FirstPower®

TEST REPORT

No. YDTEST180906 Date: 6th. Sep. 2018 Page: 1 of 5

Battery Model : CFPV2200(OPzV, 2V, 200Ah)
Sample Q'ty : 1pcs
Test item : Endurance in cycles
Applicable Standard : Refer to IEC 60254-1-2005

Test Method :

1 Capacity test

1.1 To facilitate the temperature readings, one pilot cell is selected per group of six cells, the average of the pilot cells being considered as representative of the average temperature of the battery.

The temperature of each of pilot cell shall be read immediately prior to the discharge. The individual readings shall be between 15 and 40℃ . The average initial cell temperature t0 is calculated as the arithmetic mean of the individual values.

1.2 The battery shall be completely charged in accordance with 4.3.

1.3 Within 1h to 24h after the end of charging ,the battery shall be subjected to a discharge at the current IN (see 3.1.2) This current shall be maintained constant within ±1% throughout the whole discharge time.

1.4 The voltage across the terminals of the battery (excluding battery output cables),shall be either recorded automatically against time, or noted at suitable time intervals using a voltmeter(see 4.1.1.2)

1.5 The discharge is discontinued when the average voltage has reached the value of 1.7V per cell. The discharge time shall be noted.

1.6 The uncorrected capacity C (Ah) at the initial temperature t0 is calculated as the product of the discharge current (in amperes) and the discharge time(in hours).

1.7 If the initial temperature t0 (see 1.2.1) is different from the reference temperature (30℃).the capacity C. in accordance with 5.2.6, shall be corrected to the actual capacity Ca by the equation:

Ca= (Ah)

Where T0 is the initial temperature;

tr is the reference temperature(30℃) =0.006(℃)-1 for the 5h capacity.

1.8 A new battery, submitted to the rated capacity test, when subjected to repeated CN discharge/charge cycles according to 5.2.2 to 5.2.6 shall supply at least

Ca=0.85 CN at the first cycle;

Ca=1.00 CN at or before the tenth cycle.

2 Cyclic endurance test

2.1 the test shall be carried out on cell samples as specified in 5.1

2.2 After undergoing the actual capacity test of 5.2 and having shown a capacity Ca at least equal to the nominal capacity CN, the cells shall be recharged as specified in 4.3.

2.3 The cells/monoblocs shall the be connected to a device where they shall undergo a continuous series of cycles throughout the test, each cycle comprising the following:

2.3.1 Valve regulated cells

- discharge at a current of I(A) = 0.3CA (A) to 1.80v.

FirstPower®

TEST REPORT

Test Method :

- recharge for a maximum of 16-20h immediately following the discharge, at a constant voltage not exceeding 2.35V per cell. (charge time: 16h for first 139 cycles, and 20h for later cycles)

2.3.2 Throughout the whole of either test 2.3.1, the temperature of the cells shall be maintained between 15℃ and 35 ℃ .

2.4 After each series of 25 cycles ±1 cycles, the cells/monoblocs shall undergo a capacity test as specified in 2.2.

The test shall be considered as terminated when the corrected capacity Ca resulting from this test is less than 0.8 CN during two successive series of 50 cycles ±5 cycles each.

2.5 The endurance in cycles is the number of cycles completed up to the end of the first of the two final series. This number shall be at least equal to the number stated by the manufacture.

Technical Requirement :

This represents the ability of a battery to perform repeated discharge/recharge cycles. This performance shall be tested by a series of cycles under specified conditions with 100 % DOD at I= 1.0 × I5 after which the actual capacity of the battery shall be not less than 80 % of the nominal capacity in ampere-hours (see 6.4). The number of cycles shall be not less than 1600.

Test Data

Cycle	Discharge time	Discharge current	Temperature	Capacity Ah@25
1	2h 50' 26"	60A	24℃	171.4
25	2h 05' 38"	60A	15℃	135.9
50	2h 30' 06"	60A	19℃	157.6
75	2h 29' 30"	60A	19℃	157
100	2h 32' 31"	60A	22℃	156.3
125	2h 32' 40"	60A	23℃	155.2
150	2h 46' 17"	60A	29℃	161.1
175	2h 51' 45"	60A	30℃	165.1
200	2h 42' 42"	60A	31℃	155.2
10hrs	11h 03' 59"	20A	30℃	214.9
225	2h 44' 38"	60A	32℃	155.9
250	2h 40' 33"	60A	29.5℃	154.9
275	2h 36' 43"	60A	25℃	156.7
300	2h 20' 20"	60A	19℃	147.1
10hrs ①	9h 17' 32"	20A	19℃	192.8
10hrs ②	10h 11' 25"	20A	20℃	212.6
325	2h 23' 33"	60A	17℃	153.3
350	2h 26' 48"	60A	19℃	154.2

