三帕认证

Material Safety Data Sheet

Product Name:	Lithium Ion Battery
Model:	WT 17500
Revision Date:	Jan, 02，2020
Report No.:	HT20200102MSDS13
Compiler:	Peter Pe
Reviewer:	Andy Li
Approver:	Leo Zhi

Guangzhou CP-UP Certification Technology Service Co., Ltd.

Material Safety Data Sheet

SECTION 1 - CHEMICAL AND COMPANY IDENTIFICATION	
Name of Sample: Lithium Ion Battery	**Model and Ratings:** WT 17500 3.7V 1200mAh 4.44Wh
Company: Ningbo Huitong New Energy Technology Co., Ltd.	**Address:** Room 16-15/16-16, Block B, Building Liyuanshangdu, No39, Lane158, South Section, Huan Cheng West Road, Ningbo, China
Zip code: 315000	**Fax:** /
E-mail: yancheng@huitong-energy.com	**Emergency Telephone:** 0574-87681913

SECTION2 – HAZARDS IDENTIFICATION
Hazards Identification: The battery has passed the test items of UN Model Regulations, Manual of Test and Criteria Section UN38.3
Emergency Overview: Caution: Avoid contact and inhalation the electrolyte contained inside the battery.

SECTION3 – COMPOSITION/INFORMATION ON INGREDIENT		
Ingredient	**CAS No.**	**Concentration(%)**
Lithium Cobalt oxide	12190-79-3	37
Graphite	7782-42-5	20
Phosphate(1-), hexafluoro-,lithium	21324-40-3	18
Copper	7440-50-8	10
Aluminum	7429-90-5	6
PVC(Chloroethylene,polymer)	9002-86-2	3
PVDF	24937-79-9	5
Nickel	7440-02-0	1

SECTION 4 – FIRST AID MEASURES

Eye Exposure:

In case of contact with eyes, flush with copious of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

Skin Exposure:

If the internal battery materials of an opened battery cell some into contact with skin, immediately flush with plenty of water.

Inhalation Exposure:

If inhaled the internals of battery vomiting. Seeking Immediate medical attention.

Ingestion Exposure:

If swallowed, do not induce vomiting. Seek immediate medical attention.

SECTION 5 – FIRE FIGHTING MEASURES

Danger characteristic:

Exposure to excessive heat can cause venting of the liquid electrolyte. Battery may burst and release hazardous decomposition products when exposed to a fire situation.

Hazardous combustion products:

Corrosive gas may be emitted during fire.

Fire-Fighting method& media

The stuff must equip with filtermask (full mask) or isolated breathing apparatus. The stuff must wear the clothes which can defense the fire in the upwind direction. Remove the container to the open space as soon as possible. Spray water on the containers in the fireplace to keep them cool until finish extinguishment Media: plenty of water, dry chemical powder or carbon dioxide .

SECTION 6 – ACCIDENTAL RELEASE MEASURES

Emergency treatment:

If the battery material is released, remove personnel from area until fumes dissipate. Provide maximum ventilation to clear out hazardous gases. The preferred response is to leave the area and allow the batteries to cool and vapors to dissipate. Provide maximum ventilation. Avoid skin and eye contact or inhalation of vapors. Remove spilled liquid with absorbent and incinerate waste.

SECTION 7 – HANDLING AND STORAGE

Handling:

1. Do not allow battery terminates to contact each other, or contact with other metals.
2. Do not put the cell or battery into a fire or heat it. Do not solder the cell directly. Do not use or leave the cell or battery in a place near fire or heaters.
3. Do not expose the battery to excessive physical shock or vibration.
4 Do not immerse, throw, and wet a battery in water.
5 Short-circuiting should be avoided. Short circuit will reduces the life of the battery and can lead to ignition of surrounding materials. Physical contact with to short- circuited battery can cause skin burn.
6. The batteries should not be opened, destroyed or incinerate, since they may leak or rupture and release to the environment the ingredients that they contain in the hermetically sealed container.
7. Place the cell beyond the child packing and container.

8. Do not connect the battery directly to an electric outlet or cigarette socket in a car.
9. Be sure to use the specified charger for battery, and follow the charging instructions correctly.
10. Do not mix old and new batteries together, neither with Ni-Cd, dry batteries or another manufacturer batteries or product.

Storage:

1. Batteries should be separated from other materials and stored in a noncombustible, well ventilated, sprinkler-protected structure with sufficient clearance between walls and battery stacks.
2. Keep the sample in the cool, dry and well-ventilated place(temperature:-20~30degree C humidity:45~85%). Do not exposure to direct sunlight for long periods. Keep away from fire and heating sources. Don't keep the samples with oxidizer and acid.
3. charge the battery every 6 months to the amount specified by the manufacture, even if the battery is not used.
4. Equip with relevant types and quantities of the extinguishment instruments. The storage place should be equipped with suitable shelter materials for divulgence handling.

SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION

Engineering Control:

Keep away from heat and open flame. Supply with sufficient partial air exhaust. Store in a cool, dry place.

Respiratory Protection:

Not necessary under conditions of normal use. Wear self-contained breathing filtermask if the density exceed in the air. Wear breathing apparatus under the condition of emergency rescue or evacuation.

Eyes Protection:

Not necessary under conditions of normal use. Wear protective glasses if handling a leaking or ruptured battery.

Skin and Body Protection:

Not necessary under conditions of normal use. Wear fireproofing, gas defense clothes in case of handling a leaking or ruptured battery.

Hands Protection:

Not necessary under conditions of normal use. Wear chemical resistant rubber .

Other Protections:

No smoking, dining and drinking water in the workplace. Keep good habit of hygiene.

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

Appearance:

Blue

Physical state:

Solid

Form:

Cylindrical

Odor:

Odorless

Solubility:

Insoluble in water.

SECTION 10 – STABILITY AND REACTIVITY

Stability:
Stable under normal temperature and pressure.

