



## Specification Approval Sheet

Name: NiMh battery

Model: 10448

Spec: 1.2V 1100mAh AAA

Approved By	Checkup	Make

Customer Confirmation	Signature	Date
	Company Name :	
	Stamp :	

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**Change history**

No.	Date	Edition	Class*	Change item
1	2020-11-25	A/0		New issue

\*: Class A, D and R means added, deleted and revised respectively.



## 1.SCOPE

### BATTERY MODEL: 10448

## 2.NOMINAL SPECIFICATION

2.1.Nominal voltage	1.2V
2.2.Nominal capacity	1100mAh
2.3.Minimum capacity*	1000mAh
2.4.Charging**	
Standard charge	100mA(0.1C) for 16 hours
Quick charge	200mA (0.2C)for 7 hours
Rapid charge	500mA (0.5C) for 2.4hours
Cut-off condition	-dV=5mV dT/dt=0.8~1.0℃/min   Tco=55℃
2.5.Discharge**	
Standard discharge	200mA(0.2C) to 1.0V
2.6. Ambient temperature (recommended)	
Standard charge	0~40℃
Quick charge	10~40℃
Rapid charge	10~30℃
Discharge:	-10~50℃
Storage	
Less than 30 days	-20~50℃
Less than 90 days	-20~40℃
Less than 1 year	-20~30℃
2.7.Relative humidity	≤65%
2.8.Weight	Approx. 12.5g
2.9.Dimensions	shown in the page 12

Note \*: Standard charge, rest for 1hour, standard discharge.

Five cycles are permitted for this test .The test shall be terminated at the end of the first cycle which meets the requirement.

\*\*:. Unless otherwise stated in this specifications, the battery unit should be discharged to 1.0V end voltage with 0.2C before charging.



### 3. APPEARANCE

There shall be no practical damage such as conspicuous liquid electrolyte leakage, flaw and dirt under conditions of storage or operation as specified herein.

### 4.ELECTRICAL CHARACTERISTICS

Testing conditions

The battery shall be evaluated within 1 month from the arrival date.

Unless otherwise stated in these specifications, the following test shall be carried out in an ambient temperature of  $20 \pm 5^{\circ}\text{C}$ , relative humidity of  $65 \pm 20\%$ .

Characteristics

Test Items	Test Conditions	Requirements	Remark
4.1 Open-circuit Voltage (OCV)	Voltage between the battery terminals shall be measured within 14 days after standard charge	$\geq 1.25\text{V}$	
4.2 Capacity	Standard charge, rest for 1hour, standard discharge.	$\geq 1000\text{mAh}$	Up to 5 cycles are allowed
4.3 High-rate discharge (1C)	After standard charge, rest for 1 hour before discharge to 0.9V at 1C current	$\geq 52$ minutes	Up to 5 cycles are allowed
4.4 Low temperature discharge	Within 1 hour after standard charged at $20^{\circ}\text{C}$ , discharged at a current of 0.2C to 1.0V at $0^{\circ}\text{C}$	$\geq 240$ minutes	
4.5 High temperature discharge	Within 1 hour after standard charged at $20^{\circ}\text{C}$ , discharged at a current of 0.2C to 1.0V at $40^{\circ}\text{C}$	$\geq 240$ minutes	
4.6 Internal impedance (Ri)	Upon fully charge (1KHz)	Max.50 m $\Omega$	

Test Items	Test Conditions	Requirements	Remark
4.7 IEC cycle life	IEC61951-2 (2017) 7.5.1.2 See Remark 1	≥300 Cycles	
4.8 Charge retention	Standard charged ,stored for 1 year at 20±2℃ , discharged at a current of 0.2C to 1.0V	≥210 Minutes (70%)	
4.9 Over-charge	Charge at 0.1C for 48 hours, standard discharge within 1 hour.	≥300 Minutes	
4.10 Continuous low-rate charging	After standard charged battery unit is charged at 0.03C~0.05C for 28 days	No fire , no explosion	
4.11 Forced discharge	The discharged battery unit is subjected to a reverse charge at 1C for 90 minutes	No fire , no explosion	
4.12 Vibration	IEC62133 (2017) 7.2.2 See Remark 2	No leakage, no fire , no explosion	
4.13 Free fall	IEC62133 (2017) 7.3.3 Each fully charged cell or battery is dropped three times from a height of 1 m onto a concrete floor. The cells or batteries are dropped so as to obtain impacts in random orientations. After the test, the sample shall be put on rest for a minimum of 1 h and then a visual inspection shall be performed.	No fire, no explosion.	

