3.6°F). | Technician-replaceable Battery. | N/A |
| 4.3 | Use | | N/A |
| 4.3.1 | A lithium battery shall be protected from abnormal charging currents during use. A battery tested and found acceptable for the charging current, IC (see Section 11), under fault conditions specified by the currents in the end product application by:<br>a) Two blocking components, such as diodes, or<br>b) One blocking component and one current limiting component, such as a resistor or a fuse.<br>The current limiting component shall limit the charging current to one-third the value used in the Abnormal Charging Test, Section 11. | | N/A |
| **PERFORMANCE** | | | |
| **5** | **General** | | P |
| 5.1 | Technician-replaceable Batteries | | P |

| UL 1642:2020 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 5.1.1 | Technician-replaceable lithium cells or batteries are to be tested as described in Sections 10 – 20. Section 12, Forced-Discharge Test, is applicable only to cells intended to be used in series-connected multicell applications such as battery packs. For multicell installations, also see 5.3.1. | | P |
| 5.1.2 | When a fire or explosion occurs as a result of the Crush Test, Section 13, or the Impact Test, [redacted] that the aluminum test cage is penetrated during the Projectile Test, Section 20; the use of the technician [redacted] applications in which it is not exposed to, or is protected from, any conditions shown to cause a fire or explosion. | No fire or explosion occurs | P |
| 5.1.3 | Cells and batteries subjected to the Shock Test, Section 15, Vibration Test, Section 16, Temperature Cycling Test, Section 18, and Low Pressure (Altitude Simulation) Test, Section 19, shall also not leak or vent. For these tests, unacceptable leakage is determined to have occurred when the resulting mass loss exceeds the values shown in Table 5.1, Venting and leakage mass loss criteria. | No leak or vent | P |
| 5.2 | User-replaceable Batteries | | N/A |
| 5.2.1 | User-replaceable lithium cells or batteries are to be tested as described in Sections 10 – 20. Section 12, Forced Discharge Test, is applicable only to cells intended to be used in multicell applications such as battery packs. In addition to complying with the requirements for a technician replaceable cell or [redacted] battery shall not explode or ignite when subjected to the Crush Test, Section 13, or the Impact Test, Section14. A user-replaceable battery shall comply with the requirements for Sections 10 – 20 and with the applicable construction requirements outlined in Section 4. Secondary lithium cells shall not be considered user-replaceable. | [redacted] | N/A |
| 5.2.2 | Sets of five specimens each are to be used for the Projectile Test, Section 20.3; see Table 6.1. When only one specimen from a set of five does not comply with the requirements, another set of five specimens is to be tested. All specimens from this second set shall comply with the requirements. | [redacted] | N/A |
| 5.3 | Multicell Installations | | N/A |

| UL 1642:2020 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 5.3.1 | intended for use in multicell installations or battery packs shall also be tested as described in 10.3 and Section 12. No fire or explosion shall occur as a result of these tests. In addition, batteries subjected to the test described in 10.3 shall meet the requirements as subjected to the Short-Circuit Test, Section10. | | N/A |
| **6** | **Samples** | | P |
| 6.1 | Fully charged primary cells or batteries and primary cells or batteries that have been conditioned by partial or complete discharge, or both, are to be used for the tests described in Sections 10 – 20. The number of samples to be used in each test for a primary cell or battery is shown in Table 6.1. When a group of cells or batteries of different sizes, but similar chemistries is involved, selected sizes representative of the range are to be tested. | The samples are secondary cells. | N/A |
| 6.2 | Fully charged secondary cells or batteries and secondary cells or batteries that have been conditioned by charge-discharge cycling are to be used for the tests described in Sections 10 – 20. The number of samples to be used in each test for a a group of cells or batteries of different sizes, and similar chemistries is involved, selected sizes representative of the range are to be tested. | The samples are secondary technician-replaceable cells. Prepared as required. | P |
| 6.3 | Prior to conducting the testing in Section 17, the outlined in 6.4 and 6.5. | Prepared as required. | P |
| 6.4 | For the heating test of Section 17, two sets of five samples are then placed in a test chamber and conditioned for 1 to 4 h (5 samples at the upper temperature limit and 5 samples at the lower temperature limit of the operating region) as outlined in Table 6.3. | Prepared as required. | P |
| 6.5 | While still in the test chamber set at the temperature limits, the samples are charged (5 samples at the upper temperature limit and 5 samples at lower temperature limit) at the specified maximum charging current and upper limit charging voltage per Table 6.3, using a constant voltage charging method. Charging is continued until the charge current is reduced to the specified end of charge conditions (i.e. 0.05 times the charge current). | Prepared as required. | P |
| **7** | **Conditioning of Samples** | | P |
| 7.1 | Discharge | | N/A |

| UL 1642:2020 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 7.1.1 | Primary batteries are to be completely discharged by connecting their terminals through resistors that provide the desired level of discharge within 60 days. Cells with a liquid cathode such as thionyl chloride or sulfur dioxide, shall also be conditioned by one-half discharge | The samples are secondary cells. | N/A |
| 7.1.2 | For solid electrolyte and other types of primary lithium batteries that cannot be discharged within 60 days because of the small currents they inherently produce, longer discharge times plus discharge at higher temperatures may be used to obtain the desired level discharge procedures are to be followed so as to obtain the required discharge level in the minimum time. | The samples are secondary cells. | N/A |
| 7.2 | Charge-discharge cycling | | P |
| 7.2.1 | Secondary cells are to be conditioned at 25°C (77°F). Cells are continuously cycled as per the and the number of cycles accumulated shall be at least equal to 25% of the advertised cycle life of the shorter. Cycling is to be done either individually or in groups. Cells are to be recharged prior to testing as indicated in Table 6.2. | The samples are cycled at | P |
| **8** | **Important test considerations** | | P |
| 8.1 | Some lithium batteries are capable of exploding when the tests described in Sections 10 – 20 are conducted. It is important that personnel be protected from the flying fragments, explosive force, sudden release of heat, and noise that results from such explosions. The test area is to be well ventilated to protect personnel from possible harmful fumes or gases. | Prepared the tests as required. | P |
| 8.2 | As an additional precaution, the temperatures on the surface of the battery casings shall be monitored during the tests described in Sections 10, 11, 12, 13, and 14. All personnel involved in the testing of lithium batteries are to be instructed never to approach a lithium battery while the surface temperature exceeds 90°C (194°F) and not to touch the lithium battery while the surface temperature exceeds 45°C (113°F). | Prepared the tests as required. | P |
| 8.3 | For protection, the Projectile Test, Section 20 is to be | Prepared the tests as required. | P |
| **9** | **Temperature Measurements** | | P |
| 9.1 | Temperatures are to be measured by thermocouples consisting of wires not larger than 24 AWG (0.21 mm2) and not smaller than 30 AWG (0.05 mm2) and a potentiometer-type instrument. | Prepared the tests as required. | P |

