Specification

Product	**Ni/MH Battery**
Type	**HP-M20**
Edition	**SP08(B.1)080P-20E**
Date	**2008/2/28**

Client Materials No. _____

Client Confirm _____

AA Portable Power Corp(http://www.batteryspace.com)

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Approval

Note: This Approval Sheet (Version Number: SP08(B.1)080P-20E) prepared by batteryspace.com is subject to be modified without prior notice.

1. MODEL: HP-M20

2. SPECIFICATION

·Chemistry:Nickel Metal Hydride

·Nominal voltage: 1.2 V

·Rated capacity: 20 Ah

·Standard charge: 2 A×16 hrs

·Rapid charge: 8 A (controlled by at least 3 following methods simultaneously);

-Delta V = 0mV-5mV/cell (controlling voltage-decreasing while charging);

DT/ dt = 0.8-1 Celsius/min(controlling surface temperature increment);

TCO = 45-50 Celsius (controlling battery surface temperature);

160 mins (controlling charging time at constant current).

·Discharge end-voltage: 1.0 V (0.2C discharge)

0.9 V (1C discharge)

0.8 V (3C discharge)

·Max constant current of discharge: 60 A (at 20 Celsius)

·Ambient temperature range(humidity: 65±10%)

Standard charge:	0 -- 40 Centigrade
Rapid charge:	10 -- 35 Centigrade
Discharge:	-20 -- 55 Centigrade

·Storage temperature rangehumidity:(65±10%)

Within 12 months:	-20 -- 35 Centigrade
Within 3 months:	-20 -- 45 Centigrade
Within 1 month:	-20 -- 55 Centigrade

3. Appearance & Dimension/Weight

As per attached drawing

4. Performance Testing

4.1 Test Requirement

Unless otherwise stipulated, all tests are carried out in ambient temperature 20±5 Celsius,humidity 65±10%;Tests should be made within one month after receipt of the battery.

Important: New batteries are delivered in a 0-30% charged state, discharge at 4 Ah to 1.0V/cell before any test!

4.2 Testing Procedure and Standard

Item	Measuring Procedure	Standard
1. Appearance	Visual check	Refusal of dust and oil contamination, ovbious scratch
2. Dimension	Measured by calipers	As per attached drawing
3. Weight	Weighed by balance with precision of 0.1g	Max 380 g
4. Open-circuit voltage	Measure open-circuit voltage 14 days after standard charge	Min 1.25 V
5. Capacity	Calculate capacity when discharge at 4 A to 1.0V /cell,within one hour after standard charge	Typ 20 Ah Min 19 Ah
6.High Rate Capacity(1C)	Calculate capacity when discharge at 20 A to 0.9V /cell,within one hour after standard charge	Min 18 Ah
7.High Rate Capacity(3C)	Calculate capacity when discharge at 60 A to 0.8V /cell,within one hour after standard charge	Min 16 Ah
8. Impedance	Measure the impedance of battery by applying AC with frequency of 1000Hz within one hour after standard charge (by milliohm meter)	Max 4.5 mΩ
9. Self discharge	Lay standard charged battery for 28 days at ambient temperature of 20±2 Celsius, then discharge at 4 A to 1.0V/cell, measure capacity	Min 14 Ah
10. Over-charge	Charge at 2 A for 28 days	ND,NL,NF,NE
11. Charge at high temperature	Put the battery in constant temperature box of 40±2 Celsius for 2 hours, Charge at 8 A for 3hrs and with -Delta V=5mV/cell rapid charge cut-off control, stand it in ambient temperature of 20±5 Celsius for 1 hour, discharge at 4 A to 1.0V/Cell	90% of initial capacity(min.)
12. Low-temperature discharge	Put the standard charged battery in Constant Temperature Box at -18±2 Celsius for 2 hours, discharge at 4 A to 1.0V/cell	80% of initial capacity(min.)
13. Over-discharge	Connect standard charged batteries with a resistor of 12Ω/ cell in series for 8 hours	ND,NL,NF,NE
14. Cycle life	As per IEC Standard, inspect the capacity at 500th cycle	Min 12 Ah
15. Humidity test	Put standard charged battery in ambient temperature: 33±3 Centigrade humidity: 80±5% for 14 days	ND,NL
16. Vibration-proof	Lay the standard charged battery for 1 hour with open-circuit, vibrate the battery Amplitude: 4mm Frequence: 1000times/min Direction: Any Time: 60min	Open circuit voltage variation below 0.02V/cell ND,NL
17. Impact-proof	Lay the battery standard charged for 1 hour with open-circuit,drop with the follow conditions: Height: 45cm Target: Hard wood plate Direction: Any direction Times: 3	Open circuit voltage variation below 0.03V/cell ND,NL
18 Safety	Short-circuit the positive and negative polarity for 1 hour using a leading wire of 0.75mm^2	NE but leakage or deformation allowed

Note: If batteries are properly used, it is kept in seal status, safety vent will not active. But in case of abuse use such as long time over charge, short circuit, over-discharge etc., battery inner pressure will increase and lead to safety vent open. Read instruction carefully before using.