**\*REMARK**

**1. IEC Cycle life:** IEC61951-2(2017)7.5.1.2 (The ambient temperature is  $20 \pm 2^\circ\text{C}$ )

Cycles	Charge	rest	Discharge
1	0.1C×16hrs	0	0.25C×2hrs 20mins <sup>a</sup>
2~48	0.25C×3hrs 10mins	0	0.25C×2hrs 20mins <sup>a</sup>
49	0.25C×3hrs 10mins	0	0.25C to 1.0V
50	0.1C×16hrs	1~4hr	0.20C to 1.0V

\*a If the cell voltage drops below 1.0V, discharge may be discontinued.  
Cycle 1 to 50 shall be repeated until the discharge duration on any 50<sup>th</sup> cycle become less than 3hrs

**2. Vibration :** IEC62133 (2017) 7.2.2

Frequency	10~55Hz
Amplitude	0.76mm
Rate of frequency variety	1 Hz/minute
Duration	90 minutes /axis (axis: X、Y、Z) 270 minutes in all

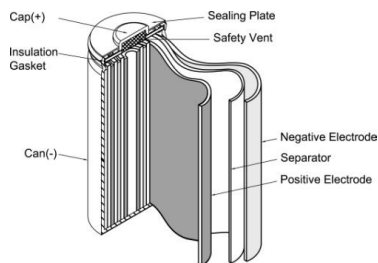
**5. ENVIRONMENTAL PROTECTION REQUIREMENT**

5.1 It is hereby certified by Tenergy that there is neither RoHS (EU Directive 2002/95/EC, 2011/65/EU, 2015/863) restricted substance nor such use, for materials to be used for unit parts, for packing/packaging materials, and for additives and the like in the manufacturing processes.

5.2 Battery Cells restricted substance conform to the requirements of the Battery Directive (EU Directive 2006/66/EC, 2013/56/EU)

5.3 Tenergy is not responsible for the collection and recycling of the waste battery as required in Battery Directive (EU Directive 2006/66/EC, 2013/56/EU)

**5.4 Battery interior constitution**



Never disassemble Tenergy batteries. Doing so may cause an internal or external short circuit or result in exposed material of battery reacting chemically with the air. It may also cause heat generation, explosion and fire. Also, this is dangerous as it may cause splashing of alkaline fluid.

**5.5 Cell materials and components**

(IMDS 446786133)

No.	Material name	CAS No.	Proportion [%]
1	Nickel-dihydroxide	12054-48-7	15 - 22



2	Iron	7439-89-6	16 - 20
3	Nickel	7440-02-0	30 - 40
4	Manganese	7439-96-5	0.3 - 1.5
5	Lanthanum	7439-91-0	1.7 - 4.5
6	Cobalt	7440-48-4	1.5 - 2.5
7	Potassium-hydroxide	1310-58-3	1 - 2
8	Polyethylene	9002-88-4	0 - 0.6
9	Cerium	7440-45-1	0.29 - 0.9
10	Neodymium	7440-00-8	0 - 1
11	Aluminium (metal)	7429-90-5	0 - 1
12	Sodium-hydroxide	1310-73-2	1 - 2
13	Lithium-hydroxide	1310-65-2	0.1 - 0.5
14	Poly(tetrafluoroethylene)	9002-84-0	0 - 0.1
15	Cellulose carboxymethyl ether sodium salt	9004-32-4	0 - 0.1
16	Polypropylene	9003-07-0	1 - 3
17	Styrene polymer with 1,3-butadiene	9003-55-8	0.1 - 0.5
18	Cobalt hydroxide (Co(OH) <sub>2</sub> )	21041-93-0	0.5 - 2
19	Zinc-hydroxide	20427-58-1	0 - 0.1
20	Water	7732-18-5	0.15 - 0.23

## 6. TRANSPORT

IATA,IMDG,Model Regulation	N/A
UN Proper shipping name	
IATA,IMDG,Model Regulation	N/A
Transport hazard class(es)	
IATA,IMDG,Model Regulation	Not subjected for transport of dangerous goods
Packing group	
IATA,IMDG,Model Regulation	N/A
Packing sign	
IATA,IMDG,Model Regulation	N/A
Environmental hazards	
Marine pollutant	No
Special precautions for user	Not applicable

Transport information: Nickel Metal Hydride Battery is exempt from dangerous goods. It is considered non-dangerous goods by the International Civil Aviation Organization(ICAO), the International Air Transport Association(IATA) DGR 61th IATA Special Provisions A199, International Martine Dangerous Goods Regulations (IMDG) (39-18), IMDG Special Provisions 963,or the «Recommendations on the Transport of Dangerous Goods Model Regulations» (21th) .



