



Specification Approval Sheet

Name : Ni-CD Battery

Model : D5000

SPEC : 1.2V 5000mAh

Approved By	Checkup	Make
		Ver: 1.0

Customer Confirmation	Signature	Date
		2009-08-14
	Company Name :	
	Stamp :	

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1. APPLICATION

This specification governs the performance of the following TENERGY Nickel-Cadmium Cylindrical stack-up battery.

Model: KD-D5000

Cell Size: D

Flat top: ($\phi 32.3^{+0.5} \times 59.2^{+0.5}$)

Consumer top: ($\phi 32.3^{+0.5} \times 60.8^{+0.5}$)

2. DATA OF STACK UP BATTERIES

All data involves voltage and weight to stack-up battery are equal to the value of unit cell times the number of unit cell which consisted in the stack-up batteries.

Example:

Stack-up battery consisting three unit cells

Nominal voltage of unit cell=1.2V

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

3. RATINGS

Description	Unit	Specification	Conditions
Nominal Voltage	V/ Cell	1.2	
Nominal Capacity	mAh	5000	
Standard Charge	mA	500(0.1C)	Ambient Temperature: $T_a = 0 \sim 45^\circ\text{C}$ (see Note 1)
	Hour	16	
Quick Charge	mA	2000(0.4C)	Ambient Temperature: $T_a = 10 \sim 40^\circ\text{C} - \Delta V = 10\text{mV}$
	hour	3.5	
Fast Charge	mA	2500(0.5C)	
	hour	2.5	
Trickle Charge		(0.03C)~(0.05C)	$T_a = 0 \sim 45^\circ\text{C}$
Standard discharge	mA	1000(0.2C)	Ambient Temperature: $T_a = -20 \sim 65^\circ\text{C}$ Humidity: Max : 85%
Discharge Cut-off Voltage	V/ Cell	1.0	
Storage Temperature	$^\circ\text{C}$	-20~20 $^\circ\text{C}$ /Within 1year	Discharged state. Humidity. Max.60%
		-20~30 $^\circ\text{C}$ /Within 6 months	Discharged state. Humidity. Max.80% (see Note3)
		-20~40 $^\circ\text{C}$ /Within 3 months	



4. PERFORMANCE

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

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

Relative Humidity: $65 \pm 20\%$

Test	Unit	Specification	Other Condition	Remarks
Capacity	mAh	≥ 4800	Standard Charge Discharge	up to 3 cycles are allowed
Open Circuit Voltage(OCV)	V/Cell	≥ 1.25	Within 1 hour after standard Charge	
Internal Impedance	m Ω / Cell	≤ 10	Upon fully charge(1KHz)	
High Rate Discharge(1C)	minute	≥ 51	Fast Charge, 0.5 hour rest Before Discharge by 1C to 1.0 V/cell	up to 3 cycles are allowed
Overcharge		No leakage nor deformation	0.1C Charge 28 days	
Charge Retention	mAh	≥ 3250 (65%)	Standard Charge, Storage: 28 days, Standard Discharge	
IEC Cycle Life/	Cycle	≥ 500	IEC61951-1(2001)4.4.1	(see Note4)
Leakage Test		No leakage nor deformation	Fully charged at 0.4C for 3.5 hour stand for 14 days	
Vibration Resistance		Change of voltage should be under 0.02V/cell, Change of impedance should be under 5 milli-ohm/cell	Charge the battery 0.1C 16hrs, then leave for 24hrs, check Battery before/after vibration, amplitude 1.5mm Vibration 3000 CPM. Any direction for 60mins.	Ambient Temperature: $T_a = 20 \pm 5^{\circ}\text{C}$
Impact Resistance		Change of voltage should be under 0.02V/ Cell Change of impedance should be under 5 m Ω .	Charge the cell 0.1C 16hrs. Then leave for 1-4hrs, check battery before/after dropped, height 50cm Wooden board (thickness 30 mm) Direction not specified, 3 times.	Ambient Temperature : $T_a = 20 \pm 5^{\circ}\text{C}$
Security Test		No break nor blast, but allow leakage or deformation	Discharge the cell 0.2C to 0V, then advance current to 1 C. Discharge the cell 1C 30minutes.	Ambient temperature: $T = 20 \pm 5^{\circ}\text{C}$

5. CONFIGURATION, DIMENSIONS AND PACKINGS

Please refer to the attached drawing.

**6. EXTERNAL APPEARANCE**

The cell/battery shall be free from cracks, scars, breakage, rust, discoloration, leakage nor deformation.

7. FOR EACH PRODUCTION LOT

For each cell part number of 100% inspection, report the reject rate, in a format such as that shown in Appendix A, as a result of each aspect of the following tests:

-OCV

-Appearance

-Capacity variation within 10% of average for cells

Remarks: Batteries are classified according to 5% of rated capacity, cartoning and packing separately according to different grades.

Appendix A

Test Item		The number of failed battery		
Model	Inspection number	OCV	Appearance	Capacity variation in excess of 10% of average for cells

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 cell/battery may result.

(5)Do not incinerate or mutilate the cell/battery.

(6)Do not solder directly to the cell/battery.