Remark: ND = no deformation; NL = no leakage; NF = no fire; NE = no explosion

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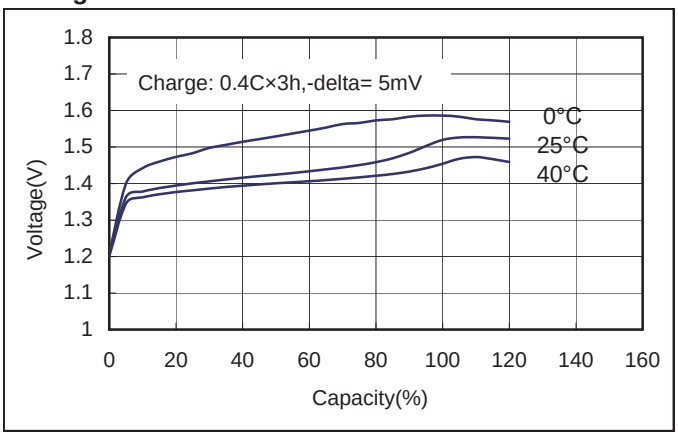
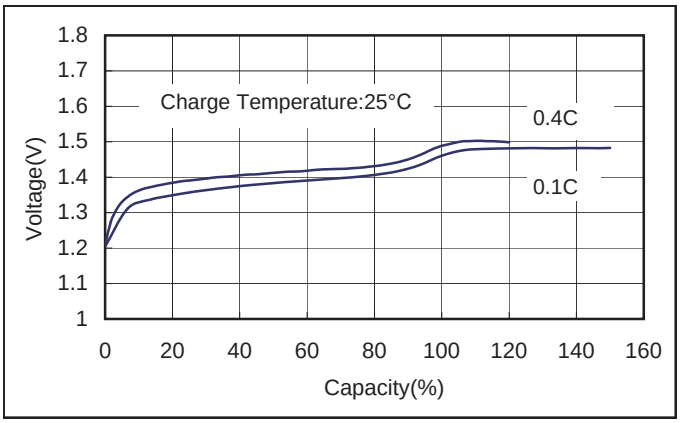
·Parameters

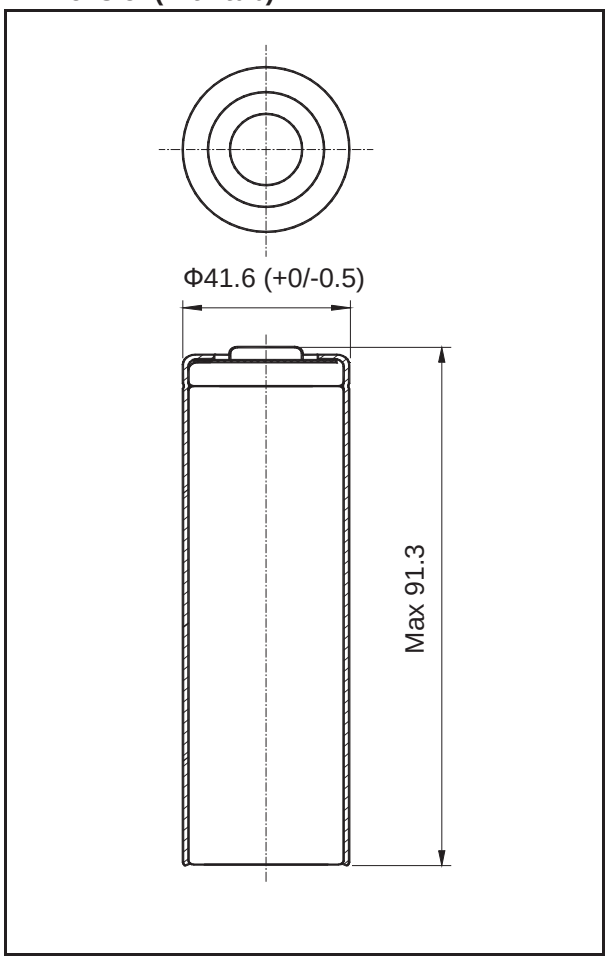
Nominal Voltage		1.2 V
Nominal capacity (0.2C)		20 Ah
Dimension	D(mm)	41.6 (+0/-0.5)
	H(mm)	Max 91.3
Weight(g)		Max 380.0
Impedance（1000Hz）		Max 4.5 mΩ
Charge	Slow Charge	2 A×16hrs
	Rapid Charge (need control)	8 A×160mins
Ambient Temperature	Charge	Slow charge: 0-40 Deg.
		Rapid Charge: 10-35 Deg.
	Discharge	-20-55 Deg.
	Storage	12 months: -20-35 Deg.
		3 months: -20-45 Deg.
		1 month: -20-55 Deg.

