

## Data Sheet

### Specifications of Nickel Metal Hydride Battery

#### 1. MODEL

Endurance 1000

#### 2. RATINGS

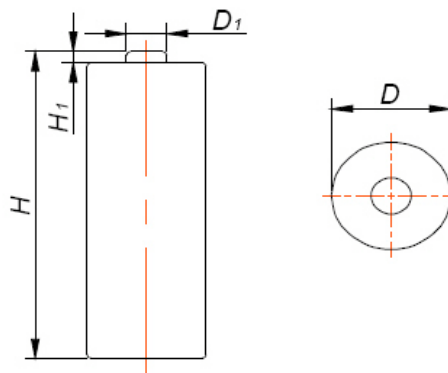
Nominal Voltage	1.2 V
Nominal	1000 mAh
Minimum	920 mAh/0.2C
Standard charge rate	100 mA × 16 h
Rapid charge rate	500 mA × 140 min ( $-\Delta V = 5$ mV)
Value of dT/dt (for reference only)	1 to 2 °C/min
Operating temperature range	@ Humidity: 65% ±20%
Standard charge	0 to +45 °C (32 to 113 °F)
Rapid charge	+10 to +45 °C (32 to 104 °F)
Discharge	-20 to +65 °C (14 to 149 °F)
Storage temperature range	@Humidity: 65% ±20%
Within 1 year	-20 to +35 °C (-4 to 95 °F)
Within 6 months	-20 to +45 °C (-4 to 113 °F)
Within 1 month	-20 to +55 °C (-4 to 131 °F)
Within 1 week	-20 to +65 °C (-4 to 149 °F)

Note :

- (1) All rapid charge methods should be discussed with our engineer
- (2) We stipulate to charge less than 40% fully power for delivery, if the charge is more than 40%, the battery has a certain latent risk. For the charge requirement is over 40% which caused quality problem, we do not undertake any responsibility.
- (3) Our battery guarantee time: 12 months
- (4) During storage period the batch battery is requested by the 40% electric charge, the battery storage surpasses 3 months, we suggest charge 40% every 3 months.

#### 3. Measurement & Dimensions to see the drawing:

D	9.8~10.5 mm
H	43.5~44.5 mm
D1	≤3.8 mm
H1	>1.6 mm





## Data Sheet

### 4. Performance Testing

#### 4.1. Test conditions

4.1.1 The battery to be tested is the product within one month after being received by customer.

#### 4.1.2 Ambient conditions:

Temperature +20 °C ±5 °C

Humidity 65% ±20%

#### 4.2 Testing Tools

##### 4.2.1 Voltage meter:

0.5 level or higher as required in IEC51/IEC485. Internal impedance exceeds 10 kΩ/V.

##### 4.2.2 Current meter:

0.5 level or higher as required in IEC51/IEC485. Internal impedance should be less than 0.01 Ω/V(including wires).

4.2.3. Micrometer caliper: With precision of 0.02 mm.

4.2.4. Internal impedance meter: Alternating current of 1000 Hz, connector measuring equipment with sin wave of 4.

##### 4.2.5: Impedance loaded meter:

Value of impedance is with +5% error allowed (including external wires).

##### 4.2.6 Incubators

Accuracy ±2 °C

#### 4.3 Test methods and benchmarks

Item	Test Method	Benchmark
1. Appearance	Eyeballing	Batteries shall be free from any stains; scratches or deformations, which may reduce the commercial value when visually inspected
2. Size	Caliper measurement	The size shall comply with the specified size as the attached drawing
3. Insulate impedance	measured with a Megger overpack and battery electrode between the degree of insulation	Outer sleeve shall exceed 10 MΩ .
4. Weight	Using disk-scale measurement	Approximate 13.0 g.
5. Charge Voltage	Following a period of discharge at 0.2CmA down to a terminal voltage of 1.0 V, standard charge, the cell or battery shall be checked at 5 minutes before finish charging	The voltage shall be less than 1.6 V.
6. Open circuit voltage: (O.C.V.)	Following a standard charge period, the open circuit voltage of the cell or battery shall be checked within 1 hour	The O.C.V. shall exceed 1.25 V
7. Closed circuit voltage: (C.C.V.)	Following a standard charge period, the closed circuit voltage of the cell or battery shall be checked with a 0.86 Ω per cell load within 1 hour	The C.C.V. shall exceed 1.2 V
8. Internal impedance	Following a standard charge period, the internal impedance of the cell or battery shall be checked at 1000 Hz within 1 hour	The internal impedance shall not be more than 35 mΩ