Distribution of Ban:
Strong oxidizer, strong acid and corrosives

Conditions to Avoid:
Fire source, heating source, disassemble, external short circuit, crushes, deformation, high temperature above 100℃, direct sunlight and high humidity, immerse in water or overcharge.

Hazardous Polymerization:
Will not occur.

Hazardous Decomposition Products:
Metal oxides, CO, CO_2

SECTION 11 – TOXICOLOGICAL INFORMATION

Acute Toxicity:
N/A

Sub-acute and Chronic Toxicity:
N/A

Irritation Data:
The internal battery materials may cause irritation to eyes and skin.

Sensitization:
Lithium transition metal oxidate-Li(M)m(O)n: the nervous system of respiratory organs may be stimulated sensitively
Copper: Sensitization of the skin may be caused by the long-term or repetitive contact.

Mutagenicity:
No information is available.

Carcinogenicity:
No information is available.

Others:
Since the materials in this battery are sealed in the can, the potential for exposure to the components of the battery is negligible, when the battery is used as directed. However technical or electrical abuse of the battery mayresult in the release of battery contents.

SECTION 12 – ECOLOGICAL INFORMATION

Eco-toxicity:
No data available.

Biodegradable:
No data available.

Mobility in soil:
No data available.

Bioconcentration or biological accumulation:
No data available.

Other harmful effects:
Don’t abandon the battery into environment, may cause water or soil pollution.

SECTION 13 - DISPOSAL CONSIDERATIONS

Appropriate Method of Substance:

The battery should be completely discharged prior to disposal in order to prevent short circuit. The battery contains recyclable materials. It is suggested recycle. Refer to National or Local regulations before handling. Disposal of the battery should be performed by permitted, professional disposal firms knowledgeable in National or Local regulations of hazardous waste treatment and hazardous waste transportation.

SECTION 14 – TRANSPORT INFORMATION

IATA:	**Proper Shipping Name:** Lithium ion batteries/packed with equipment/contained in equipment
	UN Number：UN3480/UN3481
	The battery has passed the test items of UN Model Regulations, Manual of Tests and Criteria, Part III, sub-section 38.3.According to IATA DGR 61th Edition, PACKING INSTRUCTION 965 ~ 967 of section II or IB for transportation.
IMO:	**Proper Shipping Name:** Lithium ion batteries/packed with equipment/contained in equipment
	UN Number：UN3480/UN3481
	The battery has passed the test items of UN Model Regulations, Manual of Tests and Criteria, Part III, sub-section 38.3. The goods is not restricted to IMO IMDG Code (Amend 39-18) according to special provision188.

SECTION 15 – REGULATORY INFORMATION

US DOT:

Effective December 29,2004, the DOT requires that the outside of each package the contains primary lithium batteries, regardless of size of number of batteries, batteries, be labeled with the following statement:" PRIMARY LITHIUM BATTERIES-FOBIDDEN FOR TRANSPORT ABOARD PASSENGER AIRCRAFT", The labeling requirement covers shipments via highway, rail vessel or cargo-only aircraft and covers all shipment inside, into or out of the US. The label must be in contrasting color and the letters must be 12mm (0.5 in) in height for packages weighing more than 30Kg and 6mm (0.25 in) in height for packages weighting less than 30Kg.

SECTION 16 – ADDITIONAL INFORMATION

Date：

2020-1-2

Department：

Guangzhou CP-UP Certification Technology Service Co., Ltd.
No.1, Aigang 7th Lane, Yunxing Zhukeng Village, Shiqiao Street, Panyu District, Guangzhou City, China
Tel.: 0086-20-31127037
WEB: www.cp-up.com
Email: info@cp-up.com

Other Information：

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. We make no warranty of merchantability or any other warranty express or implied, With respect to such information, and we assume no liability resulting from its use. Users should make their own investigation to determine the suitability of the information for their particular purposes. In no way shall we be liable for any claims, losses, or damage of any third party or for last profits or any special, indirect, consequential or exemplary damages arising from using the above information.

Test Report issued under the responsibility of:
检测报告负责发行机构:

中国认可
检测
TESTING
CNAS L2065

检 测 报 告
TEST REPORT

SAMPLE INFORMATION:	Rechargeable Li-ion Battery, model WT 17500, 3.7V, 1200mAh, 4.44Wh
样品信息：	可充电锂离子电池，电池型号 WT 17500, 3.7V, 1200mAh, 4.44Wh
APPLICANT:	Ningbo Huitong New Energy Technology Co., Ltd
申请单位：	宁波慧通新能源科技有限公司
TYPE OF TEST:	Commercial Inspection and Testing Services
检测类别：	商业委托检测

苏州UL美华认证有限公司广州分公司
UL-CCIC Company Limited Guangzhou Branch

Date Issued: 2017-08-21
Date Revised:2018-07-13

Applicant information 申请资料	
Name of samples 样品名称	Rechargeable Li-ion Battery 可充电锂离子电池
Type/ Model 型号规格	Battery model WT 17500, 3.7V, 1200mAh, 4.44Wh 电池型号WT 17500, 3.7V, 1200mAh, 4.44Wh
Trade mark 商标	N/A
Applicant 申请单位	Ningbo Huitong New Energy Technology Co., Ltd 宁波慧通新能源科技有限公司
Applicant address 申请单位地址	Room 16-15/16-16, Block B, Building Liyuanshangdu, No39, Lane158, South Section, Huan Cheng West Road, Ningbo, China 中国浙江省宁波市环城西路南段158弄39号丽园尚都B座16-15/16-16室
Manufacturer 制造商	Same as Applicant 同申请单位
Manufacturer address 制造商地址	Same as Applicant 同申请单位
Appearance 样品外观颜色	Blue 蓝色
Quantity of sample 样品数量	Total 43pcs
Sample identification 样品标识序号	Battery Pack: 2190118-1~2190118-18 Battery Cell: 2190121-1~2190121-25
Testing standard 参考标准	United Nations: Recommendations on the Transport of Dangerous Goods - Manual of Tests and Criteria, Sixth revised edition, 2015 (ST/SG/AC.10/11/Rev.6), Section 38.3: Lithium Batteries联合国《关于危险品货物运输的建议书》试验和标准手册第六修订版(2015)，第38.3节：锂电池
Received date / 接样日期	2019-04-08
Completion date / 完成日期	2019-05-06
Remark/备注: According to the Standard, a single-cell battery (Battery Pack) is considered a “Cell” (Battery Cell) and shall be tested according to the testing requirements for “Cell”. This testing included the samples of Battery Pack and Battery Cell as aforementioned. For testing details, please refer to Table of Test Conclusion and individual test record page. 按照标准要求，单电芯电池（电池包）被视作“电芯”（电池芯），以“电芯”的要求进行测试，本测试项目样品包含如前所述电池包和电池芯。有关测试详情，请查阅测试结论表格及各单项测试记录页。	