·Charge characteristics

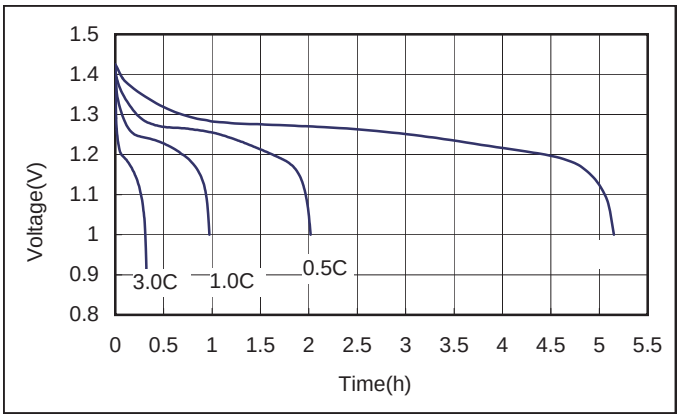




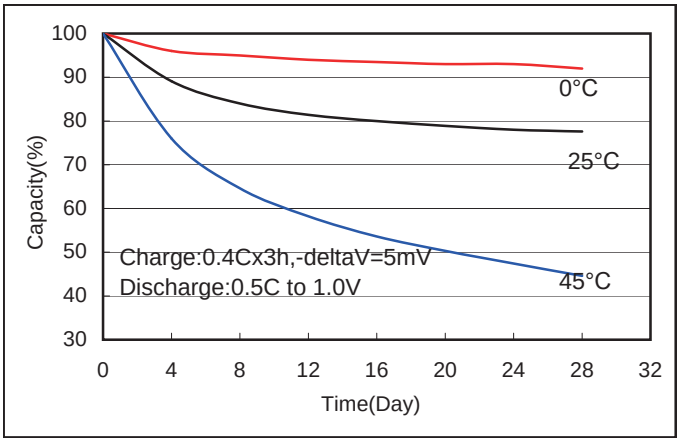
·Dimension(with tub)mm



·Discharge characteristics



·Self discharge characteristics



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•Cautions

1. We recommend to use specified NI-MH battery charger equipped with rapid charge control in case if quick charge is necessary. Do not overcharge batteries by exceeding the predetermined charging period specified. Prolonged charging may cause over heating and damage the battery.
2. Please recharge the battery before using.
3. Charge/discharge current should not exceed the current stipulated by batteryspace.com.
4. The end voltage of the battery is1.0V/Cell,do not over-discharge the battery , or it will damage the performance of battery .
5. If battery will be stored for more than 3 months, we suggest charging the battery once every 3 months. The battery should charge 30-50% before storage.
6. Do not reverse-charge the battery .
7. Do not immerse the battery into water.
8. Do not disassemble batteries or throw the batteries into fire.
9. Do not solder any lead wires directly to the batteries.
10. Make sure terminals are correctly positioned when charging.
11. Trickle charge brand new batteries or batteries being stored for a long time before using.
12. Keep the batteries out of the reach of children, see a doctor when any accidents happen.
13. Do not touch overheated batteries,recharge the battery when temperature returns to normal.
14. Battery will heat after using, please put the battery on a ventilated place to make it cool before charge it again. Avoid direct sunshine.
15. Do not mix different size of batteries; do not mix batteryspace.com.battery with other brand batteries.
16. When use the battery at too high or too low temperature, deeply charge/discharge, over-charge and over-discharge will decrease the cycle life of batteries.
17. It will cause internal air pressure increase when over-charge, short circuit or over-discharge, when such accidents happen, safety vent will open and release the air to ensure safety. Therefore, the battery should avoid airtight structure. The housing of battery should be ventilated, or other fire-source may ignite the Oxygen and Hydrogen released from the batteries.
18. The battery should have short-circuit protection device to prevent short-circuit. Do not short-circuit batteries, or it will cause permanent damage.
19. Store with load is forbidden, it will cause capacity of battery irreversible loose if store battery with loaded for a long time.
20. Please stop using if abnormal phenomenon happens.