Shenzhen Pro-Tech Energy Co., Ltd

Ni-MH BATTERY DELIVERY SPECIFICATIONS

PRESENTED TO :

MODEL NO. :

1.2V 67AF4500mAh

DATE :

23 August, 2022

Customer Part No. :

Specification Approved	Prepared By	
	Drawn By	
	Checked By	David Wong
	Approved By	Andy Shi
Customer Approved	Checked By	
	Approved By	
	Please sign and return	
	one copy to us.	



Add: B1825, Hua Chuang Yun Xuan, No.1998, Jiaxian Road, Gangtou Community, Bantian Sub-district, Longgang District, Shenzhen, China.

Postcode:518109Website:www.protech-battery.comTel:86-13510192255E-mail:silvia@protech-battery.com

1. Scope

This specification governs the performance of the following Nickel-Metal Hydride cylindrical battery.

2. Model: 1.2V 67AF4500mAh, standard industrial type, flat top.

3. External Appearance

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

4. Ratings

The data involving the nominal voltage and the approximate weight of the battery cell.

Description	Unit	Specification	Conditions	
Nominal Voltage	V	1.20	Unit: cell	
Nominal Capacity	mAh	4500	Standard charging / discharging	
Rated Capacity	mAh	4300	Standard charging / discharging	
Standard Charge	mA	450 (0.1C)	Ta = $0 \sim 45$ °C (see note)	
	hour	16		
Quick Charge	mA	2250(0.5C) With charge termination control	$-\triangle V=5\sim 8mv/$ cell Timer cutoff=120% input capacity	
	minute	140 approx. (0.5C)	Ta= $0 \sim 40^{\circ}$ C dT / dt= $0.5 \sim 1.0^{\circ}$ C / min	
Trickle Charge	mA	225(0.05C)	Ta = $0 \rightarrow 40^{\circ}C$ (see note)	
	v	1.0	Less than 1.0C discharge	
Discharge Cut-Off Voltage		0.9	1.0~2.0C discharge	
Maximum Discharging Current(mA)(continuous)	mA	9000(2C)	Ta= 0~+50°C	
Storage Temperature (40-60% charged)	°C	-20~+40	Less than 30 days	
		-20~+30	Less than 90 days	
		-20~+25	Less than 180 days	
	%	65±20RH	Relative humidity	
Typical Weight	g	64.0	Approx.	

5. Performance

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

Relative humidity: $65\pm20\%$ RH. Ambient Temperature: $20\pm5^{\circ}C_{\circ}$ Notes: Standard charge / discharge condition Charge:450 mA (0.1C) x 16hrs Discharge:900 mA (0.2C) to1.0V/cell.

The batteries must be standard discharged before charging.

Battery test information:

Test	Unit	Specification	Conditions	Remarks
Capacity	mAh	≥4300	Standard Charge / Discharge Up to 3 cycles Allowed	
Open Circuit Voltage (OCV)	v	≥1.35	Within 1 hr after standard charge Unit: cell	
Internal Impedance (Ri)	mΩ	≤25	Upon fully charge at 1Khz Unit: cell	
Rapid discharge (0.5C)	min	≥114	Standard charge, 30min rest before discharge at 0.5C to 1.0V/cellUp to 3 cycles Allowed	
Over charge test	N/A	No explosion Leakage may occur	Cell is discharged with 0.2C to1.0V, then 0.1C charged for 48 hours	
Over discharge test	N/A	No explosion	Cell is discharged with 0.2C to 0.00V, then with 1C forced discharged for 1 hour	
Charge	mAh	≥2700(60%)	Standard charge, storage for 28 days at 20°C, standard discharge	
Retention(20°C)	mAh	≥2700(60%)	After standard charged and storaged for 7 days at 40 ± 2 °C, standard discharged with 0.2C to battery cell 1.0V	
IEC cycle life test	cycle	≥500	IEC 61951-2 7.4.1.1	
Short circuit test	N/A	No fire No explosion	After 0.2C discharged to 1.00V, cell is fully charged with 0.1C for 16 hours or charged by 0.5C for 2.2hours), then shorted circuit for 1 hour or longer by a $50 \sim 100 \text{m}\Omega$ copper wire.	
Vibration test	N/A	No physical change, No leakage, Cell electrical performances unchanged	Cell is vibrated continuously lengthwise for 60minutes Amplitude: 4mm Frequency: 1000times/minutes	
Drop test	N/A	No abruption No leakage No explosion	After 0.2C discharged to 1.00V, cell is fully charged with 0.1C for 16 hours, then cell is dropped 3 times from a 1.0m height onto solid wood (20mm thick) with random orientation	
Safety device operation test	N/A	No explosion	Forced discharge at 0.2C to a final voltage of 0V, then the current be increased to 1C and forced discharge continue for 60 min	

Attention: The object of abuse test is single cell.

Append: IEC61951-2 Endurance in cycles

Standard Cycling Test:

Cycle No.	Charge	Rest	Discharge	
1	$0.1C \times 16hrs$	None	$0.25C \times 2hrs \ 20mins$	
2~48	$0.25C \times 3hrs \ 10mins$	None	$0.25C \times 2hrs \ 20mins$	
49	$0.25C \times 3hrs \ 10mins$	None	0.25C to 1.00V/cell	
50	$0.1C \times 16hrs$	1~4hrs	0.2C to 1.00V/cell	
Cycle 1 to 50 shall be repeated until the discharge capacity less than 3hrs				

The endurance test is considered complete when two such successive cycles give a discharge duration less than 3 hours. The number of cycles obtained when the test is completed shall be not less than 500.

6. Configurations, Dimensions and Markings

Please refer to the related drawing.

7. Warranty

The quality guarantee period for our products is one year.

8. Cautions

- 1. Reverse charging is not acceptable.
- 2. Charge before use, use the correct charger for Ni-MH batteries.
- 3. Do not charge / discharge with more than the specified current.
- 4. Do not short circuit the cell / battery.
- 5. Do not incinerate or mutilate the cell/battery .
- 6. Do not solder directly to the cell / battery.
- 7. The life expectancy may be reduced if the cell / battery is subjected to adverse conditions, like extreme temperature, deep cycling, excessive overcharge /over-discharge.
- 8. Store the cell / battery in a cool dry place.
- 9. For charging methods please reference to technical handbook.
- 10. When find battery power down during use, please switch off the device to avoid over discharge.
- 11. When not using a battery, disconnect it from the device.
- 12. Well-ventilated place out of direct sunlight.
- 13. During long term storage, please activate the battery once every 3 months according to the following method: Charge at 0.1C for 16hrs, rest 10 min, then discharge with 0.2C to 1.0V/cell, rest 10 mins, then charge at 0.2C for 150 mins.
- 14. When the battery is hot, please do not touch it and handle it, until it has cooled down.
- 15. Do not mix our batteries with other battery brands or batteries of a different chemistry such as alkaline and zinc carbon batteries.
- 16. Do not mix new batteries in use with semi-used batteries, battery may be over-discharged.
- 17. 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.
- 18. Keep away from children. If swallowed, contact a physician at once



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