Test Conclusion 测试结论					
No. 序号	Name of test 测试项目名称	Sample Condition 样品状态	Sample Number 样品编号	Conclusion 单项结论	Remarks 备注
T.1	Altitude simulation 高度模拟	First cycle in fully charged state/第一个交替充电放电周期完全充电	2190118-1~ 2190118-10	Pass 通过	--
T.2	Thermal test 温度试验	First cycle in fully charged state/第一个交替充电放电周期完全充电	2190118-1~ 2190118-10	Pass 通过	--
T.3	Vibration 振动	First cycle in fully charged state/第一个交替充电放电周期完全充电	2190118-1~ 2190118-10	Pass 通过	--
T.4	Shock 冲击	First cycle in fully charged state/第一个交替充电放电周期完全充电	2190118-1~ 2190118-10	Pass 通过	--
T.5	External Short-circuit 外部短路	First cycle in fully charged state/第一个交替充电放电周期完全充电	2190118-1~ 2190118-10	Pass 通过	--
T.6	Impact 撞击	First cycle in one half discharged/第一个交替充电放电周期半放电	N/A 不适用	N/A 不适用	Cylindrical cell less than 18 mm in diameter
	Crush 挤压	First cycle in one half discharged/第一个交替充电放电周期半放电	2190121-1~ 2190121-5	Pass 通过	--
T.7	Overcharge 过度充电	First cycle in fully charged state/第一个交替充电放电周期完全充电	2190118-11 ~2190118-14	Pass 通过	--
		After fifty cycles ending in fully charged state/第五十个交替充电放电周期完全充电	2190118-15~ 2190118-18	Pass 通过	--
T.8	Forced discharge 强制放电	First cycle in fully discharged state/第一个交替充电放电周期完全放电	2190121-6~ 2190121-15	Pass 通过	--
		After fifty cycles ending in fully discharged state/第五十个交替充电放电周期完全放电	2190121-16~ 2190121-25	Pass 通过	--

Test Conclusion / 检验结论：

The Rechargeable Li-ion Battery, model WT 17500, 3.7V, 1200mAh, 4.44Wh submitted by Ningbo Huitong New Energy Technology Co., Ltd is tested according to Section 38.3 of the Sixth Revised Edition of the Recommendations on the Transport of Dangerous Goods, Manual of Test and Criteria (ST/SG/AC.10/11/Rev.6, Section 38.3). The test items are full items.

由宁波慧通新能源科技有限公司送检的可充电锂离子电池，电池型号WT 17500, 3.7V, 1200mAh, 4.44Wh，依据《关于危险品货物运输的建议书》试验和标准手册第六修订版第38.3节进行检测。试验为全项目。

The test results: Pass.

