

TYSONIC BATTERIES

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1. SCOPE

This specification governs the performance of the following cylindrical cell and its stack-up batteries:

Model No. NI-CD TY-5/4SC2300mAh

This data involving nominal voltage and the approximate weight of stack-up batteries shall be equal to the value of the unit cell multiplied by the number of unit cell in the battery. For example, a stack up battery consists of five unit cell:

Nominal Voltage of unit cell=1.2V

Thus, nominal voltage of stack up battery=1.2*5=6.0V

2. RATING

Description	Unit	Specification	Conditions
Nominal Voltage	V	<u>1.2</u>	Unit Cell
Nominal Capacity	mAh	<u>2300</u>	Standard Charge/Discharge
Nominal Dimension (with sleeve)	mm	$\Phi=22.5 \pm 0.5$ $H=42.5 \pm 0.5$	Unit Cell
Weight Approx.	g	<u>60</u>	Unit Cell
Standard Charge	mA	<u>230(0.1C)</u>	T=0~45°C
	hour	<u>15</u>	
Fast Charge	mA	<u>2300(1C)</u>	T=10~40°C Tmax=45°C - $\Delta V=5 \sim 10$ mV/cell Timer CutOff=120%
	hour	<u>1.2</u>	
Standard Discharge	mA	<u>460(0.2C)</u>	T= -20~60°C Cut-off Voltage=1.0V/Cell
Maximum Discharge Current	A	<u>23(10C)</u>	Cut-off Voltage=0.7V/cell
Storage Temperature	°C	<u>-20 ~35</u>	Discharge State

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3. 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, : $65 \pm 20\%$

Note. 1: Standard Charge/Discharge Condition:

Charge: 230 mA (0.1C) \times 15hrs

Discharge: 460 mA (0.2C) to 1.0V/cell

Test	Unit	Specification	Conditions	Remarks
Capacity	mAh	≥ 2300	Standard Charge/Discharge	Up to 5 cycles are allowed
Open circuit voltage	V/Cell	≥ 1.25	Within 1 hour after standard charge	
Internal Impedance	m Ω /Cell	≤ 8	Upon fully charge (1KHZ)	Unit cell
Discharge at 1CmA	Minute	≥ 54	Standard Charge, 1 hour rest before discharge	
Overcharge	N/A	Leakage & deformation may occur, but no explosion is allowed	<u>230</u> mA (0.1C) charge 28 days	T= $20 \pm 5^\circ\text{C}$
Reverse charge	N/A	Leakage & deformation may occur, but no explosion is allowed	0.2CmA discharge to 0V, then reverse charge with 1CmA for 1 hour	
Charge Retention	mAh	≥ 1495 (65%)	Standard charge, Storage: 28 days, Standard Discharge	
IEC Cycle Life	Cycle	<i>See note. 2</i>	IEC60285 (1999) 4.4.1	
Short circuit	N/A	Leakage & deformation may occur, but no explosion is allowed	After standard charge, short circuit for 1 hour. (load $\leq 100\text{m}\Omega$ for 24hrs)	

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Continues :

Test	Unit	Specification	Conditions	Remarks
Mechanical test	hour	t(duration of discharge) ≥ 5	Charge the battery 0.1CmA 15hrs, carry out bump test under the following condition: Peak acceleration(A): $98n/s^2$ (10G) Corresponding duration of pulse(D) 16ms Corresponding velocity change 1.00m/s Number of bumps 1000 ± 10 Then stand for 1~4hrs, Discharge at 0.2CmA	

4. EXTERNAL APPEARANCE

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

5. CAUTION

1. Reverse charge is not acceptable.
2. Charge before use. The cells/batteries are delivered in an uncharged state.
3. Do not charge/discharge with more than specified current.
4. Do not short circuit the cell/battery.
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 to adverse conditions like: extreme temperature, deep cycling, excessive overcharge/over-discharge.
8. Store the cell/battery uncharged in cool dry place. Always discharge batteries before bulk storage or shipment.

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Note.2 :

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

Before the endurance in cycles test, the cell shall be discharged at 0.2CmA to a final voltage of 1.0V.

The following endurance test shall be carried out at constant current throughout, using the conditions specified in **table1**. Precautions shall be taken to prevent the cell-case temperature from rising above 35°C during the test, by providing a forced air draught if necessary.

Table 1-endurance in cycles

Cycle number	Charge	Stand in charged condition	Discharge
1	0.1CmA for 16h	None	0.25CmA for 2h20min
2 to 48	0.25CmA for 3h10min	None	0.25CmA for 2h20min
49	0.25CmA for 3h10min	None	0.25CmA to 1.0V
50	0.1CmA for 16h	1h to 4h	0.2CmA to 1.0V

*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 an exact two-week interval. A similar procedure may be adopted at cycles 100, 150, 200, 250, 300 and 350.

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

The endurance test is considered complete when two such successive cycles give discharge duration less than 3h. The number of cycles obtained when the test is completed shall be not less than 400.