

Report No.:  
报告编号: NBHT20141126U01

# 检验报告

## TEST REPORT

NAME OF SAMPLE: Lithium-ion rechargeable pack battery

产品名称: 锂离子充电电池

CLIENT: NingboHuitong New Energy Technology Co., Ltd

委托单位: 宁波慧通新能源科技有限公司

CLASSIFICATION OF TEST: Commission test

检验类别: 委托检测

广州邦未检测技术有限公司

Guangzhou MCM Certification and Testing Co., Ltd

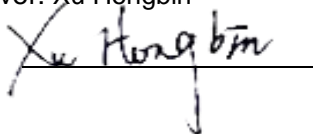


<b>General information</b> <b>基本资料</b>	
Name of samples 样品名称	Lithium-ion rechargeable pack battery 锂离子充电电池
Type/ Model 型号规格	WT18650 3,7V 2600mAh 9,62Wh
Trade mark 商标	—
Commission by 委托单位	NingboHuitong New Energy Technology Co.,Ltd 宁波慧通新能源科技有限公司
Commissioner address 委托单位地址	Room 1303, BlockB,BuildingLiyuanshangdu, No39, Lane158, South Section, Huan Cheng West Road, Ningbo, China 浙江省宁波市环城西路南段 158 弄 39 号丽园尚都 B 座 1303 室
Manufacturer 制造商	NingboHuitong New Energy Technology Co.,Ltd 宁波慧通新能源科技有限公司
Manufacturer address 制造商地址	Room 1303, BlockB,BuildingLiyuanshangdu, No39, Lane158, South Section, Huan Cheng West Road, Ningbo, China 浙江省宁波市环城西路南段 158 弄 39 号丽园尚都 B 座 1303 室
Factory 生产厂	NingboHuitong New Energy Technology Co.,Ltd 宁波慧通新能源科技有限公司
Factory address 生产厂地址	Room 1303, BlockB,BuildingLiyuanshangdu, No39, Lane158, South Section, Huan Cheng West Road, Ningbo, China 浙江省宁波市环城西路南段 158 弄 39 号丽园尚都 B 座 1303 室
Appearance: 样品外观颜色	Blue 蓝色
Sample status 样品状态	Good 完好
Package of goods 样品外包装	Carton 纸箱
Quantity of sample 样品数量	43pcs
Sample identification 样品标识序号	c1#~c43#
Reference standard 参考标准	MH/T1052-2013 《Tests for lithium batteries transported by air》 MH/T1052-2013 《航空运输锂电池测试规范》
Receiving date 接样日期	2014.11.26
Completing date 完成日期	2014.12.10

Test Conclusion 测试结论					
No.序号	Name of test 测试项目名称	Testing standard 测试标准	Test result 测试结果	Conclusion 本项结论	Remarks 备注
1	Altitude simulation 高度模拟	UN Manual of Tests and Criteria ST/SG/AC.10/11/Rev.5, amend1, 38.3. 联合国《关于危险货物运输的建议书试验和标准手册》ST/SG/AC. 10/11/ Rev. 5, amend1, 38.3.	See Appendix 1 见 附表 1	Passed 合格	/
2	Thermal test 温度试验		See Appendix 2 见 附表 2	Passed 合格	/
3	Vibration 振动		See Appendix 3 见 附表 3	Passed 合格	/
4	Shock 冲击		See Appendix 4 见 附表 4	Passed 合格	/
5	External Short-circuit 外部短路		See Appendix 5 见 附表 5	Passed 合格	/
6	Impact 撞击		/	/	N/A 不适用
	Crush 挤压		See Appendix 6 见 附表 6	Passed 合格	/
7	Overcharge 过度充电		See Appendix 7 见 附表 7	Passed 合格	/
8	Forced discharge 强制放电	See Appendix 8 见 附表 8	Passed 合格	/	
<b>Conclusion/结论:</b>  The Lithium-ion rechargeable pack batteries submitted by NingboHuitong New Energy Technology Co.,Ltd had passed the test items of UNITED NATIONS "Recommendations on the Transport of Dangerous Goods, Manual of Test and Criteria ST/SG/AC, 10/11/Rev.5 amend1, 38.3.  由宁波慧通新能源科技有限公司送检的锂离子充电电池符合联合国《关于危险品货物运输的建议书 试验和标准手册》ST/SG/AC, 10/11/Rev. 5 amend1, 38.3 的要求。  Seal/公章:  Date of issue: /日期: Dec.12,2014					