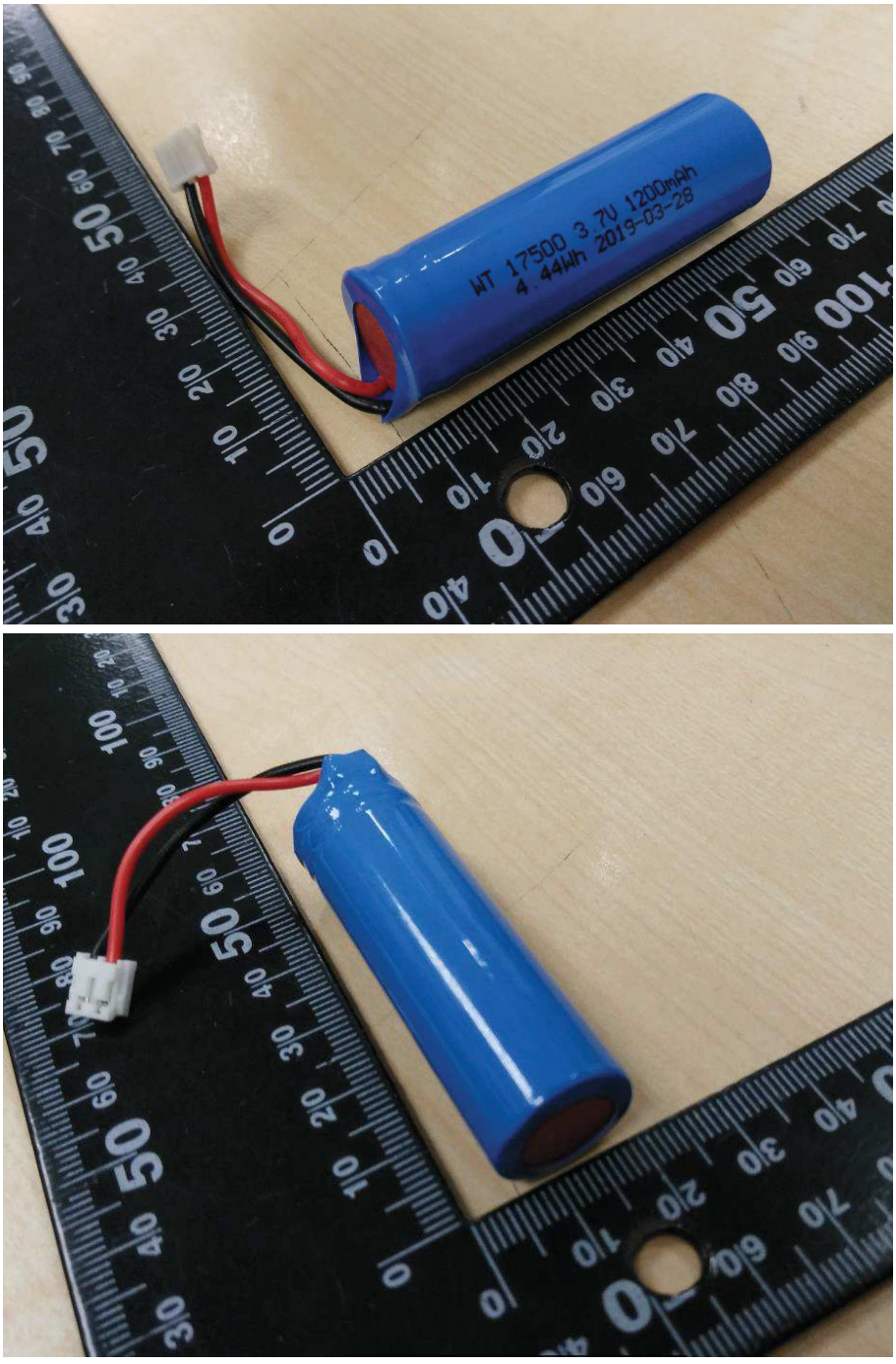
测试结果：通过。

Date of issue / 签发日期: 2019-05-09

Approved by:	Reviewed by:	Tested by:
批准： 彭军	审核： 彭军	检测： 钟宜
彭军	彭军	钟宜

Photos of samples and markings
样品及标识照片

Rechargeable Li-ion Battery, model WT 17500, 3.7V, 1200mAh, 4.44Wh
可充电锂离子电池，电池型号WT 17500, 3.7V, 1200mAh, 4.44Wh



Photos of samples and markings
样品及标识照片

Inner Cell, Model 17500, 3.7V, 1200mAh, manufacture by Ningbo Huitong New Energy Technology Co., Ltd.

内部电芯 Model 17500, 3.7V, 1200mAh, 由宁波慧通新能源科技有限公司制造

T.1 Altitude simulation
高度模拟

Test Method
测试方法

The samples were stored for at least 6 hours at an absolute pressure of 11.6 kPa (1.68 psi) and a temperature of 20 ± 5°C (68 ± 9°F). The samples were weighed before and after the exposure. The cell/battery voltage was also determined before and after the test. 将测试样品放在温度为20±5°C，大气压力为不大于11.6kpa的环境中贮存不少于6个小时。对样品在测试前后进行称重，并记录电压。

Test Result
测试结果

Sample No. 样品编号	Sample Condition 样品状态	Weight Before Test in Grams 测试前质量（克）	Weight After Test In Grams 测试后质量（克）	Percentage of Weight Loss 质量损失百分比	Voltage Before Test(V) 测试前电压（伏）	Voltage After Test(V) 测试后电压（伏）	Percent of residual Voltage 残余电压百分比	Results 结果
2190118-1	(C)	29.825	29.815	0.034	4.195	4.193	99.952	(6), (7)
2190118-2	(C)	29.879	29.868	0.037	4.199	4.199	100.000	(6), (7)
2190118-3	(C)	29.939	29.928	0.037	4.195	4.193	99.952	(6), (7)
2190118-4	(C)	29.909	29.897	0.040	4.192	4.190	99.952	(6), (7)
2190118-5	(C)	30.076	30.064	0.040	4.200	4.199	99.976	(6), (7)
2190118-6	(C)	29.772	29.760	0.040	4.191	4.188	99.928	(6), (7)
2190118-7	(C)	29.689	29.678	0.037	4.197	4.193	99.905	(6), (7)
2190118-8	(C)	30.209	30.198	0.036	4.197	4.195	99.952	(6), (7)
2190118-9	(C)	29.316	29.305	0.038	4.196	4.194	99.952	(6), (7)
2190118-10	(C)	29.776	29.764	0.040	4.194	4.192	99.952	(6), (7)

Results/结果:
(1) Leakage/漏液.
(2) Venting/排气.
(3) Disassembly/解体.
(4) Rupture/破裂.
(5) Fire/着火.
(6) No leakage, no venting, no disassembly, no rupture, no fire/无漏液，无排气，无解体，无破裂，无着火.
(7) The open circuit voltage of each cell after testing was greater than 90%/开路电压不低于试验前开路电压的90％.
Condition/状态:
(A) Fully discharged state/完全放电.
(B) Undischarged state/未放电.
(C) First cycle in fully charged state/第一个交替充电放电周期完全充电.
(D) After fifty cycles ending in fully charged state/第五十个交替充电放电周期完全充电.
(E) After twenty five cycles ending in fully charged state/第二十五个交替充电放电周期完全充电.

T.2 Thermal test
温度试验

Test Method
测试方法

The samples were subjected to temperature cycling consisting of the following. The samples were weighed before and after the exposure. The cell/battery voltage was also determined before and after the test. 测试样品将进行如下温度循环测试。样品测试前后进行称重，并记录电压。

Samples In/样品进箱:	The chamber temperature was raised to 72 ± 2°C (162 ± 4°F) within 30 minutes and maintained at this temperature for **[6]** ~~**[12]**~~ hours. 烤箱温度在30分钟内上升到72 ± 2°C，并维持此温度 **[6]** ~~**[12]**~~小时。
	The chamber temperature was reduced to -40 ± 2°C (-40 ± 4°F) within 30 minutes and maintained at this temperature for **[6]** ~~**[12]**~~ hours. 烤箱温度在30分钟内降低到-40 ± 2°C，并维持此温度 **[6]** ~~**[12]**~~小时。
	Repeat the sequence for 9 additional cycles (total of 10 cycles). 重复此顺序测试额外9个循环（总共10个循环）。
Samples Out/样品出箱:	After the 10th cycle, store the batteries at ambient temperature 20 ± 5°C (68 ± 9°F) for 24 hours prior to examination. 在第10个循环后，于20 ± 5°C环境下储存24小时，然后检查其状态。

