

GP Batteries

Document Title: Product Specification of NiMH 250AAHC Cell and Stack Up Batteries

Document Number:MQS3644

Revision: 04

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1. SCOPE

This specification governs the performance of the following GP Nickel-Metal Hydride Cylindrical Cell and its stack-up batteries.

GP Model: GP250AAHC

Cell Size: AA

The 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 cells in the battery. For example, a stack-up battery consists of three unit cells:

Nominal Voltage of unit cell = 1.2V

Thus, nominal voltage of stack-up battery = 1.2V x 3 = 3.6V

For batteries which has 2 cells or above per pack, capacity may not have the below stated minimum capacity due to increased in impedance from inter-cell connection and protection components.

2. RATINGS

Notes : Standard Charge / Discharge Conditions:

Charge : 245mA (0.1C) x 16hrs

Discharge : 490mA (0.2C) to 1.0V/cell

Description	Unit	Specification	Conditions
Nominal Voltage	V	1.2	Unit cell
Typical Capacity	mAh	2,450	Standard Charge/ Discharge
Nominal Capacity	mAh	2,450	Standard Charge/ Discharge
Minimum Capacity	mAh	2,450 (Unit Cell)	Standard Charge/ Discharge
Standard Charge	mA	245 (0.1C)	$T_a = 0 \sim 45^\circ\text{C}$ (see Note 1)
	hour	16	
Fast Charge	mA	2,450 (1C)	$dT/dt = 0.8 - 1^\circ\text{C/minute}$ $-\Delta V = 0 \sim 5\text{mV/cell}$ Timer CutOff = 100% input capacity (for ref.only) Temp. CutOff = 45 - 50°C $T_a = 10 \sim 45^\circ\text{C}$
	hour	1.0 approx. (see Note 2)	
Trickle Charge	mA	122.5(0.05C) ~ 245(0.1C)	$T_a = 0 \sim 45^\circ\text{C}$
Discharge Cut-off Voltage	V	1.0	Unit cell
Maximum Discharging Current	mA	7,350(3C)	$T_a = -20 \sim 50^\circ\text{C}$
Storage Temperature	°C	-20 ~ 35°C	
Typical Weight	gram	31.0	Unit cell

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3. PERFORMANCE

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

Ambient Temperature, T_a : $20 \pm 2^\circ\text{C}$ and
Relative Humidity : $65 \pm 20\%$.

Notes : Standard Charge / Discharge Conditions:

Charge : 245mA (0.1C) x 16hrs
Discharge : 490mA (0.2C) to 1.0V/cell

Test	Unit	Specification	Conditions	Remarks
Capacity	mAh	$\geq 2,450$	Standard Charge/Discharge	Up to 3 cycles are allowed
Open Circuit Voltage (OCV)	V	≥ 1.25	Within 1hr after standard charge	Unit cell
Internal Impedance (Ri)	m Ω	≤ 28	Upon fully charge (1kHz)	Unit cell
High Rate Discharge (0.5C)	min	≥ 108 (Unit Cell)	Standard Charge, 1hr rest before discharge	
High Rate Discharge (1C)	min	≥ 51 (Unit Cell)	Standard Charge, 1hr rest before discharge	
Overcharge	N/A	No leakage nor explosion	245mA (0.1C) charge 1 year	
Charge Retention	mAh	$\geq 1,470$	Standard Charge, Storage: 6 months, Standard Discharge	
IEC Cycles Test	Cycle	> 500	IEC 61951-2	(see Note 3)
Accelerated Cycle Life	Cycle	≥ 200	Charge: 2,450mA (1C), Discharge: 2,450mA (1C) to 1.0V/cell, Rest: 1 hour End - of - life: 80% nominal capacity. (Standard Charge/Discharge)	Cycling Charging CutOff condition: $-\Delta V = 5\text{mV/cell}$

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Test	Unit	Specification	Conditions	Remarks
Leakage	N/A	No leakage nor deformation	Fully charged at 2,450mA (1C), stand for 14 days	
External Short Circuit	N/A	No fire and no explosion	After standard charge, short circuit the cell(s) at 20+/-5°C until the cell(s) temperature returns to ambient temperature. (The resistance of the inter-connecting circuitry shall not exceed 0.1 ohm.)	
Vibration Resistance	N/A	Charge of voltage should be under 0.02V/cell, Charge 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: 3000CPM Any direction for 60mins.	Unit cell
Impact Resistance	N/A	Charge of voltage should be under 0.02V/cell, Charge of impedance should be under 5 milli-ohm/cell.	Charge the battery 0.1C 16hrs, then leave for 24hrs, check battery before / after dropped, Height: 50cm Wooden board (thickness 30mm) Direction not specified, 3 times.	Unit cell

4. CONFIGURATION, DIMENSIONS AND MARKINGS

Please refer to the attached drawing.

5. EXTERNAL APPEARANCE

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

6. WARRANTY

One (1) year limited warranty against workmanship and material defects.

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7. 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 the 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 to adverse conditions like: extreme temperature, deep cycling, excessive overcharge / overdischarge.
8. Store the cell / battery uncharged in a cool dry place. Always discharge batteries before bulk storage or shipment.
9. For storage of cells / batteries over one year, in order to maintain the function of cells, cells / batteries should be at least charged and discharged once within one year.
10. Keep away from children. If swallowed, contact a physician at once.
11. Air ventilation should be provided in the plastic case of batteries, otherwise it may have a risk of accumulating gas generated (oxygen gas, hydrogen gas) inside the cell, resulting in explosion triggered by fire sources (motors or switches). Airtight battery compartments are strongly discouraged.

- Notes : 1. T_a : Ambient Temperature
2. Approximate charge time from discharged state, for reference only.
3. IEC 61951-2 Cycle Life Test :

Cycle No.	Charge	Rest	Discharge
1	0.1C x 16hrs	none	0.25C x 2hrs20mins
2 - 48	0.25C x 3hrs10mins	none	0.25C x 2hrs20mins
49	0.25C x 3hrs10mins	none	0.25C to 1.0V / cell
50	0.1C x 16hrs	1- 4hr(s)	0.2C to 1.0V / cell

Cycles 1 to 50 shall be repeated until the discharge duration on any 50th cycle becomes less than 3hrs