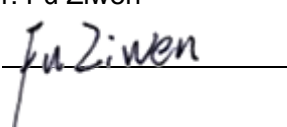
Approver: Xu Hongbin

批准:



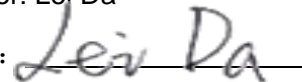
Checker: Fu Ziwen

审核:



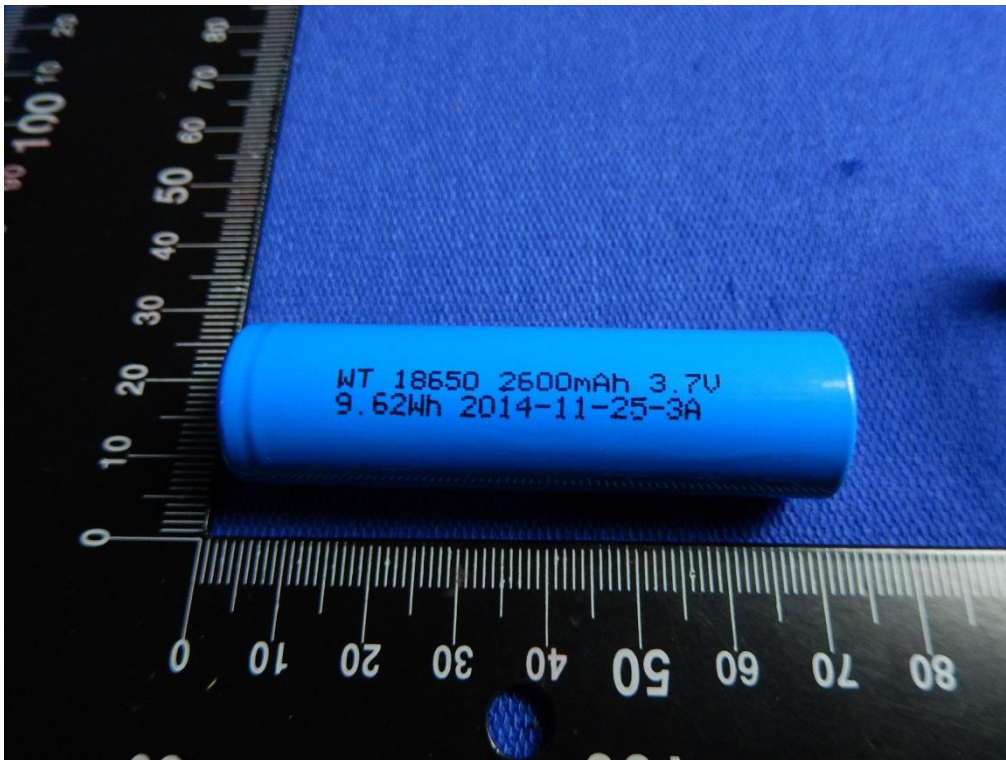
Tester: Lei Da

测试:



Photos of samples and markings  
样品及标识照片

Battery (WT18650 3,7V 2600mAh 9,62Wh)



## Appendix 1

## 附表 1

Test Items 测试项目	Altitude simulation 高度模拟						
<b>1,1</b>	<b>Test procedure</b> 测试步骤						
	Test cells and batteries shall be stored at a pressure of 11,6kPa or less for at least six hour at ambient temperature (20±5°C). 试验电池芯和电池在环境温度(20±5°C)下, 储存在小于等于 11, 6kPa 的压力下至少六小时。						
<b>1,2</b>	<b>Sample status</b> 样品状态						
	C1#~C10#, at first cycle in fully charged states; C1#~C10#, 在第一个循环完全充电状态;						
<b>1,3</b>	<b>Result</b> 测试结果						
Sample No. 样品编号	Before 测试前		After 测试后		Mass loss 质量损失 (%)	Residual OCV 剩余电压 (%)	Test result 测试结果
	Mass 样品质量 (g)	Voltage 开路电压 (V)	Mass 样品质量 (g)	Voltage 开路电压 (V)			
C1#	49,547	4,17	49,551	4,16	0,000	99,76	<b>O</b>
C2#	48,863	4,18	48,841	4,17	0,045	99,76	<b>O</b>
C3#	49,787	4,17	49,784	4,17	0,006	100,00	<b>O</b>
C4#	49,506	4,15	49,522	4,13	0,000	99,52	<b>O</b>
C5#	49,312	4,17	49,312	4,15	0,000	99,52	<b>O</b>
C6#	49,812	4,18	49,819	4,16	0,000	99,52	<b>O</b>
C7#	49,248	4,18	49,245	4,16	0,006	99,52	<b>O</b>
C8#	48,850	4,13	48,850	4,12	0,000	99,76	<b>O</b>
C9#	49,583	4,17	49,582	4,16	0,002	99,76	<b>O</b>
C10#	49,157	4,18	49,173	4,17	0,000	99,76	<b>O</b>