| UL 1642:2020 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 9.2 | The temperature measurements on the batteries are to be made with the measuring junction of the thermocouple held tightly against the metal casing of the battery. | Prepared the tests as required.<br>Casing temperature was recorded on the center of | P |
| **TESTS FOR TECHNICIAN-REPLACEABLE AND USER-REPLACEABLE BATTERIES** | | | |
| **ELECTRICAL TESTS** | | | |
| **10** | **Short-Circuit Test** | | P |
| 10.1 | Each test sample battery, in turn, is to be short-circuited by connecting the positive and negative terminals of the battery with a circuit load having a resistance load of 80±20 mΩ. The temperature of the battery case is to be recorded during the test. The battery is to discharge until a fire or explosion is obtained, or until it has reached a completely discharged state of less than 0.2 V and the battery case temperature has returned to ±10°C (±18°F) of ambient temperature. The voltage at the end of the test may not reach 0.2 V due to operation of protective devices in the circuit. The return to near ambient of the | Tested as required. See table 10 | P |
| 10.2 | Tests are to be conducted at 20 ±5°C (68 ±9°F) and at 55 ±5°C (131 ±9°F). The batteries are to reach equilibrium at 20 ±5°C or 55 ±5°C, as applicable, before the terminals are connected. | Tested as required. | P |
| 10.3 | A battery is to be tested individually unless the series or parallel. For series or parallel use, additional tests on five sets of batteries are to be conducted using the maximum number of batteries to be covered for each configuration. | Tested as required. | P |
| 10.4 | When an overcurrent protective device activates during the test, the test shall be repeated with the battery supply connected to the maximum load that does not cause the protective device to open. Protective devices that are relied upon to meet the compliance criteria for the short circuit test shall comply with 2.3.1. | Only one single lithium-ion thermal protective device | N/A |
| 10.5 | The samples shall not explode or catch fire. | The test results meet the requirements. | P |
| **11** | **Abnormal Charging Test** | | P |
| 11.1 | Primary cells or batteries shall comply with 11.2 – 11.7. | | N/A |
| 11.2 | Cells or batteries conditioned in accordance with Tables 6.1, as applicable, are to be used for this test. The batteries are to be tested in an ambient temperature of 20 ±5°C (68 ±9°F). | | N/A |

| UL 1642:2020 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 11.3 | Each test sample battery is to be subjected to a charging current of three times the current Ic, specified [redacted] dc-power supply. The specified charging current is to be obtained by connecting a resistor of the specified size and rating in series with the battery. The test charging time is to be calculated using the formula:<br>$t_c = \frac{2.5C}{3(I_c)}$, in which<br>tc is the charging time in hour<br>C is the capacity of the cell/batteiy in ampere-hours, and<br>[redacted]<br>The minimum charging time is to be 7 hours. | | N/A |
| 11.4 | When a non-resettable overcurrent or protective device operates during the test, the test is to be repeated at a charge current below the level that the protective device operates. When a resettable protective device operates during the test, the protector is allowed to reset to a total of 10 cycles; or until the appropriate charging time has been completed, but not less than 7 hours. Protective devices that are relied upon to meet the compliance criteria for the abnormal charging test shall comply with 2.3.1. | | N/A |
| 11.5 | The samples shall not explode or catch fire. | | N/A |
| 11.6 | Secondary cells or batteries shall comply with 11.7 – 11.10. | See table 11, tested as required | P |
| 11.7 | Cells or batteries conditioned in accordance with Tables 6.2, as applicable, are to be used for this test. The batteries are to be tested in an ambient temperature of 20 ±5°C (68 ±9°F). | Tested as required. | P |
| 11.8 | Each test sample battery is to be discharged at a [redacted] battery is then to be charged with a constant maximum specified output voltage and a current limit of three times the maximum charging current Ic, [redacted] be 7 hours or the time required to reach the [redacted] whichever is greater. | Tested as required. | P |

| UL 1642:2020 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 11.9 | When a non-resettable overcurrent or protective device operates during the test, the test shall be repeated at an overcharging current below the level that the protection device operates. When a resettable protective device operates during the test, the protector is to be allowed to reset to a total of 10 cycles; or until the appropriate charging time has been completed, but not less than 7 hours. Protective devices that are relied upon to meet the compliance criteria for the abnormal charging test shall comply with 2.3.1. | The samples are to be tested without any assistance of over-current or thermal protective devices. | N/A |
| 11.10 | The samples shall not explode or catch fire. | No explosion or catch fire during and after the test | P |
| **12** | **Forced-Discharged Test** | | N/A |
| 12.1 | This test is intended for cells that are to be used in series-connected, multicell applications, such as battery packs. | | N/A |
| 12.2 | connecting it in series with fully charged cells of the same kind. The number of fully charged cells to be the maximum number less one of the cells to be covered for series use. Five cells are to be completely | | N/A |
| 12.3 | with the specified number of fully charged cells the resultant battery pack is to be short circuited. | | N/A |
| 12.4 | The positive and negative terminals of the sample are to be connected with a copper wire with a resistance load of 80±20mΩ. The sample is to discharge until a fire or explosion is obtained, or until it has reached a completely discharged state of less than 0.2V and the battery case temperature has returned to ±10°C (18°F) of ambient temperature. The voltage at the end of the test may not reach 0.2V due to operation of protective devices in the circuit. The return to near results. | | N/A |
| 12.5 | When an overcurrent or protective operates during the test, the test shall be repeated with the battery supply connected to the maximum load that does not cause the protective device to open. Protective devices that are relied upon to meet the compliance criteria for the forced discharge test shall comply with 2.3.1. | | N/A |
| 12.6 | The samples shall not explode or catch fire. | | N/A |
| **MECHANICAL TESTS** | | | |
| **13** | **Crush Test** | | P |

| UL 1642:2020 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 13.1 | A battery is to be crushed between two flat surfaces. The force for the crushing is to be applied by a hydraulic ram or similar force mechanism. The flat [redacted] and the crushing is to be continued until an applied force of 13 ±1 kN (3000 ±224 lbs) is reached. Once the maximum force has been obtained it is to be released. | Tested as required.<br>See table 13 | P |
| 13.2 | [redacted] with its longitudinal axis parallel to the flat surfaces of [redacted] rotated 90° around its longitudinal axis so that both the wide and narrow sides will be subjected to the crushing force. Each sample is to be subjected to a crushing force in only one direction. Separate samples are to be used for each test. | [redacted] sample are cylindrical | P |
| | Exception: For Lithium ion systems, a cylindrical, [redacted] longitudinal axis parallel to the flat surface of the crushing apparatus. Each sample is to be subjected to a crushing force in only one direction. Test only the wide side of pouch and prismatic cells. | [redacted] | P |
| 13.3 | A coin or button battery is to be crushed with the flat surface of the battery parallel with the flat surfaces of the crushing apparatus. | Not a coin or button battery | N/A |
| 13.4 | The samples shall not explode or catch fire. | No explosion or catch fire during and after the test | P |
| **14** | **Impact Test** | | P |
| 14.1 | A test sample battery is to be placed on a flat surface. A 15.8 ±0.1-mm (5/8 ±0.004-in) diameter bar is to be placed across the center of the sample. A 9.1 ±0.46-kg (20 ±1-lb) weight is to be dropped from a height of 610 ±25 mm (24 ±1 in) onto the sample. See Figure 14.1. | Prepared the test as required. See table 14 | P |
| 14.2 | [redacted] with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8-mm (5/8-in) diameter curved surface lying across the [redacted] rotated 90° around its longitudinal axis so that both the wide and narrow sides are subjected to the impact. Each sample is to be subjected to only a single impact. Separate samples are to be used for each test. | [redacted] samples are cylindrical lithium-ion cells. | P |