Note: The duration of exposure to the test temperature extremes was determined as below:
注：样品承受极端温度的持续时间按如下确定：

- Small cells and small batteries: 6 hours; 小电芯和小电池为6小时;
- Large cells and large batteries: 12 hours. 大电芯和大电池为12小时。

Test Result
测试结果

Sample No. 样品编号	Sample Condition 样品状态	Weight Before Test in Grams 测试前质量（克）	Weight After Test In Grams 测试后质量（克）	Percentage of Weight Loss 质量损失百分比	Voltage Before Test(V) 测试前电压（伏）	Voltage After Test(V) 测试后电压（伏）	Percent of residual Voltage 残余电压百分比	Results 结果
2190118-1	(C)	29.815	29.778	0.124	4.193	4.103	97.854	(6), (7)
2190118-2	(C)	29.868	29.861	0.023	4.199	4.107	97.809	(6), (7)
2190118-3	(C)	29.928	29.915	0.043	4.193	4.103	97.854	(6), (7)
2190118-4	(C)	29.897	29.899	0.000	4.190	4.103	97.924	(6), (7)
2190118-5	(C)	30.064	30.062	0.007	4.199	4.108	97.833	(6), (7)
2190118-6	(C)	29.760	29.762	0.000	4.188	4.103	97.970	(6), (7)
2190118-7	(C)	29.678	29.680	0.000	4.193	4.110	98.021	(6), (7)
2190118-8	(C)	30.198	30.188	0.033	4.195	4.132	98.498	(6), (7)
2190118-9	(C)	29.305	29.308	0.000	4.194	4.147	98.879	(6), (7)
2190118-10	(C)	29.764	29.757	0.024	4.192	4.107	97.972	(6), (7)

Results/结果:
(1) Leakage/漏液.

(2) Venting/排气.
(3) Disassembly/解体.
(4) Rupture/破裂.
(5) Fire/着火.
(6) No leakage, no venting, no disassembly, no rupture, no fire/无漏液，无排气，无解体，无破裂，无着火.
(7) The open circuit voltage of each cell after testing was greater than 90%/开路电压不低于试验前开路电压的90%.
Condition/状态:
(A) Fully discharged state/完全放电.
(B) Undischarged state/未放电.
(C) First cycle in fully charged state/第一个交替充电放电周期完全充电.
(D) After fifty cycles ending in fully charged state/第五十个交替充电放电周期完全充电.
(E) After twenty five cycles ending in fully charged state/第二十五个交替充电放电周期完全充电.

T.3 Vibration
振动

Test Method
测试方法

The samples were subjected to vibration tests consisting of the following. The samples were weighed before and after the exposure. The cell/battery voltage was also determined before and after the test. 测试样品将进行如下振动测试。

The samples were firmly secured to the platform of the vibration machine without distorting the cells in such a manner as to faithfully transmit the vibration. The vibration was a sinusoidal waveform with a logarithmic sweep between 7 Hz and 200 Hz and back to 7 Hz traversed in 15 minutes. This cycle was repeated 12 times for a total of 3 hours for each of three mutually perpendicular mounting positions of the cell. One of the directions of vibration was perpendicular to the terminal face. 电芯和电池牢固地安装在振动台上。振动以正弦波形式，以7Hz增加至200Hz，然后在减少回到7Hz为一个循环，一个循环持续15分钟的对数前移传送。以振动的其中一个方向必须是垂直样品极性，对每个电芯从三个互相垂直的方向上循环12次，每个方向3个小时。

The logarithmic frequency sweep was as follows/对数扫频如下:

[X] For cells and small batteries: From 7 Hz a peak acceleration of 1 g was maintained until 18 Hz is reached. The amplitude was then maintained at 0.8 mm (1.6 mm total excursion) and the frequency increased until a peak acceleration of 8 g occurred (approximately 50 Hz). A peak acceleration of 8 g was then maintained until the frequency was increase to 200 Hz. 对于小电芯和小电池：7赫兹开始保持1gn的最大加速度直到频率为18赫兹，然后将振幅保持在0.8毫米（总偏移1.6毫米）并增加频率直到最大加速度达到8gn（频率约为50赫兹），将最大加速度保持在8gn直到频率增加到200赫兹。

[ ] For large batteries: From 7 Hz a peak acceleration of 1 g was maintained until 18 Hz is reached. The amplitude was then maintained at 0.8 mm (1.6 mm total excursion) and the frequency increased until a peak acceleration of 2 g occurred (approximately 25 Hz). A peak acceleration of 2 g was then maintained until the frequency was increase to 200 Hz. 对大电芯和大电池： 7赫兹开始保持1gn的最大加速度直到频率为18赫兹，然后将振幅保持在0.8毫米（总偏移1.6毫米）并增加频率直到最大加速度达到2gn（频率约为25赫兹），将最大加速度保持在2gn直到频率增加到200赫兹。

Test Result
测试结果

Sample No. 样品编号	Sample Condition 样品状态	Weight Before Test in Grams 测试前质量（克）	Weight After Test In Grams 测试后质量（克）	Percentage of Weight Loss 质量损失百分比	Voltage Before Test(V) 测试前电压（伏）	Voltage After Test(V) 测试后电压（伏）	Percent of residual Voltage 残余电压百分比	Results 结果
2190118-1	(C)	29.778	29.779	0.000	4.103	4.081	99.464	(6), (7)
2190118-2	(C)	29.861	29.861	0.000	4.107	4.100	99.830	(6), (7)
2190118-3	(C)	29.915	29.914	0.003	4.103	4.098	99.878	(6), (7)
2190118-4	(C)	29.899	29.899	0.000	4.103	4.098	99.878	(6), (7)
2190118-5	(C)	30.062	30.061	0.003	4.108	4.101	99.830	(6), (7)
2190118-6	(C)	29.762	29.762	0.000	4.103	4.099	99.903	(6), (7)
2190118-7	(C)	29.680	29.680	0.000	4.110	4.101	99.781	(6), (7)