Note: L-Leakage, V-Venting, D -Disassembly, R -Rupture, F-Fire, O-No leakage, no venting, no disassembly, no rupture, no fire.  
注: L- 泄漏; V- 排气; D- 解体; R- 破裂; F - 起火; O- 无泄漏、无排气、无解体、无破裂、无起火。

## Appendix 2

### 附表 2

Test Items 测试项目	Thermal test 温度测试						
<b>1,1</b>	<b>Test procedure</b> 测试步骤						
	<p>Test cells and batteries are to be stored for at least six hours at a test temperature equal to <math>72\pm 2^{\circ}\text{C}</math>, followed by storage for at least six hours at a test temperature equal to <math>-40\pm 2^{\circ}\text{C}</math>, The maximum time interval between test temperature extremes in 30 minutes, This procedure is to be repeated until 10 total cycles are complete, after which all test cells and batteries are to be stored for 24 hours at ambient temperature (<math>20\pm 5^{\circ}\text{C}</math>).</p> <p>将电芯和电池在温度为 <math>72\pm 2^{\circ}\text{C}</math> 的条件下贮存不少于 6 个小时, 然后, 在温度 <math>-40\pm 2^{\circ}\text{C}</math> 条件下贮存不少于 6 个小时, 两个温度间的间隔最长为 30min, 重复操作上述步骤直到 10 次, 然后, 将其在环境温度为 <math>20\pm 5^{\circ}\text{C}</math> 的条件下放置 24 个小时。</p>						
<b>1,2</b>	<b>Sample status</b> 样品状态						
	<p>C1#~C10#, at first cycle in fully charged states; C1#~C10#, 在第一个循环完全充电状态;</p>						
<b>1,3</b>	<b>Result</b> 测试结果						
Sample No. 样品编号	Before 测试前		After 测试后		Mass loss 质量损失 (%)	Residual OCV 剩余电压 (%)	Test result 测试结果
	Mass 样品质量 (g)	Voltage 开路电压 (V)	Mass 样品质量 (g)	Voltage 开路电压 (V)			
C1#	49,551	4,16	49,544	4,10	0,014	98,56	O
C2#	48,841	4,17	48,818	4,10	0,047	98,32	O
C3#	49,784	4,17	49,741	4,09	0,086	98,08	O
C4#	49,522	4,13	49,502	4,08	0,040	98,79	O
C5#	49,312	4,15	49,308	4,08	0,008	98,31	O
C6#	49,819	4,16	49,801	4,10	0,036	98,56	O
C7#	49,245	4,16	49,242	4,09	0,006	98,32	O
C8#	48,850	4,12	48,846	4,06	0,008	98,54	O
C9#	49,582	4,16	49,576	4,10	0,012	98,56	O
C10#	49,173	4,17	49,149	4,10	0,049	98,32	O
<p>Note: L-Leakage, V-Venting, D -Disassembly, R -Rupture, F-Fire, O-No leakage, no venting, no disassembly, no rupture, no fire.</p> <p>注: L- 泄漏; V- 排气; D- 解体; R- 破裂; F - 起火; O- 无泄漏、无排气、无解体、无破裂、无起火。</p>							