| UL 1642:2020 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Exception: For Lithium ion systems, a cylindrical, [redacted] longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8-mm (5/8-in) diameter curved surface lying across the center of the test sample. Each sample is to be subjected to only a single impact. Test only the wide side of pouch and prismatic cells. | [redacted] | P |
| 14.3 | A coin or button battery is to be impacted with the flat surface of the test sample parallel to the flat surface and the 15.8-mm (5/8-in) diameter curved surface lying across its center. | Not a coin or button battery | N/A |
| 14.4 | The samples shall not explode or catch fire. | No explosion or catch fire during and after the test | P |
| **15** | **Shock Test** | | P |
| 15.1 | [redacted] means of a rigid mount which supports all mounting [redacted] total of three shocks of equal magnitude. The shocks are to be applied in each of three mutually perpendicular directions unless it has only two axes of symmetry in which case only two directions shall be tested. Each shock is to be applied in a direction [redacted] is to be accelerated in such a manner that during the initial 3 ms the minimum average acceleration is 75 g (where g is the local acceleration due to gravity). The peak acceleration shall be between 125 and 175 g. Cells shall be tested at a temperature of 20 ±5°C (68 ±9°F). | Prepared the test as required. See table 15 | P |
| 15.2 | The samples shall not explode or catch fire. In addition, the sample shall not vent or leak as described in 5.1.1. | No explosion or catch fire, the sample not vent or leak | P |
| **16** | **Vibration Test** | | P |
| 16.1 | A battery is to be subjected to simple harmonic motion with an amplitude of 0.8 mm (0.03 inch) [1.6 mm (0.06 inch) total maximum excursion]. | Prepared the test as required. See table 16. | P |
| 16.2 | The frequency is to be varied at the rate of 1 Hz/min between 10 and 55 Hz, and return in not less than 90 nor more than 100 min. The battery is to be tested in three mutually perpendicular directions. For a battery that has only two axes of symmetry, the battery is to be tested perpendicular to each axis. | Tested as required. | P |
| 16.3 | The samples shall not explode or catch fire. In addition the sample shall not vent or leak as described in 5.1.1. | The test results meet the requirements. | P |
| **ENVIRONMENTAL TESTS** | | | |
| **17** | **Heating Test** | | P |

| UL 1642:2020 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 17.1 | A battery is to be heated in a gravity convection or circulating air oven with an initial temperature of 20 ±5°C (68±9°F). The temperature of the oven is to be raised at a rate of 5 ±2°C (9±3.6°F) per minute to a temperature of 130 ±2°C (266±3.6°F) and remain for [redacted] (20±5°C) and then be examined. For batteries specified for temperatures above 100°C (212°F), the conditioning temperature shall be increased from 130 ±2°C (266±3.6°F), to 30±2°C (86±3.6°F) above the manufacturers maximum specified temperature. For a battery of lithium metal chemistry, the conditioning temperature shall be increased to a maximum of 170 ±2°C (338±3.6°F). | Tested as required. Oven temperature: 130°C. | P |
| 17.2 | The samples shall not explode or catch fire. | The test results meet the requirements. | P |
| **18** | **Temperature Cycling Test** | | P |
| 18.1 | The batteries are to be placed in a test chamber and subjected to the following cycles:<br>a) Raising the chamber-temperature to 70 ±3°C (158 ±5°F) within 30 minutes and maintaining this temperature for 4 hours.<br>b) Reducing the chamber temperature to 20 ±3°C (68 ±5°F) within 30 minutes and maintaining this temperature for 2 hours.<br>c) Reducing the chamber temperature to minus 40 ±3°C (minus 40 ±5°F) within 30 minutes and maintaining this temperature for 4 hours.<br>d) Raising the chamber temperature to 20 ±3°C (68 ±5°F) within 30 minutes.<br>e) Repeating the sequence for a further 9 cycles.<br>f) After the 10th cycle, storing the batteries for a minimum of 24 hours, at a temperature of 20 ±5°C (68 ±9°F) prior to examination. | Tested as required. See table 18 | P |
| 18.2 | The samples shall not explode or catch fire. In addition, the samples shall not vent or leak as described in 5.1.1. | The test results meet the requirements. | P |
| **19** | **Low Pressure (Altitude Simulation) Test** | | P |
| 19.1 | Sample batteries are to be stored for 6 hours at an absolute pressure of 11.6 kPa (1.68 psi) and a temperature of 20 ± 3°C (68 ± 5°F). | Tested as required. See table 19 | P |
| 19.2 | The samples shall not explode or catch fire as a result of the Low Pressure (Altitude Simulation) Test. In addition, the samples shall not vent or leak as described in 5.1.1. | The test results meet the requirements. | P |
| **FIRE EXPOSURE TEST** | | | |
| **20** | **Projectile Test** | | P |

| UL 1642:2020 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 20.1 | protrudes through the screen. | | P |
| 20.2 | screen that covers a 102-mm (4-inch) diameter hole in the center of a platform table. The screen is to be constructed of steel wire mesh having 20 openings per 25.4 mm (1 in) and a wire diameter of 0.43 mm (0.017 in). | Prepared the test as required. | P |
| 20.3 | The screen is to be mounted 38 mm (1-1/2 in) above a Meker type burner. The fuel and air flow rates are to be set to provide a bright blue flame that causes the supporting screen to glow a bright red. | Prepared the test as required. | P |
| 20.4 | An eight-sided covered wire cage, 610-mm (2-ft) across and 305-mm (1-ft) high, made from metal screening is to be placed over the test sample. See Figure 20.1. The metal screening is to be constructed from 0.25-mm (0.010-in) diameter aluminum wire with 16 -18 wires per 25.4 mm (1 inch) in each direction. | Tested as required. | P |
| 20.5 | The sample is to be heated and shall remain on the ignited and burned out. It is not required to secure the sample in place unless it is at risk of falling off the screen before the test is completed. When required, the sample shall be secured to the screen with a single wire tied around the sample. | Tested as required. | P |
| **MARKING** | | | |
| **21** | **General** | | P |
| 21.1 | A battery shall be legibly and permanently marked with:<br><br>A distinctive ("catalog" or "model") number or the equivalent;<br><br>The date or other dating period of manufacture not exceeding any three consecutive months. | See marking plate on page 3 | P |
| 21.2 | | | N/A |
| **22** | **Primary Batteries** | | N/A |
| 22.1 | A primary battery shall be marked with the word "WARNING" and the following or an equivalent statement: "Risk of fire and burns. Do not recharge, temperature rating), or incinerate." If space does not permit marking on the battery, the marking may be on the smallest unit package. | | N/A |

| UL 1642:2020 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 22.2 | The packaging for a user-replaceable battery shall be marked with the word "CAUTION" and the following or equivalent statements: [redacted] | | N/A |
| 22.3 | For user replaceable lithium primary coin cells (3.0 V) the packaging shall also include the following or equivalent: "WARNING – Never put batteries in mouth. Swallowing may lead to serious injury or death. If ingested, immediately seek medical attention and [redacted] Control Center." This marking may be combined with the marking of 22.2, if the signal word "WARNING" is used instead of "CAUTION." | | N/A |

| 10 | | | | | P |
|---|---|---|---|---|---|
| | | | | | |
| Sample No. | C001 | C002 | C003 | C004 | SN22061701 3C005 |
| Ambient temperature: (°C) | 23.4 | 23.4 | 23.4 | 23.4 | 23.4 |
| Max. casing temp Tmax (°C) | 122.1 | 127.0 | 126.8 | 117.2 | 119.0 |
| Failure Mode | No | No | No | No | No |
| Sample No. | C006 | C007 | C008 | C009 | SN22061701 3C010 |
| Ambient temperature: (°C) | 55.7 | 55.7 | 55.7 | 55.7 | 55.7 |
| Max. casing temp Tmax (°C) | 113.5 | 108.0 | 112.4 | 110.7 | 106.1 |
| Failure Mode | No | No | No | No | No |
| | | | | | |
| Sample No. | C011 | C012 | C013 | C014 | SN22061701 3C015 |
| Ambient temperature: (°C) | 23.4 | 23.4 | 23.4 | 23.4 | 23.4 |
| Max. casing temp Tmax (°C) | 116.1 | 123.9 | 125.0 | 114.4 | 120.7 |
| Failure Mode | No | No | No | No | No |
| Sample No. | C016 | C017 | C018 | C019 | SN22061701 3C020 |
| Ambient temperature: (°C) | 55.7 | 55.7 | 55.7 | 55.7 | 55.7 |
| Max. casing temp Tmax (°C) | 111.7 | 109.7 | 113.3 | 115.9 | 108.5 |
| Failure Mode | No | No | No | No | No |
| Supplementary information: | | | | | |
| No explode or catch fire. | | | | | |