(7)The life expectancy may be reduced if the cell/battery is subjected adverse conditions like: extreme temperature, deep cycling, excessive overcharge/ over-discharge.

(8)Store the cell/battery uncharged in a cool dry place. Always discharge batteries before bulk storage or shipment.

Notes:

(1) T_a : Ambient Temperature.

(2) Approximate charge time from discharged state is for reference only.

(3) IEC61951-1(2003)7.4.1.1 Cycle Life:

Cycle No.	Charge	Rest	Discharge
1	$0.1C \times 16h$	None	$0.25C \times 2h20min$
2-48	$0.25C \times 3h10min$	None	$0.25C \times 2h20min$



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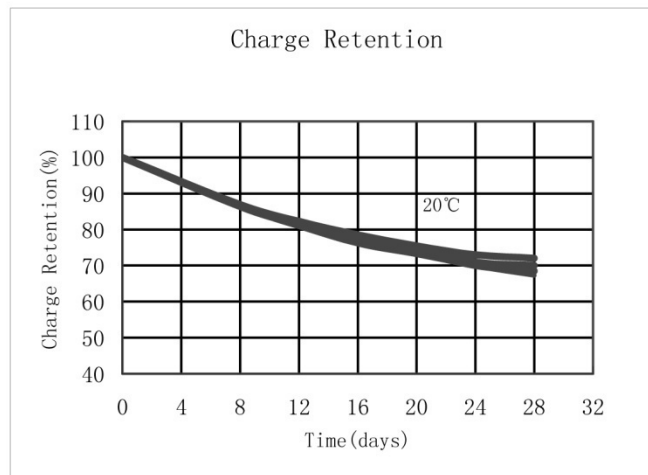
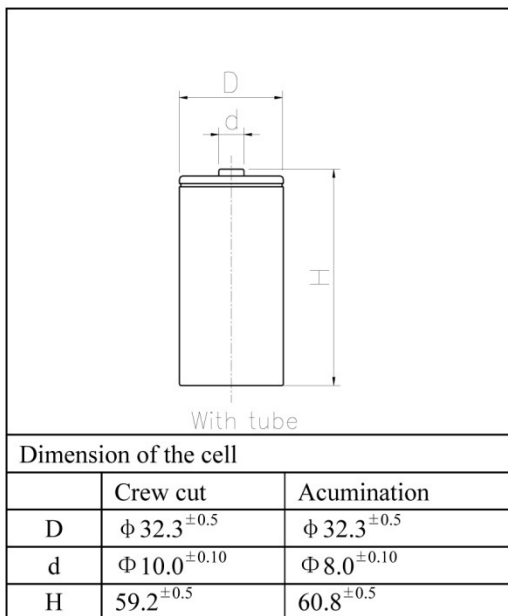
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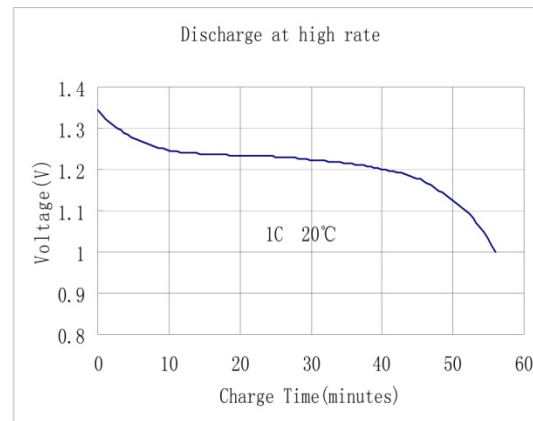
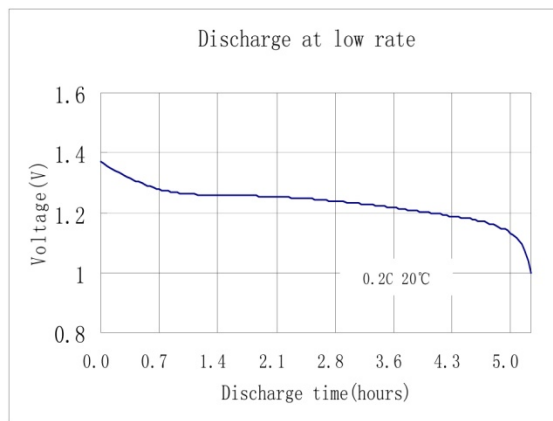
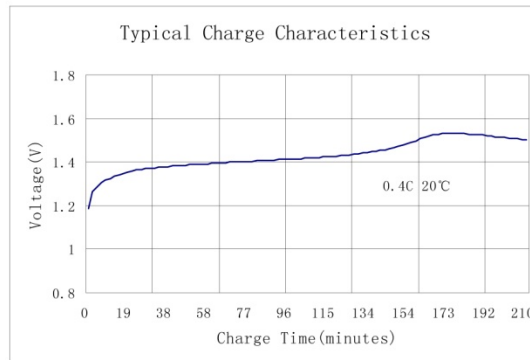
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49	$0.25C \times 3h10min$	None	0.25C to 1.0V
50	$0.1C \times 16h$	1-4h	0.2C to 1.0V
Cycles 1 to 50 shall be repeated until the discharge duration on any 50th Cycle becomes less than 3 h.			





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