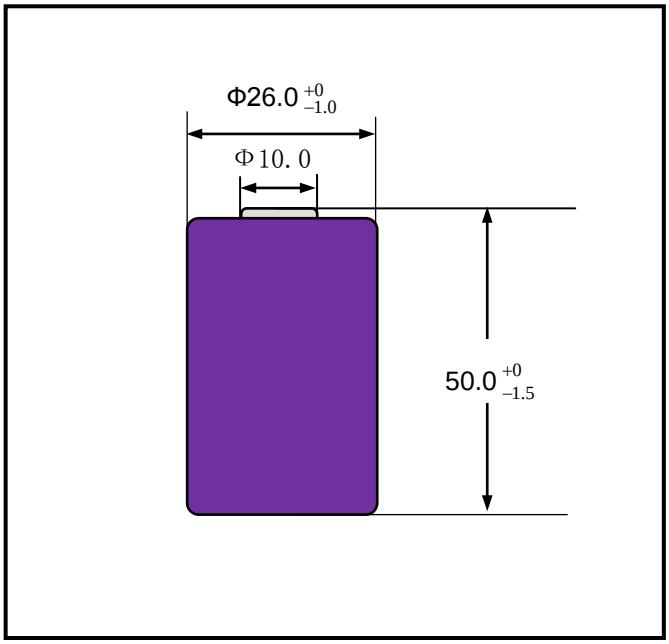
HC4000HT Cell (High Temperature)

Data Sheet

NO: D0172

Sealed Rechargeable Ni-MH Cylindrical Cell

● Dimensions (with tube)



● Specifications

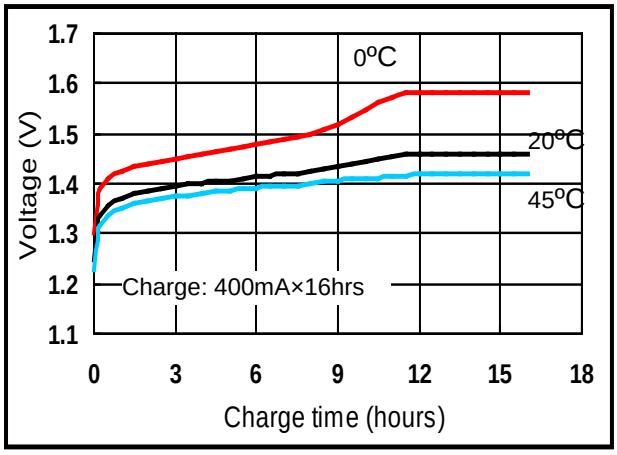
Nominal Voltage			1.2V
0.2C Capacity*	Minimum		4000mAh
	Typical**		4150mAh
Weight			90g
Typical Internal Impedance At 1kHz, fully charged, RT			6mΩ (After charge)
IEC Life Expectancy			400 cycles
Charge	Standard		400mA × 16hrs
	Trickle		200mA × 36hrs
Ambient temperature	charge	Standard	0ºC — 50ºC
		Trickle	0ºC — 55ºC
	Discharge		–10ºC — 60ºC
	Storage	< 3 months	–20ºC — 40ºC
		< 1 year	–20ºC — 30ºC

* Capacity is tested after charging 0.1C for 16hours.

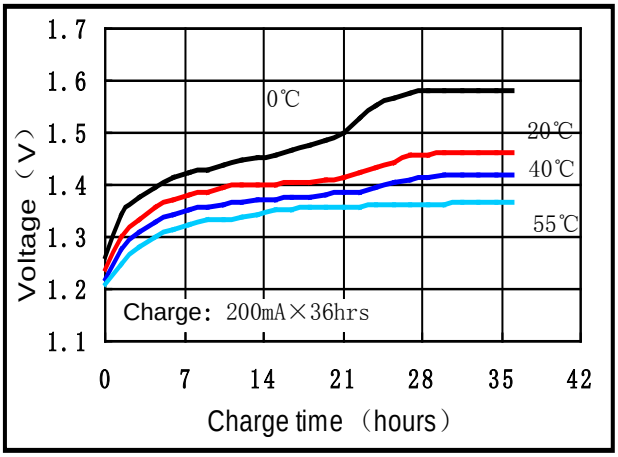
** Typical capacity and internal impedance are for reference.