| 10 | | | | | P |
|---|---|---|---|---|---|
| | | | | | |
| Sample No. | C001 | C002 | C003 | C004 | SN22061701 0C005 |
| Ambient temperature: (°C) | 23.4 | 23.4 | 23.4 | 23.4 | 23.4 |
| Max. casing temp Tmax (°C) | 134.0 | 125.4 | 133.1 | 126.5 | 129.5 |
| Failure Mode | No | No | No | No | No |
| Sample No. | C006 | C007 | C008 | C009 | SN22061701 0C010 |
| Ambient temperature: (°C) | 55.4 | 55.4 | 55.4 | 55.4 | 55.4 |
| Max. casing temp Tmax (°C) | 128.3 | 135.2 | 130.4 | 130.3 | 135.5 |
| Failure Mode | No | No | No | No | No |
| | | | | | |
| Sample No. | C011 | C012 | C013 | C014 | SN22061701 0C015 |
| Ambient temperature: (°C) | 23.4 | 23.4 | 23.4 | 23.4 | 23.4 |
| Max. casing temp Tmax (°C) | 134.0 | 132.0 | 131.3 | 133.6 | 134.3 |
| Failure Mode | No | No | No | No | No |
| Sample No. | C016 | C017 | C018 | C019 | SN22061701 0C020 |
| Ambient temperature: (°C) | 55.4 | 55.4 | 55.4 | 55.4 | 55.4 |
| Max. casing temp Tmax (°C) | 127.9 | 123.2 | 126.6 | 133.5 | 125.2 |
| Failure Mode | No | No | No | No | No |
| Supplementary information: | | | | | |
| | | | | | |
| No explode or catch fire. | | | | | |

| 10 | | | | | P |
|---|---|---|---|---|---|
| | | | | | |
| Sample No. | C001 | C002 | C003 | C004 | SN220617008C005 |
| Ambient temperature: (°C) | 23.8 | 23.8 | 23.8 | 23.8 | 23.8 |
| Max. casing temp Tmax (°C) | 128.8 | 128.3 | 127.9 | 127.4 | 126.8 |
| Failure Mode | No | No | No | No | No |
| Sample No. | C006 | C007 | C008 | C009 | SN220617008C010 |
| Ambient temperature: (°C) | 56.1 | 56.1 | 56.1 | 56.1 | 56.1 |
| Max. casing temp Tmax (°C) | 125.5 | 122.9 | 123.5 | 126.3 | 121.3 |
| Failure Mode | No | No | No | No | No |
| | | | | | |
| Sample No. | C011 | C012 | C013 | C014 | SN220617008C015 |
| Ambient temperature: (°C) | 23.8 | 23.8 | 23.8 | 23.8 | 23.8 |
| Max. casing temp Tmax (°C) | 125.8 | 127.9 | 124.5 | 126.7 | 127.1 |
| Failure Mode | No | No | No | No | No |
| Sample No. | C016 | C017 | C018 | C019 | SN220617008C020 |
| Ambient temperature: (°C) | 56.1 | 56.1 | 56.1 | 56.1 | 56.1 |
| Max. casing temp Tmax (°C) | 123.8 | 126.2 | 120.8 | 122.1 | 124.9 |
| Failure Mode | No | No | No | No | No |
| Supplementary information: | | | | | |
| | | | | | |
| No explode or catch fire. | | | | | |

| 11 | | | | P |
|---|---|---|---|---|
| Id | 0.16 A | Ue | 2.75 V | |
| Ic | 0.4 A | Uc | 4.2 V | |

| Sample No. | C021 | C022 | C023 | C024 | SN22061701 3C025 |
|---|---|---|---|---|---|
| Ambient temperature: (°C) | 20.9 | 20.9 | 20.9 | 20.9 | 20.9 |
| Max. casing temp Tmax (°C) | 27.7 | 28.0 | 28.4 | 28.1 | 27.4 |
| Failure Mode | No | No | No | No | No |

| Sample No. | C026 | C027 | C028 | C029 | SN22061701 3C030 |
|---|---|---|---|---|---|
| Ambient temperature: (°C) | 20.9 | 20.9 | 20.9 | 20.9 | 20.9 |
| Max. casing temp Tmax (°C) | 27.3 | 28.5 | 27.8 | 26.6 | 27.5 |
| Failure Mode | No | No | No | No | No |

Supplementary information:

Test current is 1.2A.

No explode or catch fire.

| 11 | | P |
|---|---|---|

| Id | 0.3 A | Ue | 2.75 V |
|---|---|---|---|
| Ic | 0.75 A | Uc | 4.2 V |

| Sample No. | C021 | C022 | C023 | C024 | SN220617010C025 |
|---|---|---|---|---|---|
| Ambient temperature: (°C) | 23.9 | 23.9 | 23.9 | 23.9 | 23.9 |
| Max. casing temp Tmax (°C) | 27.7 | 27.8 | 27.1 | 27.4 | 27.7 |
| Failure Mode | No | No | No | No | No |

| Sample No. | C026 | C027 | C028 | C029 | SN220617010C030 |
|---|---|---|---|---|---|
| Ambient temperature: (°C) | 23.9 | 23.9 | 23.9 | 23.9 | 23.9 |
| Max. casing temp Tmax (°C) | 27.0 | 27.3 | 26.9 | 27.0 | 26.9 |
| Failure Mode | No | No | No | No | No |

Supplementary information:

Test current is 2.25A.

No explode or catch fire.

| 11 | | P |
|---|---|---|

| Id | 0.4 A | Ue | 2.75 V |
|---|---|---|---|
| Ic | 1.0 A | Uc | 4.2 V |

| Sample No. | C021 | C022 | C023 | C024 | 8C025 |
|---|---|---|---|---|---|
| Ambient temperature: (°C) | 22.4 | 22.4 | 22.4 | 22.4 | 22.4 |
| Max. casing temp Tmax (°C) | 28.4 | 28.6 | 27.0 | 28.9 | 28.5 |
| Failure Mode | No | No | No | No | No |

| Sample No. | C026 | C027 | C028 | C029 | 8C030 |
|---|---|---|---|---|---|
| Ambient temperature: (°C) | 22.4 | 22.4 | 22.4 | 22.4 | 22.4 |
| Max. casing temp Tmax (°C) | 27.7 | 27.8 | 28.3 | 28.1 | 29.5 |
| Failure Mode | No | No | No | No | No |

Supplementary information:

Test current is 3.0A.

No explode or catch fire.

| 13 | | | | | P |
|---|---|---|---|---|---|
| Ambient temperature: 23.1 °C | | | | | |
| | | | | | |
| Sample No. | 031 | 032 | 033 | 034 | C035 |
| Catch fire | No | No | No | No | No |
| Explode | No | No | No | No | No |
| Crush direction | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface |
| Failure mode | No | No | No | No | No |
| | | | | | |
| Sample No. | 036 | 037 | 038 | 039 | C040 |
| Catch fire | No | No | No | No | No |
| Explode | No | No | No | No | No |
| Crush direction | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface |
| Failure mode | No | No | No | No | No |
| Supplementary information: no explosion or catch fire. | | | | | |

| 13 | | P |
|---|---|---|
| Ambient temperature: 23.2 °C | | |

| Sample No. | 031 | 032 | 033 | 034 | C035 |
|---|---|---|---|---|---|
| Catch fire | No | No | No | No | No |
| Explode | No | No | No | No | No |
| Crush direction | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface |
| Failure mode | No | No | No | No | No |

| Sample No. | 036 | 037 | 038 | 039 | C040 |
|---|---|---|---|---|---|
| Catch fire | No | No | No | No | No |
| Explode | No | No | No | No | No |
| Crush direction | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface |
| Failure mode | No | No | No | No | No |