## Appendix 3

## 附表 3

Test Items 测试项目	Vibration 振动						
<b>1,1</b>	<b>Test procedure</b> 测试步骤						
	Cells and batteries are 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 shall be a sinusoidal wave form with a logarithmic sweep between 7Hz and 200Hz and back to 7 Hz traversed in 15 minutes, This cycle shall be repeated 12 times for a total of 3 hours for each of three mutually perpendicular mounting position of the cell. 将电芯和电池牢固地安装在振动台的台面上，然后开始振动。振动以正弦波形式，以 7Hz 增加至 200Hz，然后再减少回到 7Hz 为一个循环，一个循环持续 15 分钟的对数扫频。每个电芯和电池从三个互相垂直的方向上循环 12 次，3 个小时。						
<b>1,2</b>	<b>Sample status</b> 样品状态						
	C1#~C10#, at first cycle in fully charged states; C1#~C10#, 在第一个循环完全充电状态;						
<b>1,3</b>	<b>Result</b> 测试结果						
Sample No. 样品编号	Before 测试前		After 测试后		Mass loss 质量损失 (%)	Residual OCV 剩余电压 (%)	Test result 测试结果
	Mass 样品质量 (g)	Voltage 开路电压 (V)	Mass 样品质量 (g)	Voltage 开路电压 (V)			
C1#	49,544	4,10	49,523	4,09	0,042	99,76	<b>O</b>
C2#	48,818	4,10	48,805	4,09	0,027	99,76	<b>O</b>
C3#	49,741	4,09	49,735	4,09	0,012	100,00	<b>O</b>
C4#	49,502	4,08	49,495	4,08	0,014	100,00	<b>O</b>
C5#	49,308	4,08	49,295	4,07	0,026	99,75	<b>O</b>
C6#	49,801	4,10	49,784	4,09	0,034	99,76	<b>O</b>
C7#	49,242	4,09	49,240	4,08	0,004	99,76	<b>O</b>
C8#	48,846	4,06	48,831	4,06	0,031	100,00	<b>O</b>
C9#	49,576	4,10	49,565	4,09	0,022	99,76	<b>O</b>
C10#	49,149	4,10	49,135	4,09	0,028	99,76	<b>O</b>
Note: <b>L</b> -Leakage, <b>V</b> -Venting, <b>D</b> -Disassembly, <b>R</b> -Rupture, <b>F</b> -Fire, <b>O</b> -No leakage, no venting, no disassembly, no rupture, no fire. 注: <b>L</b> - 泄漏; <b>V</b> - 排气; <b>D</b> - 解体; <b>R</b> - 破裂; <b>F</b> - 起火; <b>O</b> - 无泄漏、无排气、无解体、无破裂、无起火。							

## Appendix 4

### 附表 4

Test Items 测试项目	Shock 冲击						
<b>1,1</b>	<b>Test procedure</b> 测试步骤						
	Test cells and batteries shall be secured to the testing machine by means of a rigid mount which will support all mounting surfaces of each battery, Each cell or battery shall be subjected to a half-sine shock of peak acceleration of 150gn and pulse duration of 6 milliseconds, Each cell or battery shall be 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 or battery for a total of 18 shocks. 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。对每个电芯或电池以峰值为 150gn 的半正弦的加速度撞击，脉冲持续 6 毫秒。按三个互相垂直轴向分别对其正负极各碰撞三次，每个电芯或电池碰撞总次数为 18 次。						
<b>1,2</b>	<b>Sample status</b> 样品状态						
	C1#~C10#, at first cycle in fully charged states; C1#~C10#, 在第一个循环完全充电状态;						
<b>1,3</b>	<b>Result</b> 测试结果						
Sample No. 样品编号	Before 测试前		After 测试后		Mass loss 质量损失 (%)	Residual OCV 剩余电压 (%)	Test result 测试结果
	Mass 样品质量 (g)	Voltage 开路电压 (V)	Mass 样品质量 (g)	Voltage 开路电压 (V)			
C1#	49,523	4,09	49,513	4,09	0,020	100,00	<b>O</b>
C2#	48,805	4,09	48,807	4,09	0,000	100,00	<b>O</b>
C3#	49,735	4,09	49,735	4,09	0,000	100,00	<b>O</b>
C4#	49,495	4,08	49,497	4,08	0,000	100,00	<b>O</b>
C5#	49,295	4,07	49,296	4,07	0,000	100,00	<b>O</b>
C6#	49,784	4,09	49,785	4,09	0,000	100,00	<b>O</b>
C7#	49,240	4,08	49,240	4,08	0,000	100,00	<b>O</b>
C8#	48,831	4,06	48,830	4,06	0,002	100,00	<b>O</b>
C9#	49,565	4,09	49,568	4,09	0,000	100,00	<b>O</b>
C10#	49,135	4,09	49,136	4,09	0,000	100,00	<b>O</b>
Note: <b>L</b> -Leakage, <b>V</b> -Venting, <b>D</b> -Disassembly, <b>R</b> -Rupture, <b>F</b> -Fire, <b>O</b> -No leakage, no venting, no disassembly, no rupture, no fire. 注: <b>L</b> - 泄漏; <b>V</b> - 排气; <b>D</b> - 解体; <b>R</b> - 破裂; <b>F</b> - 起火; <b>O</b> - 无泄漏、无排气、无解体、无破裂、无起火。							