2190118-8	(C)	30.188	30.189	0.000	4.132	4.126	99.855	(6), (7)
2190118-9	(C)	29.308	29.307	0.003	4.147	4.146	99.976	(6), (7)
2190118-10	(C)	29.757	29.757	0.000	4.107	4.100	99.830	(6), (7)

Results/结果:
(1) Leakage/漏液.
(2) Venting/排气.
(3) Disassembly/解体.
(4) Rupture/破裂.
(5) Fire/着火.
(6) No leakage, no venting, no disassembly, no rupture, no fire/无漏液，无排气，无解体，无破裂，无着火.
(7) The open circuit voltage of each cell after testing was greater than 90%/开路电压不低于试验前开路电压的90%.
Condition/状态:
(A) Fully discharged state/完全放电.
(B) Undischarged state/未放电.
(C) First cycle in fully charged state/第一个交替充电放电周期完全充电.
(D) After fifty cycles ending in fully charged state/第五十个交替充电放电周期完全充电.
(E) After twenty five cycles ending in fully charged state/第二十五个交替充电放电周期完全充电.

T.4 Shock
冲击

Test Method
测试方法

The samples were subjected to shock. The samples were weighed before and after the exposure. The cell/battery voltage was also determined before and after the test. The sample cell was secured to the testing machine by means of a rigid mount, which supports all mounting surfaces of the sample. Each sample was subjected to a half-sine shock as below: 样品将进行如下冲击测试。对样品在测试前后进行称重，并记录电压。以稳固的托架固定住每个电芯和电池样品的全部配件表面。每个样品将进行如下半正弦冲击测试：

[X] For small cells: Peak acceleration of 150 gn and pulse duration of 6 milliseconds. 小电芯：峰值为150gn，脉冲持续6毫秒。

[ ] For large cells: Peak acceleration of 50 gn and pulse duration of 11 milliseconds. 大电芯：峰值为50gn，脉冲持续11毫秒。

[ ] For small batteries: Peak acceleration of the smaller of the following, and pulse duration of 6 milliseconds: 小电池：取如下较小值为峰值，脉冲持续6毫秒。

- 150 gn.
- √(100850 / mass of the battery in kg)

[ ] For large batteries: Peak acceleration of the smaller of the following, and pulse duration of 11 milliseconds: 大电池：取如下较小值为峰值，脉冲持续6毫秒。

- 50 gn.
- √(30000 / mass of the battery in kg)

Each sample was subjected to three shocks in the positive direction followed by three shocks in the negative direction of three mutually perpendicular mounting positions of the cell for a total of 18 shocks. 每个测试样品须在三个互相垂直的电池安装方位的正方向经受三次冲击，接着在反方向经受三次冲击，总共经受18次冲击。

~~Cell~~/Battery Model	WT 17500
[X] Weight of ~~Cell~~/Battery in kg	See below chart
[X] Target Peak Acceleration for Battery in gn	150gn

Test Result
测试结果

Sample No. 样品编号	Sample Condition 样品状态	Weight Before Test in Grams 测试前质量（克）	Weight After Test In Grams 测试后质量（克）	Percentage of Weight Loss 质量损失百分比	Voltage Before Test(V) 测试前电压（伏）	Voltage After Test(V) 测试后电压（伏）	Percent of residual Voltage 残余电压百分比	Results 结果
2190118-1	(C)	29.779	29.778	0.003	4.081	4.081	100.000	(6), (7)
2190118-2	(C)	29.861	29.859	0.007	4.100	4.100	100.000	(6), (7)
2190118-3	(C)	29.914	29.913	0.003	4.098	4.098	100.000	(6), (7)
2190118-4	(C)	29.899	29.899	0.000	4.098	4.097	99.976	(6), (7)
2190118-5	(C)	30.061	30.060	0.003	4.101	4.101	100.000	(6), (7)

2190118-6	(C)	29.762	29.762	0.000	4.099	4.099	100.000	(6), (7)
2190118-7	(C)	29.680	29.679	0.003	4.101	4.101	100.000	(6), (7)
2190118-8	(C)	30.189	30.188	0.003	4.126	4.127	100.000	(6), (7)
2190118-9	(C)	29.307	29.307	0.000	4.146	4.145	99.976	(6), (7)
2190118-10	(C)	29.757	29.756	0.003	4.100	4.100	100.000	(6), (7)

Results/结果:

(1) Leakage/漏液.

(2) Venting/排气.

(3) Disassembly/解体.

(4) Rupture/破裂.

(5) Fire/着火.

(6) No leakage, no venting, no disassembly, no rupture, no fire/无漏液，无排气，无解体，无破裂，无着火.

(7) The open circuit voltage of each cell after testing was greater than 90%/开路电压不低于试验前开路电压的90%.

Condition/状态:

(A) Fully discharged state/完全放电.

(B) Undischarged state/未放电.

(C) First cycle in fully charged state/第一个交替充电放电周期完全充电.

(D) After fifty cycles ending in fully charged state/第五十个交替充电放电周期完全充电.

(E) After twenty five cycles ending in fully charged state/第二十五个交替充电放电周期完全充电.