FirstPower®

TEST REPORT

No. YDTEST180906 Date: 6th. Sep. 2018

Test Data

Cycle	Discharge time	Discharge current	Temperature	Capacity Ah@25
375	2h 32' 28"	60A	20.8℃	157.7
400	2h 27' 27"	60A	19℃	154.9
10hrs	9h 52' 07"	20A	19℃	204.7
425	2h 23' 37"	60A	26℃	142.5
450	2h 23' 38"	60A	30.3℃	137.8
475	2h 23' 39"	60A	31℃	137
500	2h 23' 40"	60A	29.3℃	138.9
10hrs	10h 23' 25"	20A	28.5℃	203.5
525	2h 44' 00"	60A	29.5℃	158.3
550	2h 38' 58"	60A	28℃	155.2
575	2h 37' 57"	60A	26℃	156.6
600	2h 26' 17"	60A	21.6℃	150.4
10hrs	9h 53' 34"	20A	22℃	201.5
625	2h 28' 35"	60A	19.8℃	155.1
650	2h 18' 36"	60A	14.8℃	150.9
675	2h 38' 30"	60A	23℃	161.1
700	2h 35' 37"	60A	24℃	156.9
10hrs	10h 16' 49"	20A	24.5℃	206.4
725	2h 44' 22"	60A	26℃	163.1
750	2h 47' 36"	60A	29.7℃	161.5
775	2h 47' 54"	60A	31.2℃	160
800	2h 47' 35"	60A	29.8℃	161.4
10hrs	10h 04' 01"	20A	32℃	193.2
825	2h 40' 37"	60A	30℃	154.4
850	2h 43' 40"	60A	28℃	159.9
875	2h 42' 05"	60A	28.7℃	157.4
900	2h 41' 04"	60A	27.1℃	158.3
925	2h 25' 25"	60A	17.5℃	154.7
950	2h 25' 01"	60A	21℃	149.8
975	2h 20' 25"	60A	16℃	151.3
1000	2h 35' 28"	60A	23℃	158
10hrs	10h 26' 30"	20A	24℃	210.1

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FirstPower®

TEST REPORT

Test Data

Cycle	Discharge time	Discharge current	Temperature	Capacity Ah@25
1025	2h 42' 21"	60A	27.5℃	159.2
1050	2h 42' 53"	60A	27.2℃	160.1
1075	2h 43' 25"	60A	27.8℃	159.8
1100	2h 44' 41"	60A	28.5℃	160.2
1125	2h 43' 16"	60A	30.5℃	156.4
1150	2h 41' 53"	60A	29.5℃	156.3
1175	2h 39' 31"	60A	30℃	153.4
1200	2h 36' 18"	60A	24℃	157.6
10hrs	10h 32' 54"	20A	24℃	212.2
1225	2h 23' 47"	60A	20.3℃	149.4
1250	1h 58' 01"	60A	14.3℃	129
1275	2h 09' 40"	60A	16.5℃	139.2
1300	2h 28' 49"	60A	23℃	151.2
10hrs	10h 16' 41"	20A	23℃	208.1
1325	2h 28' 51"	60A	23.5℃	150.7
1350	2h 32' 42"	60A	28.5℃	148.5
1375	2h 27' 26"	60A	29℃	142.8
1400	2h 19' 57"	60A	29.1℃	135.6
10hrs	10h 39' 30"	20A	31℃	203.4
1425	2h 16' 54"	60A	29℃	132.7
1446	2h 12' 05"	60A	27.5℃	129.5
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--- **About testing date:**

--- Started time: 16th. Nov. 2013

--- Report time: 6th. Sep. 2018

--- The testing is in proceeding

FirstPower®

TEST REPORT

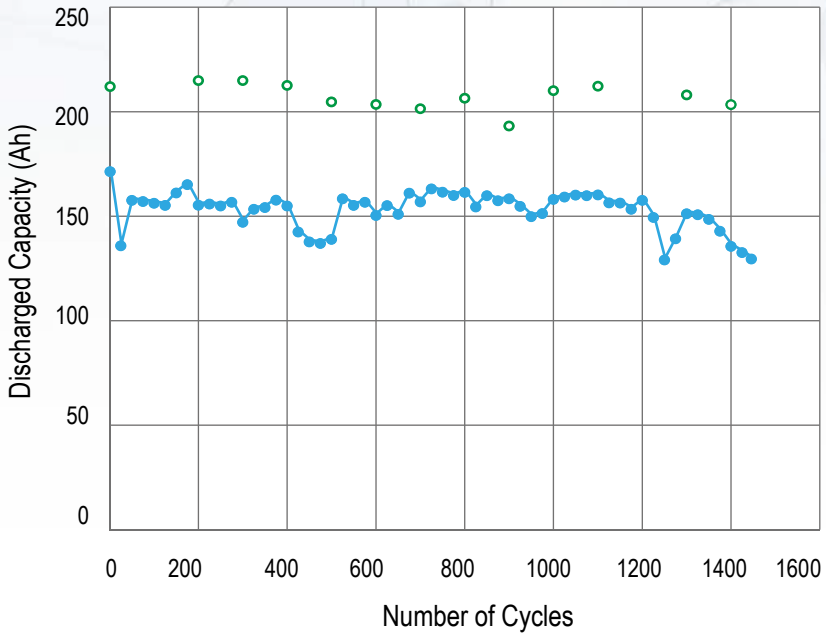
No. YDTEST180906 Date: 6th. Sep. 2018

CFPV2200(OPzV, 2V, 200Ah)

Actual Capacity
at 20A, 1.80V

Discharged Capacity
at 60A, 1.80V

Curves of Cycles



Tested by: LHZ

Checked by: CYH

Date: 2018/9/6