## Appendix 5

### 附表 5

Test Items 测试项目	External short circuit 外部短路		
1,1	<b>Test procedure</b> 测试步骤		
	<p>The cell or battery to be tested shall be temperature stabilized so that its external case temperature reaches <math>55\pm 2^{\circ}\text{C}</math> and then the cell or battery shall be subjected to a short circuit condition with a total external resistance of less than 0,1 ohm at <math>55\pm 2^{\circ}\text{C}</math>, This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to <math>55\pm 2^{\circ}\text{C}</math>, the cell or battery must be observed for a further six hour for the test to be concluded.</p> <p>保持试验环境温度稳定在 <math>55\pm 2^{\circ}\text{C}</math>，以使电芯或电池样品外表温度达到 <math>55\pm 2^{\circ}\text{C}</math>，然后，在此温度下，将其正负极用小于 0,1 欧姆的线路短接，待电芯或电池的外表温度恢复到 <math>55\pm 2^{\circ}\text{C}</math> 之后再持续 1 小时以上，对电芯或电池必须进一步观察 6 个小时才能下结论。</p>		
1,2	<b>Sample status</b> 样品状态		
	C1#~C10#, at first cycle in fully charged states; C1#~C10#, 在第一个循环完全充电状态;		
1,3	<b>Result</b> 测试结果		
Sample No. 样品编号	Max. External Temperature 样品表面最高温度 ( $^{\circ}\text{C}$ )	Test result 测试结果	Remark 备注
C1#	55,9	O	/
C2#	55,4	O	/
C3#	55,3	O	/
C4#	56,2	O	/
C5#	56,0	O	/
C6#	56,1	O	/
C7#	55,4	O	/
C8#	56,2	O	/
C9#	55,9	O	/
C10#	55,4	O	/
<p>Note: <b>D</b> -Disassembly, <b>R</b> -Rupture, <b>F</b>-Fire, <b>O</b>- no disassembly, no rupture, no fire. 注: D- 解体; R- 破裂; F - 起火; O-无解体、无破裂、无起火。</p>			

## Appendix 6

## 附表 6

Test Items 测试项目	Crush 挤压		
1,1	<b>Test procedure</b> 测试步骤		
	<p>A cell or component cell is to be crushed between two flat surfaces. The crushing is to be gradual with a speed of approximately 1,5cm/s at the first point of contact. The crushing is to be continued until the first of the three options below is reached.</p> <p>(a) The applied force reaches 13kN±0,78kN;            (b) The voltage of the cell drops by at least 100 mV; or            (c) The cell is deformed by 50% or more of its original thickness.</p> <p>Once the maximum pressure has been obtained, the voltage drops by 100mV or more, or the cell is deformed by at least 50% of its original thickness, the pressure shall be released.</p> <p>电池芯或组成电池芯在两个平面间挤压。挤压在第一个接触点以约 1,5cm/s 的速度慢慢进行，直到下面三个选项之一达到为止：</p> <p>(a) 作用力达到 13kN±0,78kN；            (b) 电池芯电压降至少达到 100mV；            (c) 电池厚度和最初比较变形至少 50%。</p> <p>一旦达到最大压力，电压降超过 100 mV 或者电池芯变形超过 50%，压力应该解除。</p>		
1,2	<b>Sample status</b> 样品状态		
	C11#~C15#, at first cycle at 50% of the design rated capacity; C11#~C15#, 在第一个循环 50%的额定容量；		
1,3	<b>Result</b> 测试结果		
Sample No. 样品编号	Max. External Temperature 样品表面最高温度 (°C)	Test result 测试结果	Remark 备注
C11#	23,1	O	/
C12#	23,2	O	/
C13#	23,1	O	/
C14#	23,4	O	/
C15#	23,2	O	/
<p>Note: D -Disassembly, F-Fire, O- no disassembly, no fire.            注: D- 解体; F - 起火; O-无解体、无起火。</p>			