T.5 External short circuit
外部短路

Test Method
测试方法

The samples were shall be heated for a period of time noted below, to reach a homogeneous stabilized temperature of 57 ± 4 °C, measured on the external case: 为使样品达到均匀稳定的初始温度：57 ± 4 °C，样品需在此环境下暴露一段时间。

- Small cells and small batteries: 6 hours. 小电芯和小电池至少暴露6小时。
- Large cells and large batteries: 12 hours.大电芯和大电池至少暴露12小时。
- **[ ]** ____hours, assessed depended on the size and design of the sample. _____小时，根据样品尺寸设计评估所得。

The samples were then subjected to a short circuit condition with a total external resistance of less than 0.1 ohm, until: 然后将样品正负极用小于0.1欧姆的总电阻回路进行短路，直到：

- Small cells, small batteries and large cells: 1 hour after the external case temperature of sample has returned to 57 ± 4 °C. 小电芯，小电池和大电芯： 样品外表温度恢复到57 ± 4 °C之后保持短路状态1小时以上。
- Large batteries: After the external case temperature of sample has decreased by half of the maximum temperature increase observed during the test and remains below that value.大电池：样品表面温度下降所测最大温升的一半，然后维持此温度之下。

Test Result
测试结果

Sample No. 样品编号	Sample Condition 样品状态	Voltage Before Test(V) 测试前电压（伏）	Maximum Temperature, °C 最高温度（摄氏度）	Results 结果
2190118-1	(C)	4.081	57.7	(4), (5)
2190118-2	(C)	4.100	57.6	(4), (5)
2190118-3	(C)	4.098	57.4	(4), (5)
2190118-4	(C)	4.097	57.6	(4), (5)
2190118-5	(C)	4.101	57.6	(4), (5)
2190118-6	(C)	4.099	57.8	(4), (5)
2190118-7	(C)	4.101	57.8	(4), (5)
2190118-8	(C)	4.127	57.7	(4), (5)
2190118-9	(C)	4.145	57.7	(4), (5)
2190118-10	(C)	4.100	57.7	(4), (5)

Results/结果:

(1) Disassembly/解体.

(2) Rupture/破裂.

(3) Fire/着火.

(4) No disassembly, no rupture, no fire within 6 hours after the test/测试后6小时内无解体，无破裂，无着火.

(5) The maximum temperature did not exceed 170°C/最高温度不超过170摄氏度.

Condition/状态:

(A) Fully discharged state/完全放电.

(B) Undischarged state/未放电.
(C) First cycle in fully charged state/第一个交替充电放电周期完全充电.
(D) After fifty cycles ending in fully charged state/第五十个交替充电放电周期完全充电.
(E) After twenty five cycles ending in fully charged state/第二十五个交替充电放电周期完全充电.

T.6 Impact / Crush
撞击 / 挤压

Test Method
测试方法

[ ] Impact (for cylindrical cells not less than 18 mm in diameter)/ 撞击（适用于直径不小于18毫米的圆柱形电池）

A test sample was placed on a flat surface. A 15.8 mm ± 0.1 mm diameter, at least 6 cm long, or the longest dimension of the cell, whichever is greater, Type 316 stainless steel bar was placed across the center of the sample. A 9.1 kg ± 0.1 kg mass was dropped from a height of 61 ± 2.5 cm at the intersection of the bar and sample in a controlled manner, using a near frictionless, vertical sliding track or channel with minimal drag on the falling mass. The vertical track or channel used to guide the falling mass was oriented 90 degrees from the horizontal supporting surface. 将试验样品放在一个平坦光滑的平面上。将一条316型不锈钢棒，其直径为15.8 mm ± 0.1 mm，长度为至少6 cm，或电芯的最长边长度（两者中较大者），放置在样品中心。将一质量为9.1 kg ± 0.1 kg的物体于61 ± 2.5 cm的高度, 无摩擦地从垂直滑轨落向样品。垂直滑轨与横向支承面互相垂直，保持90度。

The test sample was impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of a 15.8 mm ± 0.1 mm diameter curved surface lying across the center of the test sample. Separate samples were used for each test. 接受撞击的试样，纵轴应与平坦的表面平行并与横放在试样中心的直径15.8 mm ± 0.1 mm弯曲表面的纵轴垂直。每一个试样只经受一次撞击。

[X] Crush (for prismatic, pouch, coin/button cells and cylindrical cells less than 18 mm in diameter)/挤压（适用于棱柱形、袋装、硬币/纽扣电池和直径小于18毫米的圆柱形电池）

A sample was crushed between two flat surfaces. The crushing was gradual with a speed of approximately 1.5 cm/s at the first point of contact. The crushing was continued until the first of the three options below has reached/将样品放在两个平面之间挤压。挤压力度逐渐加大，在第一个接触点上的速度大约为1.5厘米/秒。挤压持续进行，直到出现以下三种情况之一：：

- The applied force reaches 13 kN ± 0.78 kN/施加的力达到13 kN ± 0.78 kN;
- The voltage of the cell drops by at least 100 mV; or/电池的电压下降至少100毫伏，或者
- The cell is deformed by 50% or more of its original thickness/电池变形达原始厚度的50%以上。

A prismatic or pouch cell was crushed by applying the force to the widest side. A button/coin cell was crushed by applying the force on its flat surfaces. For cylindrical cells, the crush force was applied perpendicular to the longitudinal axis/棱柱形或袋装电池应从最宽的一面施压。纽扣/硬币形电池应从其平坦表面施压。圆柱形应从与纵轴垂直的方向施压。

The test sample was observed for a further 6 hours. Separate samples that have not previously been subjected to other tests were used for each test/测试样品进一步观察6小时。未进行过其他测试的样品用于此测试。

Test Result
测试结果

Sample No. 样品编号	Sample Condition 样品状态	Voltage Before Test(V) 测试前电压（伏）	Maximum Temperature, °C 最高温度（摄氏度）	Results 结果
2190121-1	(C)	3.68	27.3	(3), (4)
2190121-2	(C)	3.67	28.3	(3), (4)
2190121-3	(C)	3.68	78.7	(3), (4)
2190121-4	(C)	3.67	27.1	(3), (4)
2190121-5	(C)	3.68	28.1	(3), (4)

Results/结果:
(1) Disassembly/解体.
(2) Fire/着火.
(3) No disassembly, no fire within 6 hours after the test/测试后6小时内无解体，无着火.
(4) The maximum temperature did not exceed 170°C/最高温度不超过170摄氏度.
Condition/状态:
(A) Undischarged/未放电.
(B) Fully discharged/完全放电.
(C) One half discharged/半放电.

