



Product Specification

Product Model: Nickel-Cadmium Battery

Product Type: D4000H

Draw up : Technical Department

Date : 28/04/2014



Document Title : Product Specification of Ni-Cd D4000H

Revision : 4.4

1、SCOPE

This specification governs the performance of the following extracell Nickel-Cadmium cylindrical cell and its stack-up battery.

extracell Model : D4000H

Cell Size : Dcrew cut(32.1±0.1×59.0±0.5) mm

Dcusp(32.1±0.1×60.5±0.5) mm

2、DATA OF STACK UP BATTERIES

All data involve voltage and weight of stack-up batteries are equal to the value of unit cell multiplied by the number of unit cell which consisted in the stack-up batteries.

Example : Stack-up batteries consisting three unit cells

Nominal voltage of unit cell=1.2V

Nominal voltage of stack-up batteries =1.2V×3=3.6V

3、RATINGS

Description	Unit	Specification	Condition
Nominal Voltage	V/cell	1,2	Unit cell or stack-up batteries
Nominal Capacity	mAh	4000	Standard Charge/Discharge
Standard Charge	mA	400 (0.1C)	T _a =20±5°C
	hour	14~16	
Trickle Charge	mA	(0.03C)~(0.05C)	T _a =20±5°C
Standard discharge	mA	800 (0.2C)	T _a = 20±5°C Humidity : Max85%
Discharge Cut-off Voltage	V/cell	1,0	
Storage Temperature	°C	-25~30(Within 1 year)*	Discharged state Humidity : Max85%
		-25~40(Within 6 months)	
		-25~50(Within 1 month)	
		-25~60(Within 1 week)	
Typical Weight	Gram	120	unit cell

*To keep the best performance for those not used for a long time,we recommend to charge and discharge the cells/batteries at least once in every 6 months.

4、PERFORMANCE

Unless otherwise stated, tests should be done within one month of delivery under the following conditions :



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Ambient Temperature : $20 \pm 5^{\circ}\text{C}$

Relative Humidity : $65 \pm 20\%$

Notes : Standard Charge/Discharge conditions :

Charge : 400 mA(0.1C) \times 14 hours

Discharge 800 mA(0.2C) to 1.0V/cell

Test	Unit	Specification	Condition				Remarks
Capacity	mAh	≥ 4000	Standard Charge/Discharge				up to 3 cycles are allowed
Open Circuit Voltage(OCV)	V	$\geq 1,25$	Within 1 hour after standard charge				
Internal Impedance	m Ω	≤ 9	Upon fully charged(1KHz)				
High Rate Discharge(1C)	min	≥ 48	Standard Charge, 1 hour rest before discharge by 1C to 1.0V/cell				up to 3 cycles are allowed
Charge Retention	mAh	≥ 2600	Standard Charge, Storage 28days , Standard Discharge				$T_a = 20^{\circ}\text{C} \pm 5^{\circ}\text{C}$
Permanent Charge	min	$T1, T2 \geq 225$	IEC61951-1(2003)7.4.2.3				See Table 1
	min	$T3, T4 \geq 150$					
Charge acceptance			Cycle	Charge	Rest	Discharge	See Note 1
			1	0.05C \times 48h	None	0.2C to 1.0V/cell	
	min	≥ 225	2	0.05C \times 24h	None	0.2C to 1.0V/cell	
	min	≥ 225	3	0.05C \times 24h	None	0.2C to 1.0V/cell	
IEC Cycle Life	Cycle	≥ 500	IEC61951-1(2003)7.4.1.1				See Table 2
Leakage		No leakage nor deformation	Fully charged at : 200 mA for 28 days at $0 \pm 2^{\circ}\text{C}$.				
Vibration Resistance	N/A	Change of voltage should be less than 0.02V/cell, change of impedance should be less than 5milliohm/cell	Charge the battery at 0.1C for 14hrs, then leave for 24hrs, check battery before/after vibration, amplitude 1.5mm, vibration 3000 CPM, any direction for 60mins.				
Impact Resistance	N/A	Change of voltage should be less than 0.02V/cell, change of impedance should be less than 5milliohm/cell	Charge the battery at 0.1C for 14hrs, then leave for 24hrs, check battery before/after dropped, height 50 cm wooden board(thickness 30mm) direction not specified, 3 times.				

5. CONFIGURATION, DIMENSIONS AND MARKINGS

Please refer to the attached drawing.



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6. EXTERNAL APPEARANCE

The cell/battery shall be free from cracks, scars, breakage, rust, discoloration, leakage or deformation.