## Appendix 7

### 附表 7

Test Items 测试项目	Overcharge 过度充电		
1,1	<b>Test procedure</b> 测试步骤		
	When the manufacturer's recommended charge voltage is not more than 18V, the minimum voltage of the test shall be the lesser of two times the maximum charge voltage of the or 22V 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该是两倍的厂家推荐的最大充电电压或者是 22V	The manufacturer's recommended maximum charge voltage is 4,28V. The manufacturer's recommended maximum continuous charge current is 2600mA. The voltage of the test is 8,56V. And the Current is 5200mA. 厂家推荐最大充电电压为 4, 28V, 厂家推荐最大充电电流为 2600mA. 测试的电压为 8, 56V, 电流为 5200mA.	
	When the manufacturer's recommended charge voltage is more than 18V, the minimum voltage of the test shall be 1,2 times 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该为 1, 2 倍的厂家推荐的最大充电电压	/	
1,2	<b>Sample status</b> 样品状态		
	C16#~C19#, at first cycle in fully charged states; C16#~C19#, 在第一个循环完全充电状态;		
	C20#~C23#, after 50 cycles ending in fully charged states; C20#~C23#, 在第五十个循环完全充电状态;		
1,3	<b>Result</b> 测试结果		
Sample No. 样品编号	Voltage Before test (V) 测试前开路电压 (V)	Test result 测试结果	Remark 备注
C16#	4,18	O	/
C17#	4,18	O	/
C18#	4,17	O	/
C19#	4,18	O	/
C20#	4,17	O	/
C21#	4,18	O	/
C22#	4,18	O	/
C23#	4,18	O	/
Note: <b>D</b> -Disassembly, <b>F</b> -Fire, <b>O</b> - no disassembly, no fire. 注: <b>D</b> - 解体; <b>F</b> - 起火; <b>O</b> -无解体、无起火。			

## Appendix 8

## 附表 8

Test Items 测试项目	Forced discharge 强制放电				
1,1	<b>Test procedure</b> 测试步骤				
	<p>Each cell shall be forced discharged at ambient temperature by connecting it in series with a 12V D. C, power supply at an initial current equal to the maximum discharge current specified the manufacturer The specified discharge current is to be obtained by connecting a resistive load of the appropriate size and rating in series with the test cell, Each cell shall be forced discharged for a time interval(in hours) equal to its rated capacity divided by the initial test current(in ampere).</p> <p>在 20±5℃的环境温度下, 将单个电芯连接在 12V 的直流电源上进行强制放电, 此直流电源提供每个电芯初始电流为制造厂指定的最大放电电流, 放电时间为额定容量除以初始电流。</p>				
1,2	<b>Sample status</b> 样品状态				
	<p>C24#~C33#, at first cycle in fully discharged states; C24#~C33#, 在第一个循环完全放电状态;</p> <p>C34#~C43#, after 50 cycles ending in fully discharged states; C34#~C43#, 在第五十个循环完全放电状态;</p>				
1,3	<b>Result</b> 测试结果				
Sample No. 样品编号	Voltage Before test 测试前开路电压 (V)	Test result 测试结果	Sample No. 样品编号	Voltage Before test 测试前开路电压 (V)	Test result 测试结果
C24#	3,371	○	C34#	3,371	○
C25#	3,371	○	C35#	3,370	○
C26#	3,410	○	C36#	3,391	○
C27#	3,372	○	C37#	3,372	○
C28#	3,393	○	C38#	3,376	○
C29#	3,370	○	C39#	3,371	○
C30#	3,370	○	C40#	3,381	○
C31#	3,373	○	C41#	3,370	○
C32#	3,387	○	C42#	3,370	○
C33#	3,376	○	C43#	3,371	○
<p>Note: <b>D</b> -Disassembly, <b>F</b>-Fire, <b>○</b>- no disassembly, no fire.</p> <p>注: <b>D</b>- 解体; <b>F</b> - 起火; <b>○</b>-无解体、无起火。</p>					

# 注 意 事 项

## Important

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