Separate batteries when shipping to prevent short-circuiting. They should be packed in strong packaging for support during transport.

Note: Products weighing less than 100Kg in the Container (by sea).

## 7. PRECAUTION

Please keep in mind the following points when designing and manufacturing equipment. Please insert in your instruction manual. To prevent equipment malfunctions from affecting the batteries, be sure to use protection devices for electrical circuits and batteries.

### ⚠ Danger

- Failure to carefully observe the following procedures and precautions can result in leakage of battery fluid (electrolyte), heat generation, explosion, fire and serious personal injury!

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- Never dispose of batteries in a fire or heat them.

Do not connect the (+) positive and (-) negative terminals of batteries together with electrically conductive materials, including lead wires. Do not transport or store batteries with their uncovered terminals or connected with a metal necklace or other electrically conductive material. When carrying or storing batteries, use a special case.

- Charging with an unspecified charger or a specified charger that has been modified can cause batteries to swell or rupture.
- Never disassemble batteries. Doing so may cause an internal or external short circuit or result in exposed material of battery reacting chemically with the air. It may also cause heat generation and fire. Also, this is dangerous as it may cause splashing of alkaline fluid.
- The (+) positive and (-) negative terminals of batteries are predetermined. Do not force the terminals to connect to a charger or equipment. If the terminals cannot be easily connected to the charger or the equipment, check if the (+) and (-) terminals are incorrectly positioned.
- The gas release vent which release internal gas is located in the (+) positive terminal of the battery. For this reason, never destroy this section or block or heat its gas release structure.
- Batteries contain a strong colorless alkaline solution (electrolyte). The alkaline solution is extremely corrosive and will cause skin damage. 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 from the tap or another source and consult a doctor urgently. The strong alkaline solution can damage eyes and lead to permanent loss of eyesight.

- When batteries are to be incorporated in equipment or housed within a case, avoid air-tight structures, as this may lead to the equipment or the case being damaged or may be harmful to users.

#### **⚠Warning**

- Do not apply water, seawater or other oxidizing reagents to batteries, as this can cause rust and heat generation. If a battery becomes rusted, the gas release vent may no longer operate.
- Do not over-charge batteries by exceeding the predetermined charging period specified by the battery charger's instructions or indicator. If batteries are not fully charged after predetermined charging period has elapsed, stop the charging process. Prolonged charging may cause leakage of battery fluid, heat generation, and explosion. Be sure to handle recharged batteries carefully as they may be hot.
- Batteries contain a strong colorless alkaline solution (electrolyte). If the skin or clothing comes in contact with fluid from a battery; thoroughly wash the area immediately with clean water from the tap or another source. Battery fluid can irritate the skin.
- 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.
- If batteries leak fluid, change color, change shape, or change in any other way, do not use them, otherwise they may cause heat generation, explosion and fire.
- Keep batteries and the equipment using them out of the reach of babies and small children, in order to avoid accidental swallowing of the batteries. In the event the batteries are swallowed, consult a doctor immediately.
- 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.

#### **⚠CAUTION**

- Do not strike or drop batteries.
- Battery must be recycled or disposed of properly, don't throw battery away or reach sewage system.



- Store batteries out of the reach of babies and small children. When charging or using a battery, do not let babies or small children remove the battery from the charger or the equipment being used.
- Be sure to use the recommended charging method for batteries read the product's instruction manual carefully.
- Be sure to turn off the equipment after use of batteries, otherwise may result in leakage of battery fluid.
- After removed from equipment, store batteries in a dry place and within the recommended storage temperature range. This will help preserve the batteries' performance and durability and minimize the possibility of leakage of battery fluid or corrosion. (Tenergy recommends the storage temperature range from -20 to +30deg.(for longer service life).
- Storage batteries should be charged once every year, if possible once every 6 months.
- After long term storage, there is a possibility that the battery could not be fully charged. In order to fully charge it, please charge and discharge battery for a few times.
- Do not use old and new batteries mixed together, or batteries at different charge levels. Do not use the battery mixed with a dry cell or other batteries of different capacity, type, or brand name. This may cause leakage of battery fluid and heat generation.
- If the battery terminals become dirty, clean up them with a soft dry cloth prior to use. Dirt on the terminals can result in poor contact with the equipment, loss of power, or inability to charge.