Supplementary information: no explosion or catch fire.

| 13 | | P |
|---|---|---|
| Ambient temperature: 23.2 °C | | |

| Sample No. | 031 | 032 | 033 | 034 | C035 |
|---|---|---|---|---|---|
| Catch fire | No | No | No | No | No |
| Explode | No | No | No | No | No |
| Crush direction | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface |
| Failure mode | No | No | No | No | No |

| Sample No. | 036 | 037 | 038 | 039 | C040 |
|---|---|---|---|---|---|
| Catch fire | No | No | No | No | No |
| Explode | No | No | No | No | No |
| Crush direction | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface |
| Failure mode | No | No | No | No | No |

Supplementary information: no explosion or catch fire.

| 14 | | P |
|---|---|---|
| Ambient temperature: 23.3°C | | |

| Sample No. | C041 | 042 | C043 | C044 | 3C045 |
|---|---|---|---|---|---|
| Catch fire | No | No | No | No | No |
| Explode | No | No | No | No | No |
| Impact direction | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface |
| Failure mode | No | No | No | No | No |

| Sample No. | C046 | C047 | C048 | C049 | 3C050 |
|---|---|---|---|---|---|
| Catch fire | No | No | No | No | No |
| Explode | No | No | No | No | No |
| Impact direction | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface |
| Failure mode | No | No | No | No | No |

Supplementary information: no explosion or catch fire.

| 14 | | P |
|---|---|---|
| Ambient temperature: 23.1°C | | |

| Sample No. | C041 | C042 | C043 | C044 | SN22061701 0C045 |
|---|---|---|---|---|---|
| Catch fire | No | No | No | No | No |
| Explode | No | No | No | No | No |
| Impact direction | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface |
| Failure mode | No | No | No | No | No |

| Sample No. | C046 | C047 | C048 | C049 | SN22061701 0C050 |
|---|---|---|---|---|---|
| Catch fire | No | No | No | No | No |
| Explode | No | No | No | No | No |
| Impact direction | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface |
| Failure mode | No | No | No | No | No |

Supplementary information: no explosion or catch fire.

| 14 | | | | | P |
|---|---|---|---|---|---|
| Ambient temperature: 23.1°C | | | | | |
| | | | | | |
| Sample No. | C041 | C042 | C043 | C044 | SN220617008C045 |
| Catch fire | No | No | No | No | No |
| Explode | No | No | No | No | No |
| Impact direction | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface |
| Failure mode | No | No | No | No | No |
| | | | | | |
| Sample No. | C046 | C047 | C048 | C049 | SN220617008C050 |
| Catch fire | No | No | No | No | No |
| Explode | No | No | No | No | No |
| Impact direction | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface | Longitudinal axis parallel to the flat surface |
| Failure mode | No | No | No | No | No |
| Supplementary information: no explosion or catch fire. | | | | | |

| 15 | | | | | P |
|---|---|---|---|---|---|
| Ambient temperature: 23.1°C | | | | | |
| | | | | | |
| Sample No. | C051 | C052 | C053 | C054 | SN220617013C055 |
| Mass before test (g) | 26.815 | 26.592 | 26.531 | 26.829 | 26.722 |
| Mass after test (g) | 26.811 | 26.589 | 26.529 | 26.826 | 26.719 |
| Mass loss ratio (%) | 0.015 | 0.011 | 0.008 | 0.011 | 0.011 |
| | | | | | |
| Sample No. | C056 | C057 | C058 | C059 | SN220617013C060 |
| Mass before test (g) | 26.987 | 26.635 | 26.715 | 26.816 | 26.775 |
| Mass after test (g) | 26.983 | 26.632 | 26.713 | 26.813 | 26.772 |
| Mass loss ratio (%) | 0.015 | 0.011 | 0.007 | 0.011 | 0.011 |
| Supplementary information: no explosion or catch fire, in addition the sample did not vent or leak. Max loss less than 0.1% | | | | | |

| 15 | | P |
|---|---|---|
| Ambient temperature: 22.9°C | | |

| Sample No. | C051 | C052 | C053 | C054 | SN22061701 0C055 |
|---|---|---|---|---|---|
| Mass before test (g) | 39.113 | 39.486 | 39.518 | 39.227 | 39.285 |
| Mass after test (g) | 39.109 | 39.482 | 39.515 | 39.224 | 39.281 |
| Mass loss ratio (%) | 0.010 | 0.010 | 0.008 | 0.008 | 0.010 |

| Sample No. | C056 | C057 | C058 | C059 | SN22061701 0C060 |
|---|---|---|---|---|---|
| Mass before test (g) | 39.508 | 39.362 | 39.481 | 39.598 | 39.393 |
| Mass after test (g) | 39.505 | 39.358 | 39.477 | 39.595 | 39.390 |
| Mass loss ratio (%) | 0.008 | 0.010 | 0.010 | 0.008 | 0.008 |

Supplementary information: no explosion or catch fire, in addition the sample did not vent or leak. Max loss less than 0.1%.

| 15 | | P |
|---|---|---|
| Ambient temperature: 22.8°C | | |

| Sample No. | C051 | C052 | C053 | C054 | SN22061700 8C055 |
|---|---|---|---|---|---|
| Mass before test (g) | 45.271 | 45.137 | 45.025 | 44.837 | 45.077 |
| Mass after test (g) | 45.266 | 45.133 | 45.021 | 44.833 | 45.074 |
| Mass loss ratio (%) | 0.011 | 0.009 | 0.009 | 0.009 | 0.007 |

| Sample No. | C056 | C057 | C058 | C059 | SN22061700 8C060 |
|---|---|---|---|---|---|
| Mass before test (g) | 44.568 | 44.899 | 44.787 | 44.935 | 44.928 |
| Mass after test (g) | 44.564 | 44.895 | 44.784 | 44.931 | 44.925 |
| Mass loss ratio (%) | 0.009 | 0.009 | 0.007 | 0.009 | 0.007 |

Supplementary information: no explosion or catch fire, in addition the sample did not vent or leak. Max loss less than 0.1%.

| 16 | | P |
|---|---|---|
| Ambient temperature: 23.2°C | | |

| Sample No. | C061 | C062 | C063 | C064 | SN22061701 3C065 |
|---|---|---|---|---|---|
| Mass before test (g) | 26.822 | 26.324 | 26.563 | 26.813 | 26.464 |
| Mass after test (g) | 26.816 | 26.317 | 26.557 | 26.807 | 26.457 |
| Mass loss ratio (%) | 0.022 | 0.027 | 0.023 | 0.022 | 0.026 |

| Sample No. | C066 | C067 | C068 | C069 | SN22061701 3C070 |
|---|---|---|---|---|---|
| Mass before test (g) | 26.477 | 27.071 | 26.765 | 26.905 | 26.753 |
| Mass after test (g) | 26.470 | 27.064 | 26.759 | 26.899 | 26.746 |
| Mass loss ratio (%) | 0.026 | 0.026 | 0.022 | 0.022 | 0.026 |

Supplementary information: no explosion or catch fire, in addition the sample did not vent or leak. Max loss less than 0.1%.

| 16 | | P |
|---|---|---|
| Ambient temperature: 23.1°C | | |

| Sample No. | C061 | C062 | C063 | C064 | SN22061701 0C065 |
|---|---|---|---|---|---|
| Mass before test (g) | 39.274 | 39.469 | 39.511 | 39.453 | 39.417 |
| Mass after test (g) | 39.267 | 39.462 | 39.505 | 39.446 | 39.411 |
| Mass loss ratio (%) | 0.018 | 0.018 | 0.015 | 0.018 | 0.015 |

| Sample No. | C066 | C067 | C068 | C069 | SN22061701 0C070 |
|---|---|---|---|---|---|
| Mass before test (g) | 39.649 | 39.422 | 39.498 | 39.408 | 39.269 |
| Mass after test (g) | 39.642 | 39.416 | 39.491 | 39.402 | 39.262 |
| Mass loss ratio (%) | 0.018 | 0.015 | 0.018 | 0.015 | 0.018 |