● Typical Characteristics

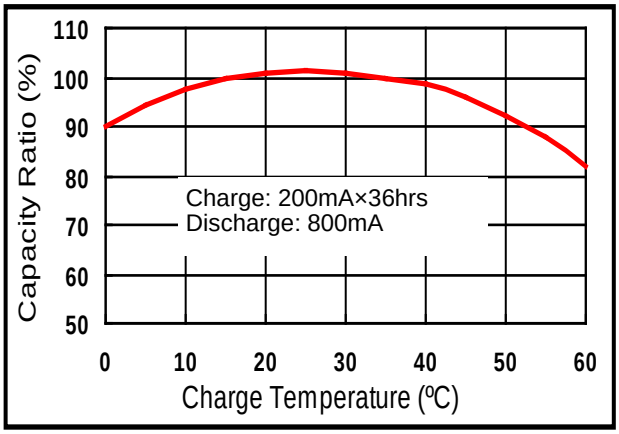
● Standard charge characteristics



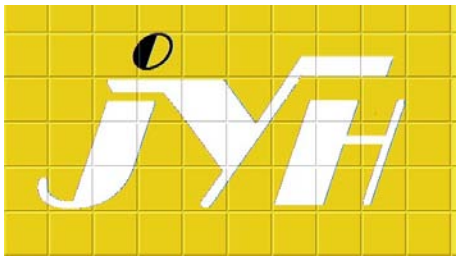
● Trickle charge characteristics



● Discharge characteristics



Subject to change without prior notice



SPECIFICATION for

Sealed Rechargeable Nickel Metal Hydride Battery

Battery Model	HC4000HT
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1. Preface

This product specification covers the requirements for the following rechargeable sealed Nickel Metal Hydride cell type manufactured and delivered by **JYH** Battery Co. Ltd.

HC4000HT cell

2. Description and Model

2.1	Description	Rechargeable sealed Nickel Metal Hydride cylindrical cell High temperature type
2.2	Model	HC4000HT

3. Ratings

3.1	Nominal Voltage	1.2V		
3.2	Typical Capacity	4150mAh after standard charge and 800mA discharge		
3.3	Nominal Capacity	4000mAh		
3.4	Minimum Capacity	4000mAh		
3.5	Standard charge	400mA for 16 hrs.		
3.6	Trickle charge	120mA to 200mA		
3.7	Operating temperature	Charging:	Standard: Trickle:	0ºC to 50ºC 0ºC to 55ºC
		Discharging:		-10ºC to 60ºC
3.8	Storage temperature		< 1 year:	-20ºC to 30ºC
			< 3 months:	-20ºC to 40ºC
3.9	Dimensions	Diameter	$26.0^{+0}_{-1.0}$ mm	
		Height	$50.0^{+0}_{-1.5}$ mm	
3.10	Typical weight	90g		
3.11	Maximum discharge current	4000mA		
3.12	Discharge cut-off Voltage	1.0V/cell		

4. Performance

Unless otherwise stated, tests should be conducted under the following conditions:

Time frame	Within one month of delivery
Ambient temperature	20 ± 5ºC
Relative Humidity	65 ± 20%

4.1 Standard Capacity

The initial capacity is the discharge capacity of the cell measured with a discharging current of 800mA to a cut-off voltage of 1.0V within one hour after the standard charge.
Up to five cycles are permitted for this test.

Discharge capacity ≥ 4000mAh

4.2 Open circuit Voltage

The open circuit Voltage is above 1.25V within one hour after standard charge

4.3 Initial Impedance

The initial internal resistance is measured at 1KHz within one hour after standard charge.

Initial internal impedance ≤ 15mOhm

4.4 High rate capacity

High rate capacity is measured with a discharging current of 2000mA to a cut-off voltage of 1.0V after standard charge.

High rate capacity ≥ 3400mAh

4.5 Charge retention

After standard charge and storage time of 28 days at ambient temperature, the capacity is measured with a discharging current of 800mA to a cut-off voltage of 1.0V.

Capacity ≥ 2400mAh

4.6 Discharge capacity at 0℃

After the standard charge, the cell is stored in an ambient temperature of 0℃±2℃ for not less than 16h and not more than 24h. The capacity is measured with a discharging current of 800mA to a cut-off voltage of 1.0V.

Discharge capacity ≥ 3200mAh.

4.7 Leakage

After charging at 400mA and storage for 7 days at room temperature, no leakage nor deformation.

4.8 IEC cycle life

According IEC 61951-2 (2003-04), the test should be carried out in accordance with the conditions below:

Cycle number	Charge	Stand in charged condition	Discharge
1	400mA for 16 hrs	None	1000mA for 140 mins *****
2-48	1000mA for 190 mins	None	1000mA for 140 mins *****
49	1000mA for 190 mins	None	800mA to 1.0 V
50	400mA for 16 hrs	1 h to 4 h	800mA to 1.0 V **

*****: If the cell voltage drops below 1.0 V, the discharge may be discontinued.

******: It is permissible to allow sufficient open-circuit rest time after the completion of discharge at cycle 50, so as to start cycle 51 at a convenient time. A similar procedure may be adopted at cycles 100,150,200,250,300,350 and 400. The test would be ended until the discharge time of any 50th cycle is less than 3 hours.

Cycle life is not less than 400 cycles.

4.9 Permanent charge endurance

The permanent charge endurance test regime consists of:

- An initial charge efficiency test.
- An ageing period.
- A final charge efficiency test.

