Ni-MH Rechargeable Battery

4xAAA 800mAh(H) 4.8V

Specification

1 APPLICATIONS

The specification applies to the following sealed Ni-MH rechargeable battery made by SUNRISE.

TYPE:4*AAA800mAh(H)

2 WORKING THEORY

The negative of Sunrise Nickel-Cadmium cylindrical battery is metal of Cadmium, the positive is NiOOH, The electrolyte is NaOH of high purity. The electrochemical process are represented by the following reactions:

$$NiOOH+H_2O+e \rightarrow Ni(OH)_2+OH^-$$

$$MH+OH^- - e \rightarrow M+H_2O$$

$$MH+NiOOH \rightarrow M+Ni(OH)_2$$

During discharge, NiOOH of negative is oxidized to Ni(OH)2, The free electrons flow into the positive through the external circuit , NiOOH of positive receive the electrons and be deoxidized to Ni(OH) 2. Charge process is just the opposition of discharge.

3 EXTERNAL DIMENSION/WEIGHT(SINGEL)

3.1 Dimensions:1 $10.5^{\pm0.2}\times43.5^{\pm0.5}$(mm)
3.2 Gross weight: 13.80(g)

4 ELECTRICAL PERFORMANCE

4.1 Nominal voltage： 4.8 V 。

4 .2 Test requirements

The following conditions are for new batteries(within one month after delivery)

Environmental Temperature: + 15 ~ + 25℃; Relative humidity: 45% ~ 85%.

4.3Available capacity

Available capacity is not a stable value, it changes depending on discharge rate, temperature and end voltage. Sunrise battery is charged at $0.1C_5A$ for 16hrs under test conditions, and discharge up to an end of discharge voltage of 1.0V/cell at $0.2C_5A$, then the available capacity of the battery is 100%-105% of the rated capacity.

4.4 Charging conditions

Before it is charged, the battery should be discharged at 0.2C5A to an end of voltage of 1.0V/cell under test conditions.

The following conditions are charge conditions:

4.4.1 Standard charge : $0.1C_5A$ charge current for 16h

4.4.2 Normal charge : $0.2C_5A$ charge current for 7. 5h

4.4.3 Trickle charge : $0.03C_5A \sim 0.05C_5A$ permanent charge

4.5 Charging control

When battery is charged, cutting off the charging current depending on one of the following factors:

-ΔV: 15mV/cell

Duration: Input 120%-130% of rated capacity

4.6 Operate temperature range:(Max relative humidity:85%)

Standard charge : -10 ~ + 50℃

Quick charge : 0 ~ + 55℃

Trickle charge : 0 ~ + 50℃

Discharge : 0 ~ + 65℃

4.7 Storage temperature range (Max relative humidity:85%)

Within six months: -20 ~ + 45℃

Within two years: -20 ~ + 35℃

Within a month: -20 ~ + 55℃

Within a week: -20 ~ + 65℃

4.8 Discharge performance

The capacity of the battery shall be not less than 90% of nominal capacity after charged at 0.1C5A for 16h at 20±5℃, rest for16h to 24h at 0℃±2℃,then discharged at 0.2C5A to 1.0V/cell at 0℃±2℃.

4.9 Test method & performance

Test	Unit	Specification	Conditions	remarks
Shipment Voltage	V /c el l	≥0.8		AQLⅡ=0.65%
Open Circuit Voltage (OCV)	V /c el l	≥ 1 .2 5	After 1 hour standard cha rge	
Internal impedance	mΩ /c ell	≤17	Charge at 0.1C $_5$A for 16hrs, Rest for 1h, and measure the impedance with LCR instrument (AC 1KHz)	
Discharge	minute	≥4 00	Charge at 0.1C $_5$A for	End Voltage