Supplementary information: no explosion or catch fire, in addition the sample did not vent or leak. Max loss less than 0.1%.

| 16 | | | | | P |
|---|---|---|---|---|---|
| Ambient temperature: 23.2°C | | | | | |
| | | | | | |
| Sample No. | C061 | C062 | C063 | C064 | SN22061700 8C065 |
| Mass before test (g) | 44.812 | 44.957 | 45.129 | 44.857 | 44.421 |
| Mass after test (g) | 44.803 | 44.949 | 45.120 | 44.847 | 44.412 |
| Mass loss ratio (%) | 0.020 | 0.018 | 0.020 | 0.022 | 0.020 |
| | | | | | |
| Sample No. | C066 | C067 | C068 | C069 | SN22061700 8C070 |
| Mass before test (g) | 44.962 | 44.769 | 44.937 | 44.449 | 44.461 |
| Mass after test (g) | 44.952 | 44.761 | 44.929 | 44.440 | 44.451 |
| Mass loss ratio (%) | 0.022 | 0.018 | 0.018 | 0.020 | 0.022 |
| Supplementary information: no explosion or catch fire, in addition the sample did not vent or leak. Max loss less than 0.1%. | | | | | |

| 18 | | | | | P |
|---|---|---|---|---|---|
| Ambient temperature: 22.9°C | | | | | |
| | | | | | |
| Sample No. | C091 | C092 | C093 | C094 | SN22061701 3C095 |
| Mass before test (g) | 26.914 | 26.825 | 26.765 | 26.804 | 26.694 |
| Mass after test (g) | 26.906 | 26.819 | 26.758 | 26.798 | 26.687 |
| Mass loss ratio (%) | 0.030 | 0.022 | 0.026 | 0.022 | 0.026 |
| | | | | | |
| Sample No. | C096 | C097 | C098 | C099 | SN22061701 3C100 |
| Mass before test (g) | 26.357 | 26.765 | 26.653 | 26.704 | 26.604 |
| Mass after test (g) | 26.350 | 26.757 | 26.646 | 26.696 | 26.597 |
| Mass loss ratio (%) | 0.027 | 0.030 | 0.026 | 0.030 | 0.026 |
| Supplementary information: no explosion or catch fire, in addition the sample did not vent or leak. Max loss less than 0.1%. | | | | | |

| 18 | | P |
|---|---|---|
| Ambient temperature: 23.1°C | | |

| Sample No. | C091 | C092 | C093 | C094 | SN22061701 0C095 |
|---|---|---|---|---|---|
| Mass before test (g) | 39.375 | 39.474 | 39.482 | 39.323 | 39.499 |
| Mass after test (g) | 39.368 | 39.466 | 39.474 | 39.316 | 39.491 |
| Mass loss ratio (%) | 0.018 | 0.020 | 0.020 | 0.018 | 0.020 |

| Sample No. | C096 | C097 | C098 | C099 | SN22061701 0C100 |
|---|---|---|---|---|---|
| Mass before test (g) | 39.358 | 39.422 | 39.427 | 39.392 | 39.319 |
| Mass after test (g) | 39.350 | 39.415 | 39.421 | 39.385 | 39.312 |
| Mass loss ratio (%) | 0.020 | 0.018 | 0.015 | 0.018 | 0.018 |

Supplementary information: no explosion or catch fire, in addition the sample did not vent or leak. Max loss less than 0.1%.

| 18 | | P |
|---|---|---|
| Ambient temperature: 22.9°C | | |

| Sample No. | C091 | C092 | C093 | C094 | SN22061700 8C095 |
|---|---|---|---|---|---|
| Mass before test (g) | 44.452 | 44.831 | 45.201 | 44.913 | 44.302 |
| Mass after test (g) | 44.441 | 44.821 | 45.191 | 44.902 | 44.292 |
| Mass loss ratio (%) | 0.025 | 0.022 | 0.022 | 0.024 | 0.023 |

| Sample No. | C096 | C097 | C098 | C099 | SN22061700 8C100 |
|---|---|---|---|---|---|
| Mass before test (g) | 44.671 | 45.113 | 45.009 | 45.379 | 45.232 |
| Mass after test (g) | 44.661 | 45.103 | 45.000 | 45.370 | 45.221 |
| Mass loss ratio (%) | 0.022 | 0.022 | 0.020 | 0.020 | 0.024 |

Supplementary information: no explosion or catch fire, in addition the sample did not vent or leak. Max loss less than 0.1%

| 19 | | P |
|---|---|---|
| Ambient temperature: 22.1°C | | |

| Sample No. | C101 | C102 | C103 | C104 | 3C105 |
|---|---|---|---|---|---|
| Mass before test (g) | 26.711 | 26.452 | 26.785 | 26.697 | 26.619 |
| Mass after test (g) | 26.708 | 26.449 | 26.781 | 26.693 | 26.616 |
| Mass loss ratio (%) | 0.011 | 0.011 | 0.015 | 0.015 | 0.011 |

| Sample No. | C106 | C107 | C108 | C109 | 3C110 |
|---|---|---|---|---|---|
| Mass before test (g) | 26.593 | 26.372 | 26.914 | 26.809 | 26.527 |
| Mass after test (g) | 26.591 | 26.369 | 26.911 | 26.806 | 26.524 |
| Mass loss ratio (%) | 0.008 | 0.011 | 0.011 | 0.011 | 0.011 |

Supplementary information: no explosion or catch fire, in addition the sample did not vent or leak. Max loss less than 0.1%.

| 19 | | P |
|---|---|---|
| Ambient temperature: 22.2°C | | |

| Sample No. | C101 | C102 | C103 | C104 | SN22061701 0C105 |
|---|---|---|---|---|---|
| Mass before test (g) | 39.369 | 39.458 | 39.452 | 39.317 | 39.498 |
| Mass after test (g) | 39.366 | 39.456 | 39.449 | 39.313 | 39.495 |
| Mass loss ratio (%) | 0.008 | 0.005 | 0.008 | 0.010 | 0.008 |

| Sample No. | C106 | C107 | C108 | C109 | SN22061701 0C110 |
|---|---|---|---|---|---|
| Mass before test (g) | 39.462 | 39.256 | 39.489 | 39.488 | 39.262 |
| Mass after test (g) | 39.459 | 39.253 | 39.485 | 39.486 | 39.259 |
| Mass loss ratio (%) | 0.008 | 0.008 | 0.010 | 0.005 | 0.008 |

Supplementary information: no explosion or catch fire, in addition the sample did not vent or leak. Max loss less than 0.1%

| 19 | [redacted] | P |
|---|---|---|

Ambient temperature: 22.1°C

[redacted]

| Sample No. | [redacted] C101 | [redacted] C102 | [redacted] C103 | [redacted] C104 | SN22061700 8C105 |
|---|---|---|---|---|---|
| Mass before test (g) | 44.906 | 44.962 | 45.062 | 44.968 | 45.111 |
| Mass after test (g) | 44.902 | 44.959 | 45.059 | 44.964 | 45.107 |
| Mass loss ratio (%) | 0.009 | 0.007 | 0.007 | 0.009 | 0.009 |

[redacted]

| Sample No. | [redacted] C106 | [redacted] C107 | [redacted] C108 | [redacted] C109 | SN22061700 8C110 |
|---|---|---|---|---|---|
| Mass before test (g) | 45.034 | 44.903 | 44.375 | 45.147 | 44.763 |
| Mass after test (g) | 45.031 | 44.900 | 44.371 | 45.144 | 44.759 |
| Mass loss ratio (%) | 0.007 | 0.007 | 0.009 | 0.007 | 0.009 |

Supplementary information: no explosion or catch fire, in addition the sample did not vent or leak. Max loss less than 0.1%.