4.9.1 Initial charge efficiency test (3 cycles) at 40±2℃

Cycle no.1:	Charge for 48 hours at 200mA, discharge at 800mA to a final voltage of 1.0 V/cell. No minimum duration required.
Cycle no.2	Charge for 24 hours at 200mA, discharge at 800mA to a final voltage of 1.0 V/cell. 3.75 hours minimum duration required.
Cycle no.3	Charge for 24 hours at 200mA, discharge at 800mA to a final voltage of 1.0 V/cell. 3.75 hours minimum duration required.

4.9.2 Ageing period (3 cycles) at 70℃±2℃

Cycle no.1	Charge for 60 days at 200mA, discharge at 800mA to a final voltage of 1.0 V/cell. No minimum duration required.
Cycle no.2	Charge for 60 days at 200mA, discharge at 800mA to a final voltage of 1.0 V/cell. No minimum duration required.
Cycle no.3	Charge for 60 days at 200mA, discharge at 800mA to a final voltage of 1.0 V/cell. No minimum duration required.

Note: The temperature of 70℃ has been selected to simulate the ageing of cells during 4 years.

4.9.3 Final charge efficiency test (3 cycles) at 40±2℃

Cycle no.1:	Charge for 48 hours at 200mA, discharge at 800mA to a final voltage of 1.0 V/cell. No minimum duration required.
Cycle no.2	Charge for 24 hours at 200mA, discharge at 800mA to a final voltage of 1.0 V/cell. 2.5 hours minimum duration required.
Cycle no.3	Charge for 24 hours at 200mA, discharge at 800mA to a final voltage of 1.0 V/cell. 2.5 hours minimum duration required.

4.10 Vibration Test

This means the endurance of the cell against vibrations

Conditions:	Frequency	10Hz - 500Hz
	Vibration amplitude	0.35 mm peak or maximum 50 m/s^2
	Axes of vibration	3 mutually perpendicular axes
	Sweep cycles	5 cycles
	Sweep speed	1 octave per minute

Criteria: No visible liquid leakage, no venting, nor functional loss.

4.11 Drop Test

This means the endurance of the cell against drop

Condition:	Height	100cm
	Direction	Not specified
	Surface	Wooden board, 5cm thickness
	Test times	3 times

Criteria: No visible liquid leakage, no venting, nor functional loss.

4.12 Safety Device Operation

This means the safety device of the cell will allow the escape of gas if the internal pressure exceeds a critical value.

The cell shall be forced discharged at an ambient temperature of 20ºC ± 5ºC at a constant current of 800mA to a final voltage of 0 V. The current shall then be increased to 4000mA and maintained in direction at the same ambient temperature of 20ºC ± 5ºC for 60 min.

Leakage and deformation may occur, however, no explosion is allowed.

4.13 Overcharging

The overcharge capacity is the discharge capacity of the cell measured with a discharge current of 800mA to a cut-off voltage of 1.0V within one hour after charging for 48 hours at a current of 400mA.

Overcharge capacity ≥ 4000mAh. No leakage.

5. Appearance

The cell shall be free from deformation, cracks and leakage

6. Warranty

As long as the cell is treated in accordance with this product specification, one year limited warranty against workmanship and material defects is given.

Caution

- The cells/batteries are delivered in an uncharged state, charge before use.
- If battery terminals become dirty, clean up them with a soft dry cloth prior to use.
- Charge and discharge under specified ambient temperature recommend to JYH specification.
- Turn off the equipment after use.
- Store the cells/batteries in a cool dry place.
- For the cells/batteries after a long term storage, please charge and discharge for a few cycles to recover its initial performance.
- Always discharge batteries before bulk storage or shipment.
  Cells/batteries contain a strong colorless alkaline solution (electrolyte).
- When the operating time of a battery becomes much shorter than its initial operating time even after recharged, it should be replaced to a new battery as its battery life has ended.

Warning

- Never solder onto cell directly.
- Short circuit leading to cell terminals must be avoided.
- Do not dispose of cell into fire or dismantled under any condition.
- Cell reversal is not permitted.
- Store cells/batteries out of the reach of babies and children.
- Use batteries in extreme condition may affect the service life. such as: deep cycle，extreme overcharge and overdischarge.
- If cells/batteries leak fluid, change color, change shape, or change in any other way, stop using immediately.
- Do not mix different cell types and capacities in the same battery assembly.
- The gas release vent which release internal gas is located in the positive terminal of battery, never deform his section or cover or obstruct its gas release structure.
- Do not remove the outer tube from a battery or damage it. Doing so will expose the battery to the risk of a short circuit, and may cause leakage of battery fluid, heat, generation, explosion and fire.
- Do not apply water, seawater or other oxidizing reagents to cells/batteries, as this can cause rust and heat generation. If a battery becomes rusted, the gas release vent may no longer operate, and can result in explosion.

First Aid Measure

- Cells/batteries contain a strong colorless alkaline solution. The alkaline solution is extremely corrosive and will cause skin and eyes damage. If the skin or clothing comes in contact with fluid from battery, thoroughly wash the area immediately with clean water. If any fluid from a battery comes in contact with user’s eyes, they should immediately flush their eyes and wash them thoroughly with clean water and consult a doctor urgently.