7. WARRANTY

One year limited warranty against workmanship and material defects.

8. CAUTION

- [1] Reverse charging is not acceptable.
- [2] Charge before use. The cells/batteries are delivered in an uncharged state.
- [3] Do not charge/discharge with more than our specified current.
- [4] Do not short circuit the cell/battery permanent damage to the cells/batteries may result.
- [5] Do not incinerate or mutilate the cells/batteries.
- [6] Do not solder directly to the cells/batteries.
- [7] The expected life may be reduced if the cells/batteries are subjected to adverse conditions as:
extreme temperature, deep cycling, excessive overcharge/ over-discharge.
- [8] Store the cells/batteries in a cool dry place. Always discharge batteries before packing.

Table 1: IEC61951-1(2003)7.4.2.3 Permanent Charge Endurance Test:

Cycle Number	Ambient temperature	Charge	Rest	Discharge	Discharge capacity
1	+40°C±2°C	0.05C×48h	None	0.2C to 1.0V/cell	
2		0.05C×24h	None	0.2C to 1.0V/cell	T1
3		0.05C×24h	None	0.2C to 1.0V/cell	T2
4	+70°C±2°C	0.05C×60d	None	0.2C to 1.0V/cell	
5		0.05C×60d	None	0.2C to 1.0V/cell	
6		0.05C×60d	None	0.2C to 1.0V/cell	
7	+40°C±2°C	0.05C×48h	None	0.2C to 1.0V/cell	
8		0.05C×24h	None	0.2C to 1.0V/cell	T3
9		0.05C×24h	None	0.2C to 1.0V/cell	T4

Table 2: IEC61951-1(2003)7.4.1.1 Cycle Life:

Cycle No.	Charge	Rest	Discharge
1	0.1C×16h	None	0.25C×2h20min
2-48	0.25C×3h10min	None	0.25C×2h20min
49	0.25C×3h10min	None	0.25C to 1.0V/cell
50	0.1C×16h	1-4h	0.2C to 1.0V/cell
Cycle 1 to 50 shall be repeated until the discharge duration on any 50th cycle becomes less than 3 h.			

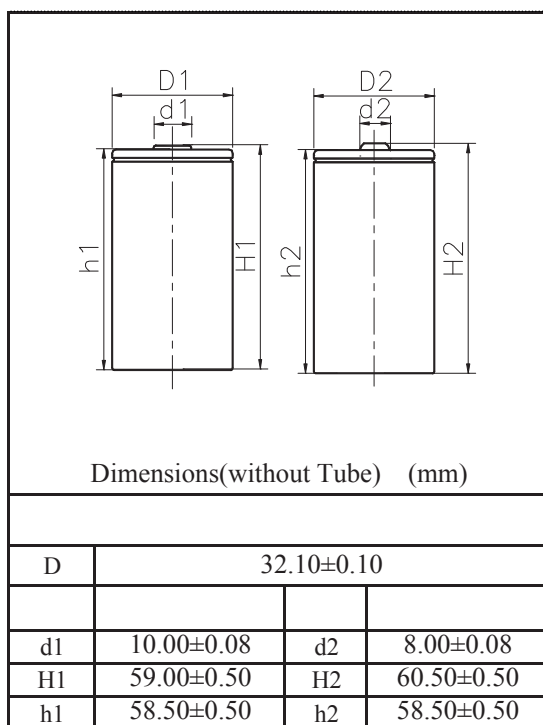
Notes: (1) Before test, the cell shall be discharged at 0.2C to 1.0V/cell, and stored 16h ~ 24h at 55°C±2°C.

(2) T_a: Ambient Temperature.

EXTRACELL[®]-e

MODEL No: D4000H

Description: 4000 mAh SIZE Ni-Cd D



Specification

Nominal Capacity			4000 mAh
Nominal Voltage			1,2 V
Charge current		Trickle	200 mA
		Standard	400 mA
Charge time		Trickle	48 Hrs~
		Standard	14~16 Hrs
Ambient Temperature	Charge	Trickle	-25°C~70°C
		Standard	-25°C~70°C
	Discharge		-25°C~70°C
			*-40°C~70°C
	Storage		-25°C~60°C
			** -40°C~60°C
Internal Impedance(mΩ) (After Charge)			≤ 9
Weight			120 g

* IT'S POSSIBLE TO DISCHARGE AT -40°C ONLY IF THE BATTERY IS ALREADY CHARGED

** IT'S POSSIBLE TO STORAGE AT -40°C ONLY IF THE BATTERY IS ALREADY CHARGED