## 8. BATCH ACCEPTANCE

### Recommended test sequence for batch acceptance

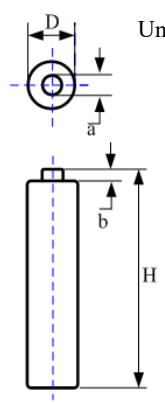
The sampling procedure shall be established in accordance with IEC61951-2:2017 10.3 table 34. Unless otherwise agreed between supplier and purchaser, inspections and tests shall be performed using inspection levels and AQLs (acceptable quality level) recommended in table as follow:

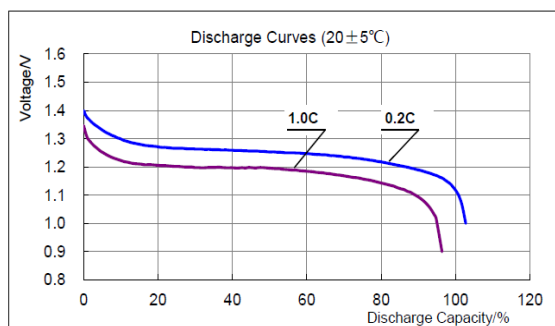
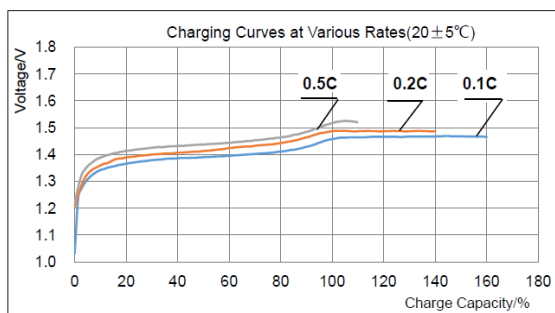
Group	Clause or sub clause	Inspection/tests	Recommendation	
			Inspection level	AQL %

A	As agreed	Visual inspection	II	4
		- absence of mechanical damage	II	4
		- absence of corrosion on case and terminals	S3	1
		- number, position and secure fittings of connection tabs	II	0.65
B	Clause 6 As agreed 5.3	- absence of liquid electrolyte on case and terminals		
		Physical inspection	S3	1
		- dimensions	S3	1
		- weight	S3	1
C	7.3.2 7.3.2	- marking		
		Electrical inspection	II	0.65
		- open-circuit voltage and polarity	S3	1
		- discharge at 20 °C at 0,2 It A 20 °C 下 0.2C		
NOTE Two or more failures on a single cell are not cumulative. Only the failure corresponding to the lowest AQL is taken into consideration.				

## Data Sheet

## Battery Model: 10448

Nominal voltage (V)		1.2
Capacity* (mAh)	Nominal	1100
	Minimum	1000
Charging**	Standard	0.1C×16hours
	Quick	0.2C×7hours
	Rapid	0.5C×2.4hours
	Cut-off condition	dV=5mV dT/dt=0.8~1.0 C /min Tco=55 C
Ambient temperature (recommended) (C)	Standard charge	0~40
	Quick charge	10~40
	Rapid charge	10~30
	Discharge	-10~50
	Storage	-20~30
Internal resistance		≤50 mΩ
End voltage of discharge		1.0V
Charge (capacity) retention (20 C 1 year 0.2C discharge to 1.0V)		≥210minutes (70%)
Weight		Approx. 12.5g
Dimensions With tube	D	Diameter 10.5 <sup>+0</sup> <sub>-0.5</sub>
	H	Height 44.5 <sup>+0</sup> <sub>-1.0</sub>
	a	Top diameter 3.7 <sup>+0</sup> <sub>-0.3</sub>
	b	Top height 0.8 (Minimum)
Drawing		 <p>Unit: mm</p>



Note:

The data sheet is for reference only and should not be used as a basis for product described guarantee or warranty.