



TESTING
CNAS L0095

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No.: RZUN2017-0630

TEST REPORT

UN38.3

NAME OF SAMPLE: Primary Li-SOCl₂ Battery

CLIENT: HCB BATTERY CO., LTD.

CLASSIFICATION OF TEST: Commission Test

Vkan Certification & Testing Co., Ltd.




TEST REPORT

No.:RZUN2017-0630

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Name of samples: Primary Li-SOCl ₂ Battery	Type/Model: ER261020M 3,6V 12500mAh 3,6g
Appearance: Blue	Trade mark: HCB
Commissioned by: HCB BATTERY CO., LTD.	Manufacturer: HCB BATTERY CO., LTD.
Commissioner address: Special NO.1, Taizhong Avenue, Gaoqiao Industrial Park, Wujiashan Economic Development Zone, Wuhan	Manufacturer address: Special NO.1, Taizhong Avenue, Gaoqiao Industrial Park, Wujiashan Economic Development Zone, Wuhan
Classification of test: Commission Test	Quantity of sample: 40 cells
Tested according to: ST/SG/AC.10/11/Rev.6/Section 38.3	Sample identification: c1#~c40#
Receiving date: 2017-02-12	Means of receiving: Submitted by commissioner
Completing date: 2017-03-10	Test item: 7 items
<p>Test conclusion:</p> <p>The Primary Li-SOCl₂ batteries submitted by HCB BATTERY CO., LTD. are 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. The test results comply with the relevant requirements of the standard.</p> <div style="text-align: center; margin-top: 20px;">  <p>Seal of CVC CVC Date of issue: 2017.03.10 检验检测专用章</p> </div>	

Approved by:

Li Guang

Reviewed by:

Zhang Sigao

Tested by:

Wei Guoshua

Description and illustration of the sample:

The sample's status is good

Test item	Sample No.	State	Remark
T.1~T.5	c1#~c10#	in undischarged states	-
	c11#~c20#	in fully discharged states	-
T.6	c21#~c25#	in undischarged states	-
	c26#~c30#	in fully discharged states	-
T.8	c31#~c40#	in fully discharged states	-

Description of the sampling procedure:

/

Description of the deviation from the standard, if any:

/

Remarks:

Throughout this report a comma is used as the decimal separator.

Photos of Samples and Labels

Cell (ER261020M 3,6V 12500mAh 3,6g)



ST/SG/AC.10/11/Rev.6/Section 38.3			
Clause	Requirements	Result	Verdict
38.3.4	Procedure		—
38.3.4.1	Test 1: Altitude simulation1		P
	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)		
38.3.4.1	Requirement 1 Cells and batteries Mass loss limit: ≤ 0,1% 2 Open circuit voltage not less than 90%, The requirement relating to voltage is not applicable to test cells and batteries at full discharged states. 3 No leakage, no venting, no disassembly, no rupture and no fire	The samples c1#~c20# : No leakage, no venting, no disassembly, no rupture and no fire/c1#~c20# The data see	P
	Test 2: Thermal test		
38.3.4.2	Test cells and batteries are to be stored for: 1 one temperature cycle: 72±2°C(6h) —40±2°C(6h) 2 The maximum time interval between test temperature extremes is 30 minutes 3 This procedure is to be repeated 10 times 4 after which all test cells and batteries are to be stored for 24 hours at ambient temperature (20±5°C)		P
	Requirements 1 Cells and batteries Mass loss limit: ≤ 0,1% 2 Open circuit voltage not less than 90%, The requirement relating to voltage is not applicable to test cells and batteries at full discharged states. 3 No leakage, no venting, no disassembly, no rupture and no fire	The samples c1#~c20# : No leakage, no venting, no disassembly, no rupture and no fire c1#~c20# The data see	

ST/SG/AC.10/11/Rev.6/Section 38.3			
Clause	Requirements	Result	Verdict
38.3.4.3	<p>Test 3: Vibration</p> <p>1 Cells and batteries are firmly secured to the platform of the vibration machine</p> <p>2 The vibration :a sinusoidal waveform with a logarithmic sweep between 7 Hz and 200 Hz and back to 7 Hz traversed in 15 minutes</p> <p>3 the logarithmic frequency sweep is as follows: from 7 Hz a peak acceleration of 1 gn is maintained until 18 Hz is reached, The amplitude is then maintained at 0,8 mm (1,6 mm total excursion) and the frequency increased until a peak acceleration of 8 gn occurs (approximately 50Hz), A peak acceleration of 8 gn is then maintained until the frequency is increased to 200 Hz</p> <p>4This cycle repeated 12 times for a total of 3 hours for each of three mutually perpendicular mounting position of the cell. One of the directions of vibration must be perpendicular to the terminal face.</p>		P
	<p>Requirements</p> <p>1 Cells and batteries Mass loss limit: $\leq 0,1\%$</p> <p>2 Open circuit voltage not less than 90%, The requirement relating to voltage is not applicable to test cells and batteries at full discharged states.</p> <p>3 No leakage, no venting, no disassembly, no rupture and no fire</p>	<p>The samples c1#~c20# :</p> <p>No leakage, no venting, no disassembly, no rupture and no fire c1#~c20#</p> <p>The data see</p>	