**Critical components information**

Material: e.g. external enclosure, PCB, closed-end connector, sleeves, cord anchorage etc.

Components with winding: e.g. motor, transformer, magnetic coil etc.

Other components: e.g. switch, thermostat, heater, plug, internal wire, capacitor, relay, varistor etc.

| | Type/ Model | Technical data | Standard | Mark(s) of conformity |
|---|---|---|---|---|
| | BM6B | $LiMn_2O_4$, Conductive Additive | -- | -- |
| | QR-D18S | Graphite, Conductive Additive | -- | -- |
| | LM016S | $LiPF_6$+EC+DMC+DEC | -- | -- |
| | BD25 | PP/PE, Shutdown temperature: 130°C | -- | -- |

**--End of main report--**

# Attachment 1



Report No.: CN225NC1 001

Test location:

[redacted]

**Main Test Apparatus**

| | Item | Equipment | [redacted] | Model | Cal. | Due. |
|---|---|---|---|---|---|---|
| ☑ | CMC-YQ-001 | Programmable Temp.& Humi Chamber | Zhongzhou | ZZ-K01B | [redacted] | [redacted] |
| ☑ | CMC-YQ-002 | Programmable Temp.& Humi Chamber | Zhongzhou | ZZ-K02B | [redacted] | [redacted] |
| ☑ | CMC-YQ-003 | Battery Test System | RePower | ACTS-20V5A | [redacted] | [redacted] |
| ☑ | CMC-YQ-004 | Battery Test System | RePower | PBTS-20V5A | [redacted] | [redacted] |
| □ | CMC-YQ-005 | Battery Test System | RePower | ACTS-20V10A | [redacted] | [redacted] |
| ☑ | CMC-YQ-006 | Battery Extrusion Testing machine | Gaoxin | GX-5067-TSM | [redacted] | [redacted] |
| ☑ | CMC-YQ-007 | Battery Burning Testing Machine | Gaoxin | GX-6053 | [redacted] | [redacted] |
| □ | CMC-YQ-008 | Battery thermal shock tester | GWS | SPH101 | [redacted] | [redacted] |
| □ | CMC-YQ-009 | Battery forced internal short circuit testing machine | Gaoxin | GX-6055-CSM | [redacted] | [redacted] |
| ☑ | CMC-YQ-010 | Battery short-circuit tester | Gaoxin | GX-6055-B5HL | [redacted] | [redacted] |
| ☑ | CMC-YQ-011 | Battery weight impact testing machine | Zhongzhou | ZZ-A11 | [redacted] | [redacted] |
| ☑ | CMC-YQ-012 | Low Altitude Simulation Tester | Gaoxin | GX-3020-ZC80 | [redacted] | [redacted] |
| □ | CMC-YQ-013 | Single-Blade Drop Tester | Gaoxin | GX-6050-A | [redacted] | [redacted] |
| ☑ | CMC-YQ-014 | Vibration test instrument | Labtone | EV206VT650 | [redacted] | [redacted] |
| ☑ | CMC-YQ-015 | Vertical Shock Test Instrument | Labtone | SKT50 | [redacted] | [redacted] |
| ☑ | CMC-YQ-016-1 | Data Collector | KEYSIGHT | 34970A | [redacted] | [redacted] |
| ☑ | CMC-YQ-016-2 | Data Collector | KEYSIGHT | 34970A | [redacted] | [redacted] |
| □ | CMC-YQ-016-3 | Data Collector | KEYSIGHT | 34970A | [redacted] | [redacted] |
| □ | CMC-YQ-019- | DC POWER | PULIER | PSW80-40.5 | [redacted] | [redacted] |

# Attachment 1



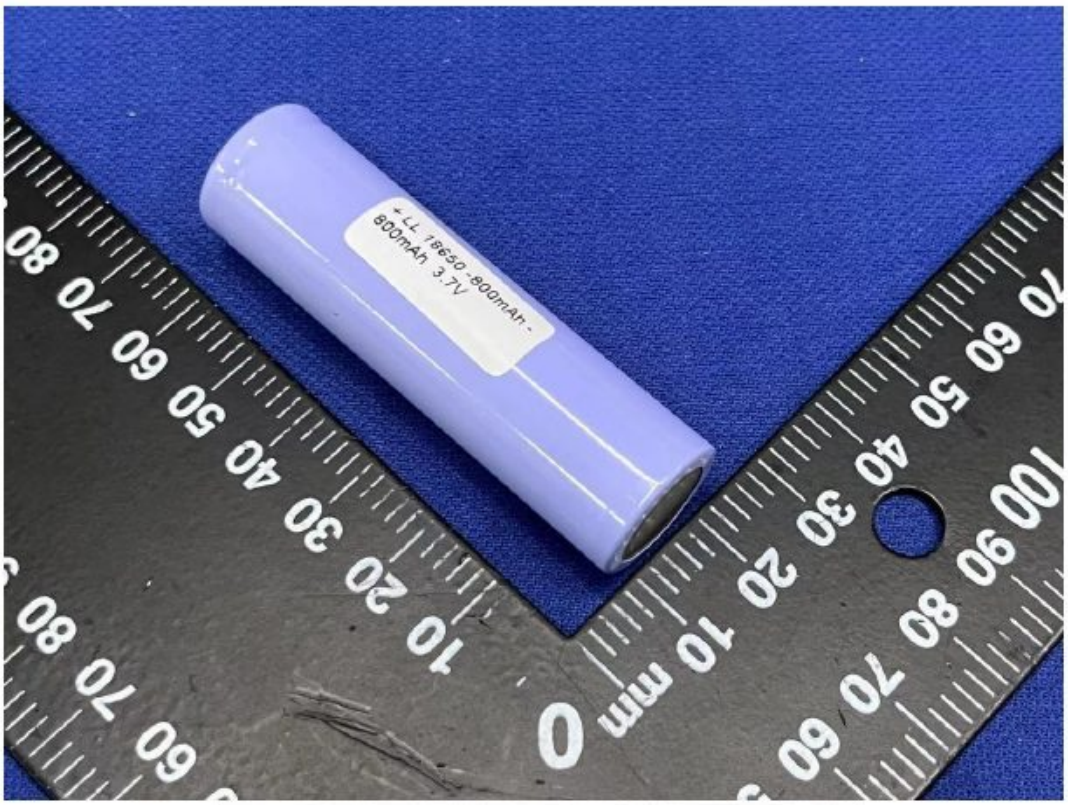
| | Item | Equipment | [redacted] | Model | Cal. | Due. |
|---|---|---|---|---|---|---|
| | 1 | | | | | |
| □ | CMC-YQ-019-2 | DC POWER | PULIER | PSW80 | [redacted] | [redacted] |
| ☑ | CMC-YQ-044-1 | Temperature & humidity monitoring | CIMC | ZL-TH10TP | [redacted] | [redacted] |
| ☑ | CMC-YQ-044-2 | Temperature & humidity monitoring | CIMC | ZL-TH10TP | [redacted] | [redacted] |
| ☑ | CMC-YQ-044-3 | Temperature & humidity monitoring | CIMC | ZL-TH10TP | [redacted] | [redacted] |
| ☑ | CMC-YQ-044-4 | Temperature & humidity monitoring | CIMC | ZL-TH10TP | [redacted] | [redacted] |
| ☑ | CMC-YQ-044-5 | Temperature & humidity monitoring | CIMC | ZL-TH10TP | [redacted] | [redacted] |
| □ | CMC-YQ-044-6 | Temperature & humidity monitoring | CIMC | ZL-TH10TP | [redacted] | [redacted] |
| □ | CMC-YQ-021 | Electronic platform scale | Yingheng | TCS-200KG | [redacted] | [redacted] |
| □ | CMC-YQ-022 | Electronic Balance | Zhonghui | JCS-6=5103W | [redacted] | [redacted] |
| □ | CMC-YQ-023 | Digital caliper | Menet | MNT 0-150 | [redacted] | [redacted] |
| □ | CMC-YQ-024 | Vernier caliper | Menet | (0～200)mm | [redacted] | [redacted] |
| □ | CMC-YQ-025 | Digital Multimeter | Shifu | FLUKE-17B+ | [redacted] | [redacted] |
| □ | CMC-YQ-026 | Dc Low Internal Testing Resistance | Lishi | KJ2511 | [redacted] | [redacted] |
| ☑ | CMC-YQ-027 | Ac Internal Testing Resistance | Jinailian | JK2520B | [redacted] | [redacted] |
| □ | CMC-YQ-028 | Programmed DC Electronic Load | Shunjie | SJ8512B | [redacted] | [redacted] |
| ☑ | CMC-YQ-029 | Timer | Timer | XL-009A | [redacted] | [redacted] |
| □ | CMC-YQ-031 | Battery Test System | RePower | RCDS-100V100A | [redacted] | [redacted] |
| □ | CMC-YQ-032 | Insulation resistance tester | UNI-TREND | UT501A | [redacted] | [redacted] |
| □ | CMC-YQ-033 | Microscope | Huada | 1200X | [redacted] | [redacted] |
| ☑ | CMC-YQ-039 | Battery Test System | Neware | CT-4008T-5V6A-S1-F | [redacted] | [redacted] |
| □ | CMC-YQ-034 | Dew-point Meter | XIERSI | S505 | [redacted] | [redacted] |