(0.2C $_5$ A)			16hrs, And rest for 1 h , then discharge at 0.2C $_5$ A	is 1.0V/cell
Discharge (1C $_5$ A)	minute	≥54	Charge at 0.1C $_5$A for 16hrs,And rest for 1 h , then discharge at 1.0C $_5$A	End Voltage is 0.9V/cell
Overcharge	minute	≥255	0.05C $_5$ A charge for 28 days, then discharge at 0.2C $_5$ A	End Voltage is 1.0V/cell
Over discharge		No leakage and no deformation	Discharged for 24hrs with an load resistor	Load(Ω)=1.2V ×n/2C $_5$ A
Reverse charge		No burst	Reverse charge at 1.0C $_5$ A for 1hrs	Prior to test, cell shall be fully discharged
Safety valve performance		No disrupt, no burst, but leakage and deformation are allowed.	Charge at 1.0C5A for 1.5hrs and discharge at 0.2C5A to 0V, then discharge at 1.0C$_5$A for 60min	
Charge retention	mAh	≥65%	Standard charge; Storage of 28 days; Standard discharge	Ambient Tempera tu re: 20±2℃
Cycle life	Cycle	≥500	IEC61951-1(7.4.1. 1)	Refer .to Note
Leakage		No leakage or deformation	Fully charge at 40mA(0.1C $_5$ A), then storage of 14 days	

Note: Cycle life { IEC61951-1(7.4.1. 1)}:

Cycle number	Charge	Stand in charged condition	Discharge

1 2-4 8 49 50	0.10I_tA for 16h 0.25I_tA for 3h 10 min 0.25I_tA for 3h 10 min 0.10I_tA for 16h	none none none 1h to 4h	0.25I_tA for2h 20min [a] 0.25I_tA for2h 20min [a] 0.25I_tA to1.0V 0.20I_tA to1.0V [b]
a) If the cell voltage drops below 1.0V,discharge may be discontinued. b) It is permissible to allow sufficient open-circuit rest time after the completion of discharge at cycle 50,so as to start cycle 51 at a convenient time .A similar procedure may be adopted at cycles 100,150 and 200.			

Cycles 1 to 50 shall be repeated until the discharge duration on any 50th cycle become less than 3h. At this stage, a repeat capacity measurement as specified for cycle 50 shall be carried out.

The endurance test is considered complete when two such successive capacity cycles give a discharge duration of less than 3h,The total number of cycles obtained when the test is completed shall be not less than 50.

4.10 Storage

After a open-circuit storage of 12 months, the battery can be charged and discharged at 0.2C_5 A ~ 0.5C_5 A immediately. It shall not cause damage to its performances.

4 .11 Vibration

The battery shall not cause damage to its performances when tested with the amplitude at 4 mm (0.158 inch) and the frequency at 1000Hz.

4.12 Drop test

The battery shall not cause damage to its performances when dropped to the wooden board at a height of 450mm(17.716 inch).

5 SUGGESTION & ADVICE

5.1 Do not reverse charge batteries.

5.2 Do not incinerate or mutilate batteries, may burst or release toxic material.

5.3 Do not solder directly to cells or batteries.

5.4 Do not mix new batteries in use with semi-used batteries, over-discharge may occur.

5.5 If find any noise, excessive temperature or leakage from a battery, please stop its use.

5.6 When find battery power down during use, please switch off the device to avoid over-discharge.

5.7 When not using a battery, disconnect it from the device.

5.8 Never put a battery into water or seawater.

5.9 Do not attempt to take batteries apart or subject them to pressure or impact. Heat

may be generated or fire may result. The alkaline electrolyte is harmful to eyes and skin. And it may damage clothing upon contact.

5.10 Keep away from children. If swallowed, contact a physician at once.

5.11 The end-voltage are recommended at 1.0±0.1V/cell so as not to cause memory effect.

5.12 The battery may go fail when shorted if over-charged or charged with an incorrect way.

5.13 Store batteries in a cool dry place.

5.14 Use the correct charger for Ni-Cd or Ni-MH batteries.

5.15 If necessary, please contact Sunrise for detailed information.