## Data Sheet

9. Capacity	<ul style="list-style-type: none"> <li>Following a standard charge period, the cell shall be stored for a period of 1 hour. The capacity shall be equal or more than minimum capacity when discharged at 0.2C mA down to a terminal voltage of 1.0V</li> <li>The capacity returned might not initially attain the specified value following the first charge – discharge cycle. In this event, the test may be repeated a further two or three times to attain the minimum capacity.</li> </ul>	The capacity is greater than or equal to the minimum capacity
10. High Drain Discharge	To discharge by 0.5C to 1.0 V within 1 hour after standard charge	The Capacity is higher than or equal to 112 min
11. Over-charge	Following a period of discharge at 0.2C mA down to a terminal voltage of 1.0 V, standard charge and then charge for 48hrs at 0.1C mA. The capacity of the cell or battery shall not be less than the rated capacity when discharged at 0.2C mA	It shall not be externally deformed and no leakage of electrolyte in liquid form shall be observed
12. Over-discharge	Following a period of discharge at 0.2C mA down to a terminal voltage of 1.0V, combine the cells with a 0.86 $\Omega$ per cell load. After stored for a period of 24 hours, standard charged and then discharge at 0.2C mA	the cell or battery shall not be externally deformed and no leakage of electrolyte in liquid form shall be observed, and the subsequent capacity shall not be less than 90% of rated capacity
13. Self discharge	<ul style="list-style-type: none"> <li>Following a period of discharge at 0.2C mA down to a terminal voltage of 1.0V, standard charge and then the cell or battery shall be stored for 180 days below 20 °C</li> <li>Following a period of discharge at 0.2C mA down to a terminal voltage of 1.0 V, rated standard charge and then the cell or battery shall be stored for 360 days below 20 °C</li> </ul>	<ul style="list-style-type: none"> <li>The subsequent capacity shall not be less than 85% of rated capacity when discharged at 0.2C mA</li> <li>The subsequent capacity shall not be less than 80% of rated capacity when discharged at 0.2C mA</li> </ul>
14. Cycle Life	Based on clause 7.4.1.1, IEC61951-2 2003	The charge-discharge cycles shall exceed 500 times
15. Humidity	Standard charge and store for 14 days under the following storage conditions: 33 °C $\pm$ 3 °C (91.4 °F $\pm$ 5.4 °F), Relative humidity of 80% $\pm$ 5%. (Salting is permitted).	No leakage of electrolyte in liquid form shall be observed
16. Vibration	Store the cell or battery more than 24 hours after standard charge, following vibration tests over an amplitude of 4 mm (0.1575 inches) at a frequency of 16.7 Hz (1000 cycles per minute) and repeated through any axes during 60mins	The subsequent fluctuation of open circuit voltage and internal impedance shall be less than 0.02 V and 5 m $\Omega$ respectively, and the cell or battery shall not be externally deformed and no leakage of electrolyte in liquid form shall be observed



## Data Sheet

17. Free falling (Drop)	Store the cell or battery more than 24 hours after standard charge, following a drop test from 450mm (17.717 inches ) on to a hard-wood board in a vertical axis 2 be times on each of 2 mutually perpendicular axes	The subsequent fluctuation of open circuit voltage and internal impedance shall be less than 0.02 V and 5 mΩ respectively, and the cell or battery shall not externally deformed and no leakage of electrolyte in liquid form shall be observed
18. Short-circuit	to store it for 1 hour after standard charged, and to make positive and negative electrode short-circuit with a wire with the section 0.75 mm <sup>2</sup> min and shortest length, the short-circuit time is 1 hour	It shall not explode during or at the end of a 1 hour short-circuit test. However, leakage of electrolyte, testing external deformation or outer sleeve cracking is permitted
19. Safety Valve Performance (Over discharging)	to be discharged with 1C mA for 5 hours	The safety valve must start normally , battery without breakage;Leakage, distortion and outer package breakage are allowed
20. Safety Valve Performance (over charging)	to be charged with 1C mA for 5 hours	No explosion, but leakage, distortion and out package distortion and out package
21. To discharge at low temperature	to be stored for 24 hours at 0 °C ±2 °C ,and discharged at 0.2C mA at 0 °C ±2 °C	discharge duration shall exceed 3 hour and 30 min

### 5. The transportation and storage

#### 5.1 Transportation

In the transportation process the battery should maintain at clean, dry, and the well ventilated environment, and prevents the fierce vibration, the impact or the extrusion, prevents to be exposed to the sun and rain. Battery could be transported by automobile, train, steamboat ,airplane and other transportation vehicle .

