

GP Batteries

Document Title: Product Specification of NiMH GP300CHCB Cell and Stack Up Batteries

Document Number: MQS3877

Revision: 01

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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: GP300CHCB

Cell Size: **C**

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 : 300mA (0.1C) x 16hrs

Discharge : 600mA (0.2C) to 1.0V/cell

Description	Unit	Specification	Conditions
Nominal Voltage	V	1.2	Unit cell
Typical Capacity	mAh	3,000	Standard Charge/ Discharge
Nominal Capacity	mAh	3,000	Standard Charge/ Discharge
Minimum Capacity	mAh	3,000	Standard Charge/ Discharge
Standard Charge	mA	300 (0.1C)	$T_a = 0 \sim 45^\circ\text{C}$ (see Note 1)
	hour	16	
Fast Charge	mA	3,000(1C)	$dT/dt = 0.8 - 1 \text{ /minute}$ - $\Delta V = 0 \sim 5\text{mV/cell}$ Timer CutOff =105% input capacity (for ref.only) Temp. CutOff = 45 - 50 $T_a = 10 \sim 45$
	hour	1.0 approx. (see Note 2)	
Trickle Charge	mA	150(0.05C) ~ 300(0.1C)	$T_a = 0 \sim 45^\circ\text{C}$
Discharge Cut-off Voltage	V	1.0	Unit cell
Maximum Discharging Current	mA	3,000(1C)	$T_a = -20 \sim 50^\circ\text{C}$
Storage Temperature		-20 ~ 30°C	
Typical Weight	gram	69	Unit cell

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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_a : $20 \pm 2^\circ\text{C}$ and
Relative Humidity : $65 \pm 20\%$.

Notes : Standard Charge / Discharge Conditions:
Charge : 300mA (0.1C) x 16hrs
Discharge : 600mA (0.2C) to 1.0V/cell

Test	Unit	Specification	Conditions	Remarks
Capacity	mAh	$\geq 3,000$ (Unit cell)	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	Average:5 Range:3~8	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	300mA (0.1C) charge 1 year	
Charge Retention	mAh	2400	Standard Charge Storage: 24 months at 20°C Discharge at 600mA to 1.0V at 20°C	
IEC Cycles Test	Cycle	≥ 1000	IEC 61951-2	(see Note 3)
Accelerated Cycle Life	Cycle	≥ 300	Charge: 3,000mA (1C), Discharge: 3,000mA (1C) to 1.0V/cell, Rest: 1 hour End - of - life: 80% nominal capacity. (Standard charge/discharge)	Cycling Charging CutOff condition: $-\Delta V = 0-5\text{mV/cell}$

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Test	Unit	Specification	Conditions	Remarks
Leakage	N/A	No leakage nor deformation	Fully charged at 3,000mA (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 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	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: 3000CPM Any direction for 60mins.	Unit cell
Impact Resistance	N/A	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 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.

7. CAUTION

1. Reverse charging is not acceptable.
2. Do not charge / discharge with more than the specified current.

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3. Do not short circuit the cell / battery. Permanent damage to the cell / battery may result.
4. Do not incinerate or mutilate the cell / battery.
5. Do not solder directly to the cell / battery.
6. The life expectancy may be reduced if the cell / battery is subjected to adverse conditions like: extreme temperature, deep cycling, excessive overcharge / overdischarge.
7. Blister packaging should have a separation of 1-2mm between batteries so that batteries would not contact each other.
8. Bulk pack batteries should be separated from each other by using paper strips or egg tray.
9. During storage and transportation, blister pack / bulk pack batteries should be packed to provide efficient air ventilation.
10. Store the blister pack batteries at temperatures between 10-30°C. During transportation, blister pack batteries should be stored under deck, in a cool, dry place and away from all sources of heat. Temperature during transportation should be controlled at 10-25°C.
11. Batteries in bulk pack should be stored at temperatures between 10-25°C during storage and transportation.
12. For storage of cells / batteries over one year, in order to prevent the degrading the function of cells, cells / batteries should be at least charged and discharged once within one year.
13. Keep away from children, If swallowed, contact a physician at once.
14. Air ventilation should be provided in the plastic case of batteries, otherwise it may have a risk of generating gas inside them (oxygen gas, hydrogen gas) resulting explosion triggered by fire sources (motor or switches). Caution should be focused on the ventilation of battery compartments. 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			