

BAO TONG USA INC. dba TYSONIC BATTERIES

1 . SCOPE

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

Model No. NI-CD TY-F-8000 Flat Top

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>8000</u>	Standard Charge/Discharge
Nominal Dimension (with sleeve)	mm	$\Phi=32.5 \pm 0.5$ $H=91.0 \begin{smallmatrix} +0 \\ -2.0 \end{smallmatrix}$	Unit Cell
Weight Approx.	g	<u>210</u>	Unit Cell
Standard Charge	mA	<u>800(0.1C)</u>	T=0~45°C
	hour	<u>15</u>	
Fast Charge	mA	<u>2400(0.3C)</u>	T=10~40°C Tmax=45°C -ΔV=5~8mV/cell ΔT/Δt=1°C/min
	hour	<u>4.5</u>	
Standard Discharge	mA	<u>1600(0.2C)</u>	T= -20~60°C Cut-off Voltage=1.0V/Cell
Storage Temperature	°C	<u>-20 ~35</u>	Discharge State

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: 800 mA (0.1C) ×15hrs

Discharge: 1600 mA (0.2C) to 1.0V/cell

Test	Unit	Specification	Conditions	Remarks
Capacity	mAh	≥ 8000	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	≤ 6	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>800</u> mA (0.1C) charge 28 days	T=20±5°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	≥ 5200 (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)	
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.

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 a discharge duration less than 3h. The number of cycles obtained when the test is completed shall be not less than 400.