#### 5.2 Storage

5.2.1 Battery must be stored at -20 °C~ +35 °C, (It is best at 15 °C ~ +25 °C) and put in the clean, dry and ventilated place with relative humidity 85% max. It must be kept away from corrodent substance, fire hazard and heat resource.

#### 5.2.2 Storage placement way

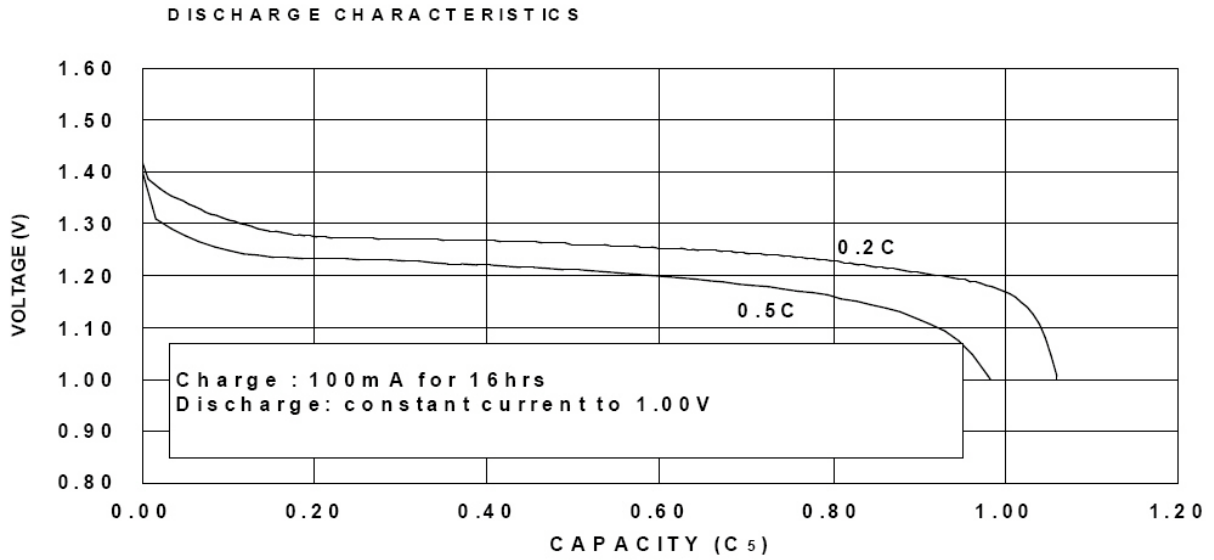
The packed battery in a carton stack less than 5 layers, to guarantee that between the cell box has the good air circulation condition, please maintain between the carton above 5~10 cm distance, which prevents the safety incident caused by a pile of agglomeration to heat.



