1. SCOPE

This specification governs the performance of the following GP Nickel Metal Hydride Cylindrical Cell and its stack-up batteries which constitute less than 20 unit cells.

GP Model: GP1100DH
Cell Size: D

The data involving nominal voltage and the approximate weight of the 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 five unit cells:
Nominal voltage of unit cell = 1.2V
Thus, nominal voltage of stack-up battery = 1.2 V ×5 = 6.0V

2. RATINGS

Description	Unit	Specification	Conditions
Nominal Voltage	V	1.2	Unit cell
Nominal Capacity	mAh	11,000	Standard Charge / Discharge
Minimum Capacity	mAh	11,000	Standard Charge / Discharge
Typical Capacity	mAh	11,550	Standard Charge / Discharge
Standard Charge	mA	1100 (0.1C)	T_a = 0 ~ 40°C (see Note 1)
	hr	16	
Fast Charge	mA	2,200 ~ 5,500 (0.2C~0.5C) with charge termination control	-deltaV = 0 ~ 5mV/ cell Timer cutoff = 105% nominal input Temp. cutoff = 40 ~ 50°C dT/dt = 0.8°C/min T_a = 10 ~ 40°C (see Note 1)
	hr	5.25 approx. (0.2C) 2.1 approx. (0.5C) (see Note 2)	
Trickle Charge	mA	550 (0.05C) ~ 1100 (0.1C)	T_a = 0 ~ 40°C
Discharge Cut-off Voltage	V/cell	1.0	Unit cell
Maximum Discharging Current	A	55 (continuous)	
Storage Temperature	°C	-20 ~ 60 °C (within 1 week) -20 ~ 35 °C (more than 1 week)	Discharged state, open circuit
Typical Weight	g	179	Unit cell

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3. PERFORMANCE

Before proceed the following tests, the cells should be discharged at 0.2C to 1.0V cutoff.
Unless otherwise stated, tests should be done within one month of delivery under the following conditions :

Ambient Temperature, T_a : 20 ± 5^oC
Relative Humidity : $65 \pm 20\%RH$

Notes : Standard Charge / Discharge Condition
Charge : 1,100mA (0.1C) x 16hrs
Discharge : 2,200mA (0.2C) to 1.0V/cell

Test	Unit	Specification	Conditions	Remarks
Capacity	mAh	$\geq$ 11,000	Standard Charge / Discharge	Up to 3 cycles are allowed
Open Circuit Voltage (OCV)	V/cell	$\geq$ 1.25	Within 1hr after standard charge	Unit cell
Internal Impedance (Ri)	mΩ/cell	Average: 6 Range: 4 ~ 8	Upon fully charge At 1kHz	Unit cell
High Rate Discharge (1C)	mAh	$\geq$ 9,900	Standard charge, rest time within 1hr	
High Rate Discharge (3C)	mAh	$\geq$ 8,800	Standard charge, rest time within 1hr	
Overcharge	N/A	No conspicuous deformation and/or leakage	550mA (0.05C) maximum current for 1 year	
Charge Retention	mAh	$\geq$ 8,800	Standard Charge, Storage: 28 days, Standard Discharge	
IEC Cycles Test	Cycle	$\geq$ 500	IEC61951-2 (2003) 7.4.1.1	(see Note 3)
Accelerated Cycle Life	Cycle	$\geq$ 300	Charge: 5,500mA (0.5C) to -deltaV=5~10mV Discharge: 5,500mA (0.5C) to 1V/cell End of life: 80% of nominal capacity	

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Test	Unit	Specification	Conditions	Remarks
Leakage	N/A	No Leakage	After battery is fully discharged. Battery is placed under load (e.g. resistor, but not include current generator). The battery should be monitored for a period up to 2 months but not less than 10 days	Load current 0.1C max.
External Short Circuit	N/A	No fire and no explosion.	After standard charge, short circuit the cell at 20+/-5^{o}C until the cell temperature returns to ambient temperature. (The resistance of the inter-connecting circuitry shall not exceed 0.1ohm.)	
Vibration Resistance	N/A	△V < 0.02V/cell Ri (Internal impedance) < 5mΩ/cell	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	△V < 0.02V/cell Ri (Internal impedance) < 5mΩ/cell	Charge at 0.1C for 16hrs, and then leave for 24hrs, check battery before / after drop Height: 0.9m Thickness of the wooden board: 30mm Direction is not specified Test for 3 times	Unit cell

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4. CONFIGURATIONS, DIMENSIONS AND MARKINGS

Please refer to its Data Sheet.

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. When using a new battery for the first time or after long term storage, please fully charge the battery before use.
3. For charging methods please referred to our technical handbook.
4. Use the correct charger for Ni-Cd or Ni-MH batteries.
5. Do not reverse charge batteries.
6. Do not short circuit batteries, permanent damage to batteries may result.
7. Do not incinerate or mutilate batteries, may burst or release toxic material.
8. Do not solder directly to cells or batteries.
9. Do not subject batteries to adverse condition such as extreme temperature, deep cycling and excessive over charge/over discharge.
10. Store batteries in a cool dry place.
11. Do not mix GP batteries with other battery brands or batteries of a different chemistry such as alkaline and zinc carbon.
12. Do not mix new batteries in use with semi-used batteries, over-discharge may occur.
13. 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 an ignition source.
14. When connecting a battery pack to a charger, ensure correct polarity.
15. If find any noise, excessive temperature or leakage from a battery, please stop its use.
16. When the battery is hot, please do not touch it and handle it, until it has cooled down.
17. Do not remove the outer sleeve from a battery pack nor cut into its housing.
18. When find battery power down during use, please switch off the device to avoid over discharge.

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19. When not using a battery, disconnect it from the device.
20. Unplug a battery by holding the connector itself and not by pulling at its cord.
21. After use, if the battery is hot, before recharging it, allow it to cool in a well-ventilated place out of direct sunlight.
22. Never put a battery into water or seawater.
23. During long term storage, battery should be charged and discharged once about every half a year.
24. 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.
25. Keep away from children. If swallowed, contact a physician at once.

Notes : 1. T_a: Ambient Temperature
2. Approximate charge time from discharged state, for reference only.
3. IEC61951-2 (2003) 7.4.1.1 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
Cycle 1 to 50 shall be repeated until the discharge duration on any 50th cycle becomes less than 3hrs			

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