T.7 Overcharge
过度充电

Test Method
测试方法

Batteries were subjected to a charge current of twice the manufacturer's recommended maximum continuous charge current/ 2倍制造厂推荐的最大持续充电电流对样品充电。

The minimum voltage of the test was as follows/最小的测试电压由按如下决定：

- When the manufacturer's recommended charge voltage is not more than 18 V, the minimum voltage of the test was the lesser of 2 times the maximum charge voltage of the battery or 22 V. 如果厂家推荐的充电电压不超过18V，本测试的最小充电电压应是厂家标定最大充电电压的两倍或者是22V之中的较小者。

- When the manufacturer's recommended charge voltage is more than 18 V, the minimum voltage of the test was 1.2 times the maximum charge voltage. 如果厂家推荐的充电电压超过18V，本测试的最小充电电压应是厂家标定最大充电电压的1.2倍。

- Tests were conducted at ambient temperature 20 ± 5°C. The duration of the test was 24 hours. 测试在20 ± 5°C的环境温度下进行，试验持续24小时。

Battery Model/电池型号	WT 17500
Overcharge Current/过充电流	1200mA *2=2400mA
Overcharge Voltage/过充电压	4.25V *2=8.5V

Test Result
测试结果

Sample No. 样品编号	Sample Condition 样品状态	Test Voltage, V 测试电压（伏）	Measured Overcharge Current, mA 测量的过充电流（毫安）	Results 结果
2190118-11	(A)	8.5	2400	(3)
2190118-12	(A)	8.5	2400	(3)
2190118-13	(A)	8.5	2400	(3)
2190118-14	(A)	8.5	2400	(3)
2190118-15	(B)	8.5	2400	(3)
2190118-16	(B)	8.5	2400	(3)
2190118-17	(B)	8.5	2400	(3)
2190118-18	(B)	8.5	2400	(3)

Results/结果:
(1) Disassembly/解体.
(2) Fire/着火.
(3) No disassembly, no fire within seven days after the test/测试后7天内无解体，无着火.
Condition/状态:
(A) First cycle in fully charged state/第一个交替充电放电周期完全充电.
(B) After fifty cycles ending in fully charged state/第五十个交替充电放电周期完全充电.
(C) After twenty five cycles ending in fully charged state/第二十五个交替充电放电周期完全充电.

T.8 Forced discharge
强制放电

Test Method
测试方法

Each cell was forced discharged at ambient temperature by connecting it in series with a 12 V DC power supply at an initial current equal to the maximum discharge current specified by the manufacturer. 在常温环境下，将单个电芯连接在12V的直流电源上进行强制放电，此直流电源提供给每个电芯初始电流为制造厂指定的最大放电电流。

The specified discharge current was obtained by connecting a resistive load of the appropriate size and rating in series with the test cell. Each cell was forced discharged for a time interval (in hours) equal to its rated capacity divided by the initial test current (in amperes). 指定的放电电流通过串联在测试电芯上的合适大小和功率的负载来获得，每个电芯的强制放电时间（小时）为额定容量除以初始电流（安培）。

Test Result
测试结果

Sample No. 样品编号	Condition 样品状态	Initial Discharge Current, mA 初始放电电流（毫安）	Voltage of Discharged Cell Before Test(V) 测试前电压（伏）	Voltage After Test(V) 测试后电压（伏）	Results 结果
2190121-6	(B)	1200	3.31	0	(3)
2190121-7	(B)	1200	3.23	0	(3)
2190121-8	(B)	1200	3.32	0	(3)
2190121-9	(B)	1200	3.21	0	(3)
2190121-10	(B)	1200	3.31	0	(3)
2190121-11	(B)	1200	3.21	0	(3)
2190121-12	(B)	1200	3.33	0	(3)
2190121-13	(B)	1200	3.21	0	(3)
2190121-14	(B)	1200	3.22	0	(3)
2190121-15	(B)	1200	3.22	0	(3)
2190121-16	(C)	1200	3.22	0	(3)
2190121-17	(C)	1200	3.22	0	(3)
2190121-18	(C)	1200	3.33	0	(3)
2190121-19	(C)	1200	3.23	0	(3)
2190121-20	(C)	1200	3.22	0	(3)
2190121-21	(C)	1200	3.31	0	(3)
2190121-22	(C)	1200	3.22	0	(3)
2190121-23	(C)	1200	3.32	0	(3)
2190121-24	(C)	1200	3.31	0	(3)
2190121-25	(C)	1200	3.22	0	(3)

Results/结果:
(1) Disassembly/解体.
(2) Fire/着火.
(3) No disassembly, no fire within seven days after the test/测试后七天内无解体、无着火.
Condition/状态:
(A) Fully discharged state/完全放电.
(B) First cycle in fully discharged state/第一个交替充电放电周期完全放电.
(C) After fifty cycles ending in fully discharged state/第五十个交替充电放电周期完全放电.

注 意 事 项
Important

1. 未经本试验室书面同意，不得复制或部分地复制本报告。
   Nobody is allowed to photocopy or partly photocopy this test report without written permission of UL.

2. 本报告无批准人、审核人及检测人签名无效。
   The test report is invalid without the signatures of Approver, Reviewer and Tester.

3. 本报告涂改无效。
   The test report is invalid if altered.

4. 对检验报告若有异议，应于收到报告之日起十五天内向检验单位提出。
   Objections to the test report must be submitted to UL within 15 days.

5. 本报告中以点号代替小数点。
   Throughout this report a point is used as the decimal separator.

6. 本报告仅对送检样品负责。
   The test report is valid for the tested samples only.

7. 本报告并未授权许可申请单位使用UL任何UL的名称、商标、标识等。
   The test report does not grant applicant the use of UL name, trademark or label.

8. 任何情况下检测单位的赔偿责任都不会超过检测单位就本次检测所收取的检测费用。
   UL's liability under no circumstance will exceed the testing fee received from applicant for test conducted hereof this testing report.

9. 检测数据和结果不具备社会证明性作用。
   The test data and results do not have social proof function.

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