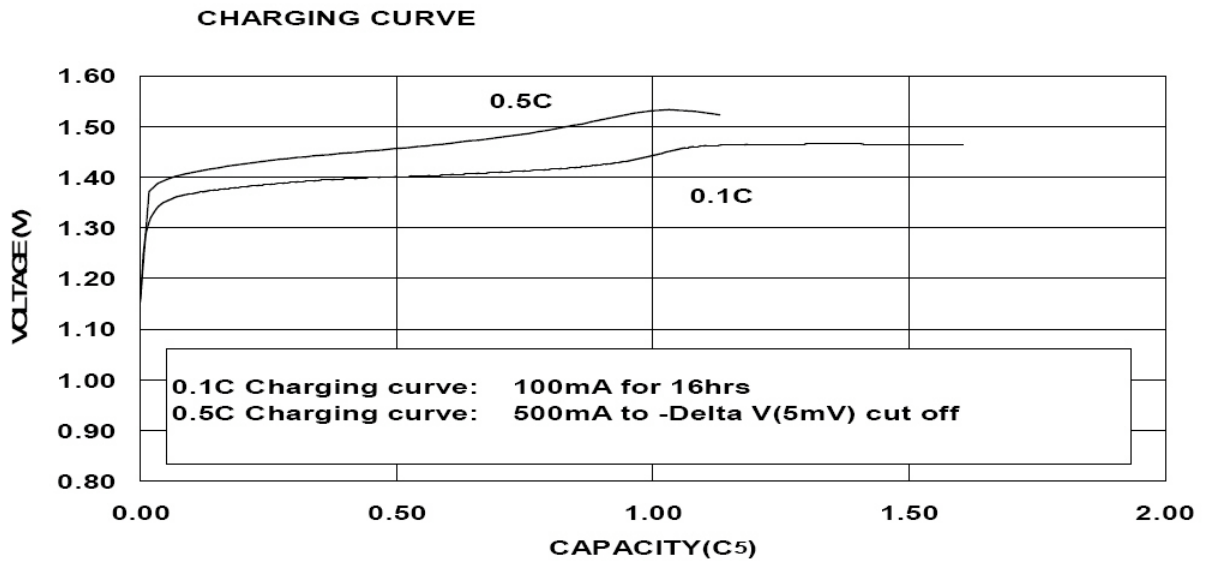
# Data Sheet

## 6. Discharging and charging curves

### 6.1. Discharging Curves



### 6.2. Charging Curves





## Data Sheet

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### 7. Warning and Security

To prevent the impact of equipment failure caused by the battery, and to make sure the security of circuit and battery set, please consider below things when design and produce the production equipment. Please put it into your instruction.

#### **Danger !**

Against the following matters will result in battery leakage, heat, explosion, fire and serious personal injury!

- (1) Prohibited to throw the battery into fire or heat!
- (2) Prohibited to collide or throw battery!
- (3) Don't weld the lead on the battery directly.
- (4) Don't put the battery on a place which is more than 1.5 meter in case of dropping. Don't drop it at the height of more than 1.5 meter.
- (5) Don't connect the positive pole and electrode pole directly of battery, such as leading wire. If the tab terminal of poles doesn't set insulation covering, please don't transport or store. Please don't touch the metal necklace, key or any other conductive material. Please use special carton when transport or store.
- (6) Must use the charger appointed by us to charge our batteries, and follow our instructors.
- (7) Prohibited to disassemble our batteries. It will cause external or internal short circuit, and the exposed parts will have chemical reaction then result in very dangerous heat, explosion, fire or splash of electrolyte.

#### **Warning!!**

- (1) Don't contact batteries with water, sea water or other oxidation reagents, which will cause rustiness and heat. If batteries get rusty, explosive decompression valve won't work and will lead to explosion.
- (2) Don't over-charge batteries, that is, don't continually charge batteries despite the designed charging time. If the batteries are not fully charged within the designed charging time, please stop to charge. The delay of charging time will lead to leakage, heat and explosion.
- (3) Our NI-MH battery includes the colorless strong alkaline liquor (i.e. electrolyte), if the skin or clothes touch NI-MH battery liquor, please use the boron acid water or the vinegar acid water to clean, after that, with the clear water thoroughly flushes. Because the battery's electrolyte can corrode the skin.
- (4) It is forbidden for more than 20 pcs batteries in series. Because it will result in leakage, getting shock or giving off heat.
- (5) Don't disassemble the battery, as it will result in short-circuit, leakage, giving off heat, catching fire and explosion.
- (6) Don't use the batteries when they are leakage, any color deterioration, distortion or other changes are found. Otherwise it will get hot, catching fire or explosion may happen.
- (7) Please keep the batteries and other electronic products related to battery away from baby, children, to avoid accident of swallowing of battery. If there is any accident, please go to see the doctor.
- (8) To use new battery when the working time of the battery is far short from the initial working time, as the cycle life of this battery is finished.

### 8. Others

- 8.1. We reserve right to revise the specification without notification;
- 8.2. Anything not mentioned in this specifications, customer and Conrad Electronic should discuss to get a solution;
- 8.3. We do not undertake any responsibility for the accidents caused by actions not matching with specifications.

\*\*\*\*\* END \*\*\*\*\*