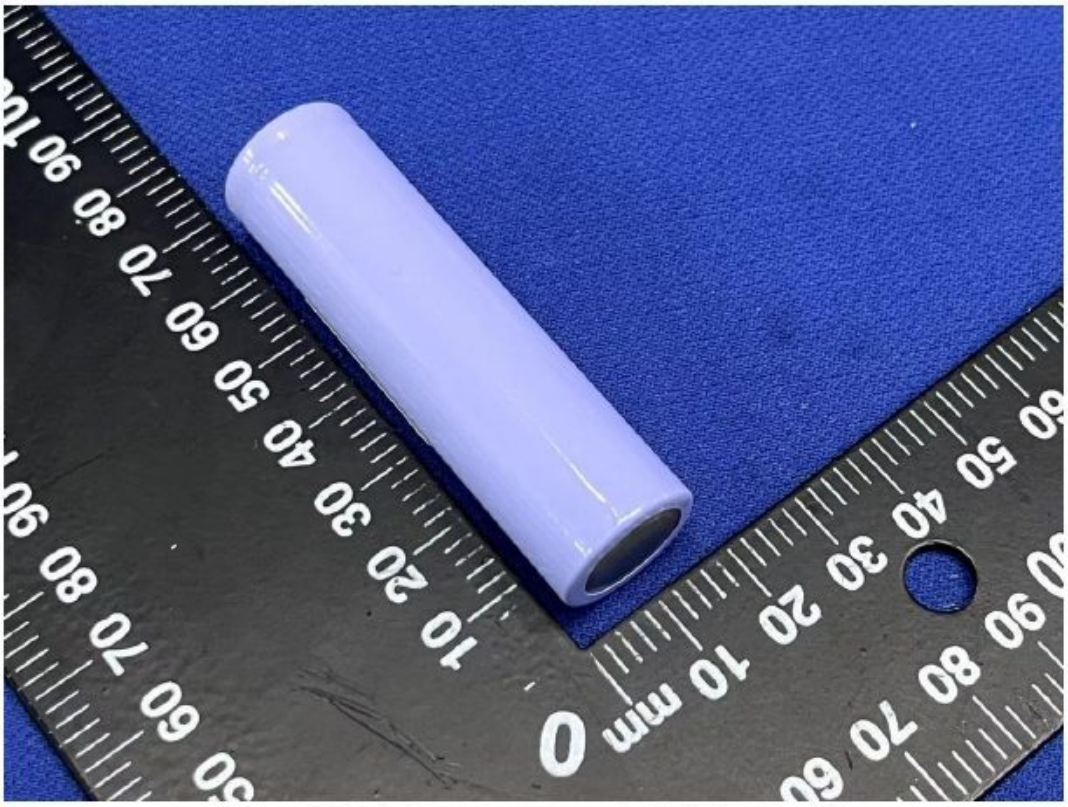
# Attachment 1



| | Item | Equipment | [redacted] | Model | Cal. | Due. |
|---|---|---|---|---|---|---|
| □ | CMC-YQ-045 | Battery Test System | Neware | CT-4008T-5V1A-S1-F | [redacted] | [redacted] |
| ☑ | CMC-YQ-048-1 | Battery Test System | HengYiNeng | HT100120C-VT | [redacted] | [redacted] |
| □ | CMC-YQ-048-2 | Battery Test System | HengYiNeng | HT100120C-VT | [redacted] | [redacted] |

Product:



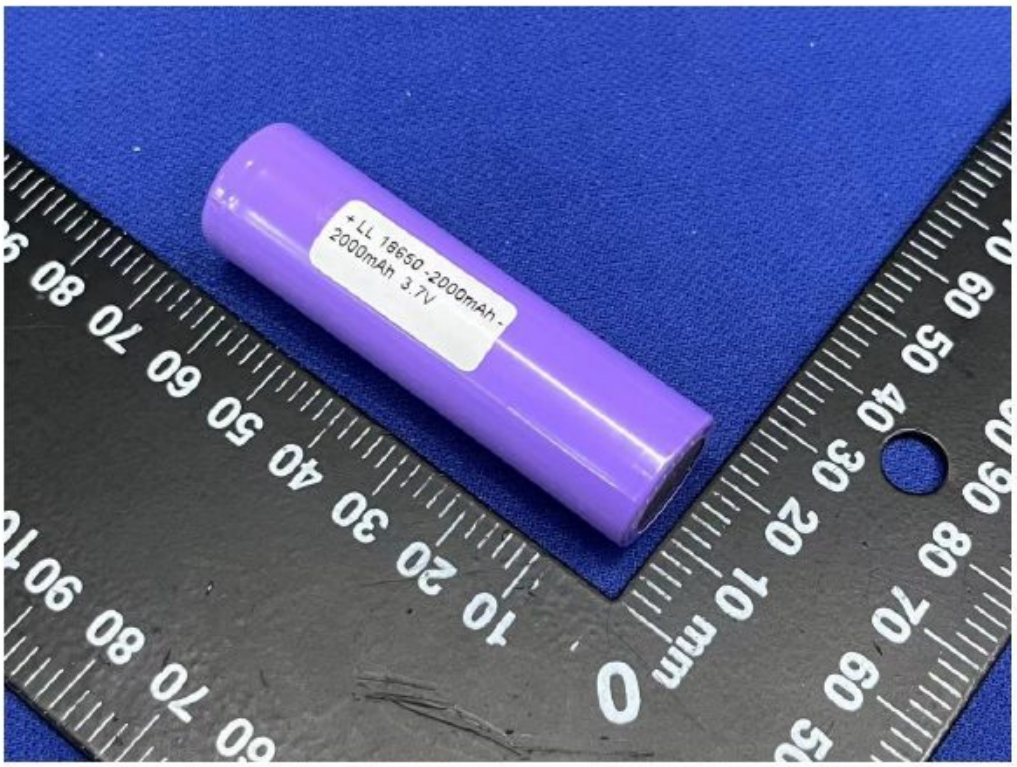



Product:






Product: [redacted]




[redacted]



[redacted]