

GP Batteries

Product Specification

Model No.: GP60AAAHC

Document Number: TQS4025

Rev.: 08

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Modification History:

Ver	Issue Date	Change
08	2/Jan/2009	1. Change the Remarks of Capacity from “Up to 3 cycles are allowed” to “Up to 3 cycles are allowed. The test shall be terminated at the end of the first cycle which meets the requirement”; 2. Add point 24 to section 7. CAUTION

1. SCOPE

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

GP Model: GP60AAAHC

Cell Size: AAA

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 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

2. RATINGS

Description	Unit	Specification	Conditions
Nominal Voltage	V	1.2	Unit cell
Typical Capacity	mAh	630	Standard Charge / Discharge
Nominal Capacity	mAh	600	Standard Charge / Discharge
Minimum Capacity	mAh	600	Standard Charge / Discharge
Standard Charge	mA	60 (0.1C)	$T_a = 0 \sim 45^{\circ}\text{C}$ (See Note 1)
	Hr	16	
Fast Charge	mA	600 (1C)	$-\Delta V = 0 \sim 5\text{mV/cell}$ or Timer cutoff = 105% input capacity Temp. cutoff = $45 \sim 50^{\circ}\text{C}$ $T_a = 10 \sim 45^{\circ}\text{C}$ $dT/dt = 0.8 \sim 1^{\circ}\text{C/min}$ (1C)
	hr	1.05 approx. (See Note 2)	
Trickle Charge	mA	30(0.05C)~60 (0.1C)	$T_a = 0 \sim 45^{\circ}\text{C}$
Discharge Cut-off Voltage	V	1.0	Unit cell
Maximum Discharging Current	mA	1800 (3C)	$T_a = -20 \sim 50^{\circ}\text{C}$
Storage Temperature	$^{\circ}\text{C}$	$-20 \sim 35$	Discharged state
Typical Weight	g	13.0	Unit cell

3. PERFORMANCE

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

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

Relative Humidity : $65 \pm 20\%\text{RH}$

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Notes: Standard Charge / Discharge Condition

Charge : 60mA (0.1C) x 16hrs

Discharge : 120mA (0.2C) to 1.0V/cell

Test	Unit	Specification	Conditions	Remarks
Capacity	mAh	≥ 600	Standard Charge / Discharge	Up to 3 cycles are allowed. The test shall be terminated at the end of the first cycle which meets the requirement
Open Circuit Voltage (OCV)	V	≥ 1.25	Within 1hr after standard charge	Unit cell
Internal Impedance (Ri)	m Ω	≤ 70	Upon fully charge (1kHz)	Unit cell
High Rate Discharge (0.5C)	minute	≥ 108	Standard Charge, 1hr rest before discharge	
High Rate Discharge (1C)	min	≥ 48	Standard Charge, 1hr rest before discharge	
Overcharge	N/A	No leakage nor explosion	60mA (0.1C) charge for 1yr	
Charge Retention	mAh	$\geq 360(60\%)$	Standard Charge, Storage: 28 days at RT or 7 days at 45°C, Standard Discharge	
IEC Cycles Test	Cycle	> 500	IEC 61951-2 (2003) 7.4.1	(See Note 3)
Accelerated Cycle Life	Cycle	≥ 250	Charge: 600mA (1C) Discharge: 600mA (1C) to 1.0V/cell End of life: 80% of nominal capacity	Cycling charging cutoff condition: - $\Delta V = 0 \sim 5\text{mV/cell}$ or timer cutoff = 105% of input capacity
Leakage	N/A	No leakage nor deformation	Fully charged at 600mA (1C), stand for 14days	
External Short circuit	N/A	No fire and no explosion.	After standard charge, short circuit the cell at 20 \pm 5°C until the cell temperature returns to ambient temperature. (The resistance of the inter-connecting circuitry shall not exceed 0.1 ohm.)	

Test	Unit	Specification	Conditions	Remarks
Vibration Resistance	N/A	Change of voltage $\Delta V < 0.02V$ Change of Internal impedance $\Delta Ri < 5m\Omega$	Charge at 0.1C for 16hrs, and 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 $\Delta V < 0.02V$ Change of Internal impedance $\Delta Ri < 5m\Omega$	Charge at 0.1C for 16hrs, and then leave for 24hrs, check battery before / after drop Height: 50cm Thickness of the wooden board: 30mm Direction is not specified Test for 3 times	Unit cell

4. CONFIGURATIONS, DIMENSIONS AND MARKINGS

Please refer to the related drawing.

5. EXTERNAL APPEARANCE

The cell / battery shall be free from cracks, scars, breakage, rust, discoloration, leakage and deformation.

6. WARRANTY

One year limited warranty against workmanship and material defects.

7. CAUTION

1. Batteries should be charged prior to use.
2. For charging methods please referred to our technical handbook.
3. Use the correct charger for Ni-Cd or Ni-MH batteries.
4. Do not reverse charge batteries.
5. Do not subject batteries to adverse condition such as extreme temperature, deep cycling and excessive over charge/over discharge.
6. Avoid batteries being used in an airtight compartment. Ventilation should be provided inside the battery compartment; otherwise batteries may generate hydrogen gas, which could cause an explosion if exposed to

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an ignition source..

7. Do not attempt to take batteries apart or subject them to pressure or impact. Heat may be generated or fire may result. The alkaline electrolyte is harmful to eyes and skin, and it may damage clothing upon contact.
8. Keep away from children. If swallowed, contact a physician at once.
9. Do not short circuit batteries; permanent damage to batteries may result.
10. Do not incinerate or mutilate batteries, may burst or release toxic material.
11. Do not solder directly to cells or batteries.
12. Store batteries in a cool dry place.
13. If find any noise, excessive temperature or leakage from a battery, please stop its use.
14. When not using a battery, disconnect it from the device.
15. When using a new battery for the first time or after long-term storage, please fully charge the battery before use.
16. Do not mix new batteries in use with semi-used batteries, over-discharge may occur.
17. When connecting a battery pack to a charger, ensure correct polarity.
18. When the battery is hot, please do not touch it and handle it, until it has cooled down.
19. Do not remove the outer sleeve from a battery pack nor cut into its housing.
20. When find battery power down during use, please switch off the device to avoid over discharge.
21. Unplug a battery by holding the connector itself and not by pulling at its cord.
22. After use, if the battery is hot. Before recharging it, allow it to cool in a well-ventilated place out of direct sunlight.
23. Never put a battery into water or seawater.
24. In order to maintain satisfactory cell/battery performance when being stored under extending period of time, cycling (i.e. charging and discharging) of the cell / battery within 6 months period is highly recommended. At least one times cycling should be conducted within one year.

Notes : 1. T_a : Ambient Temperature

2. Approximate charge time from discharged state, for reference only.

3. IEC 61951-2(2003) 7.4.1 Endurance in cycles:

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