ST/SG/AC.10/11/Rev.6/Section 38.3			
Clause	Requirements	Result	Verdict
38.3.4.4	<p>Test 4: Shock/Test 4:</p> <p>1 Test cells and batteries shall be secured to the testing machine</p> <p>2 shock: a half-sine shock of peak acceleration of 150 g_n (or Acceleration(g_n)= $\sqrt{\left(\frac{100850}{mass}\right)}$, which is smaller) and pulse duration of 6 milliseconds, large cells and large batteries shall be subjected to a half-sine of peak acceleration of 50 g_n (or Acceleration(g_n)= $\sqrt{\left(\frac{30000}{mass}\right)}$, which is smaller) and pulse duration of 11 milliseconds</p> <p>3 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</p>		P
	<p>Requirements</p> <p>1 Cells and batteries Mass loss limit: ≤ 0,1%</p> <p>2 Open circuit voltage not less than 90%, The requirement relating to voltage is not applicable to test cells and batteries at full discharged states.</p> <p>3 No leakage, no venting, no disassembly, no rupture and no fire</p>	<p>The samples c1#~c20# :</p> <p>Acceleration=150g_n</p> <p>No leakage, no venting, no disassembly, no rupture and no fire</p>	
		<p>The data see</p>	

ST/SG/AC.10/11/Rev.6/Section 38.3			
Clause	Requirements	Result	Verdict
38.3.4.5	Test 5: External Short Circuit		P
	<p>1 The cell or battery to be tested shall be temperature stabilized so that its external case temperature reaches $57\pm 4^{\circ}\text{C}$</p> <p>2 the cell or battery shall be subjected to a short circuit condition with a total external resistance of less than 0,1 ohm at $57\pm 4^{\circ}\text{C}$, This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to $57\pm 4^{\circ}\text{C}$, or in the case of the large batteries, has decreased by half of the maximum temperature increase observed during the test and remains below that value.</p> <p>3 the cell or battery must be observed for a further six hour for the test to be concluded,</p>		
	<p>Requirements During the test and within six hours after test ,the cells or batteries</p> <p>1. External temperature not exceed 170°C 2. No disassembly, no rupture and no fire.</p>	<p>The samples c1#~c20# : no disassembly, no rupture and no fire c1#~c20#</p> <p>The data see</p>	

ST/SG/AC.10/11/Rev.6/Section 38.3			
Clause	Requirements	Result	Verdict
38.3.4.6	Test 6: Impact / Crush		P
	Impact (applicable to cylindrical cells not less than 20mm in diameter) /		P
	1 This test sample cell or component cell is to be placed on a flat smooth surface 2 A 15,8 mm diameter bar is to be placed across the center of the sample, A 9,1kg mass is to be dropped from a height of 61±2,5cm onto the sample. 3 The test sample is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15,8 mm ± 0,1mm diameter curved surface lying across the centre of the test sample. Each sample is to be subjected to only a single impact.		
	Requirements 1 Cells external temperature not exceed 170°C. 2 No disassembly, no fire within six hours of this test	The samples c21#~c30#: no disassembly and no fire c21#~c30# The data see	
Crush (applicable to prismatic, pouch, coin/button cells and cylindrical cells less than 20mm in diameter)		N/A	
1 A cell or component cell is to be crushed between two flat surfaces. The crushing is to be gradual with a speed of approximately 1,5 cm/s at the first point of contact. The crushing is to be continued until the first of the three options below is reached. (a) The applied force reaches 13 kN ± 0,78 kN. (b) The voltage of the cell drops by at least 100 mV, (c) The cell is deformed by 50% or more of its original thickness. 2. A prismatic or pouch cell shall be crushed by applying the force to the widest side. A button/coin cell shall be crushed by applying the force on its flat surfaces. For cylindrical cells, the crush force shall be applied perpendicular to the longitudinal axis.			
Requirements 1 Cells external temperature not exceed 170°C. 2 No disassembly, no fire within six hours of this test	-		

ST/SG/AC.10/11/Rev.6/Section 38.3			
Clause	Requirements	Result	Verdict
38.3.4.7	Test 7: Overcharge		N/A
	1 The charge current shall be twice the manufacturer's recommended maximum continuous charge current		
	a) 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 battery or 22V b) When the manufacturer's recommended charge voltage is more than 18V, the minimum voltage of the test shall be 1,2 times the maximum charge voltage		
	3 Tests are to be conducted at ambient temperature 20 ±5°C, The duration of the test shall be 24 hours		
	Requirements No disassembly and no fire within seven days of this test	—	
38.3.4.8	Test 8: Forced discharge		P
	Each cell shall be forced discharged at ambient temperature by connecting it in series with a 12 V D.C. power supply at an initial current equal to the maximum discharge current specified by 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)		
	Requirements No disassembly and no fire within seven days of this test	The samples c31#~c40#: For voltage data before test, see table 3. No disassembly and no fire	

Table1: T1~T5 / 表 1. 试验 1~试验 5											
Sample No.	Mass prior to test (g)	OCV prior to test (V)	Test 1: Altitude simulation		Test 2: Thermal test		Test 3: Vibration		Test 4: Shock/		Test 5: External Short Circuit
			Mass loss(%)	Change ratio	Mass loss(%)	Change ratio	Mass loss(%)	Change ratio	Mass loss(%)	Change ratio	Temp. (°C)
c1#	102,817	3,671	0,001	100,00	0,012	100,00	0,000	100,00	0,000	100,00	61,3
c2#	102,629	3,671	0,003	100,00	0,010	100,00	0,000	100,00	0,000	100,00	64,0
c3#	102,615	3,670	0,001	100,00	0,011	100,00	0,000	100,00	0,000	100,00	62,1
c4#	103,629	3,671	0,002	100,00	0,009	100,00	0,000	100,00	0,000	100,00	63,8
c5#	102,722	3,671	0,001	100,00	0,015	100,00	0,000	100,00	0,000	100,00	62,1
c6#	102,701	3,672	0,002	100,00	0,008	100,00	0,000	100,00	0,000	100,00	61,9
c7#	102,624	3,670	0,002	100,00	0,013	100,00	0,000	100,00	0,000	100,00	62,4
c8#	102,503	3,670	0,001	100,00	0,009	100,00	0,000	100,00	0,000	100,00	61,4
c9#	102,669	3,671	0,003	100,00	0,013	100,00	0,000	100,00	0,000	100,00	62,5
c10#	102,673	3,671	0,002	100,00	0,009	100,00	0,000	100,00	0,000	100,00	61,9
c11#	102,720	-	0,002	-	0,010	-	0,000	-	0,000	-	57,1
c12#	102,641	-	0,002	-	0,007	-	0,000	-	0,000	-	58,4
c13#	102,701	-	0,003	-	0,008	-	0,000	-	0,000	-	57,2
c14#	102,694	-	0,003	-	0,010	-	0,000	-	0,000	-	58,1
c15#	102,916	-	0,001	-	0,011	-	0,000	-	0,000	-	57,3
c16#	103,027	-	0,002	-	0,009	-	0,000	-	0,000	-	57,8
c17#	103,654	-	0,003	-	0,007	-	0,000	-	0,000	-	57,1
c18#	102,763	-	0,003	-	0,008	-	0,000	-	0,000	-	58,4
c19#	102,712	-	0,001	-	0,014	-	0,000	-	0,000	-	58,6
c20#	102,659	-	0,001	-	0,006	-	0,000	-	0,000	-	58,1

Table2: Impact											
Test 6: Impact / 	Sample No.	c21#	c22#	c23#	c24#	c25#	c26#	c27#	c28#	c29#	c30#
	OCV prior to test /	3,668	3,672	3,670	3,672	3,672	3,649	3,604	3,282	3,668	3,523
	Temp. (°C)	24,1	23,8	23,8	24,9	23,4	23,1	23,4	23,8	23,5	23,4

Table 3: Forced discharge											
Test 8: Forced discharge /	Sample No.	c31#	c32#	c33#	c34#	c35#	c36#	c37#	c38#	c39#	c40#
	OCV prior to test	3,421	3,402	3,283	3,411	3,298	3,304	3,601	3,522	3,428	3,509

Important

1. The test report is invalid without the official stamp of CVC and Paging seal of CVC.
2. Nobody is allowed to photocopy or partly photocopy this test report without written permission of CVC.
3. The test report is invalid without the signatures of Ratifier, Reviewer and Testing engineer.
4. The test report is invalid if altered,
5. Objections to the test report must be submitted to CVC within 15 days,
6. The test report is valid for the tested samples only.
7. As for the Verdict, “-” means “no need for judgement”, “P” means “pass” , “F” means “fail” and “N/A” means “not applicable”.

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