

Energivm

Technical Product Specification

Cat : Nickel Cadmium Rechargeable
(High temperature type)
Model no. : CD4000D-HT (END4000HD)
Issue date : 11-Jan-10
Revision : A

(1) Scope

This specification is applicable for high temperature type Nickel Cadmium cylindrical rechargeable battery. This product series is specifically developed for continual charging condition. All data involves voltage and weight of stack-up battery pack are equal to the value of unit cell times the number of cells in the battery pack.

Example:

Stack-up battery pack consist of 3 cells

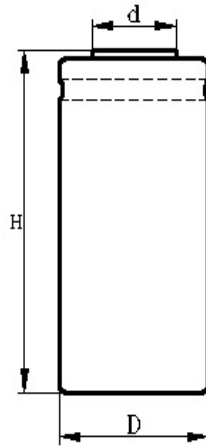
Nominal voltage of one cell = 1.2V

Nominal voltage of stack up battery pack = 3.6V (3 x 1.2V)

(2) General information

Characteristics		Specification	Remark
Minimum Capacity		4000 mAh	0.1C charge for 16 hrs 0.2C discharge till 1.0V
Nominal Voltage		1.2V	
Charge current	Standard	400mA(0.1C) for 16 hrs	Ambient temp at 0 to 60°C
	Trickle	120 mA (0.03C) to 200 mA (0.05C)	Ambient temp at 0 to 70°C
Discharge current	Standard	800mA (0.2C) till 1.0V	Ambient temp at -20 to 70°C
Storage temperature	< 1 year	-20 to 30°C	Humidity ≤ 85% RH
	< 3 months	-20 to 45°C	
Weight (for reference)		~113 grams	

(3) Dimension



$$d = 10.0 \pm 0.2$$

$$H = 60.0^{+0}_{-1.5}$$

$$D = 33.0^{+0}_{-1.0}$$

* Units in mm

(4) Electrical Performance

Unless otherwise specified, tests should be conducted within one month of delivery under conditions of ambient temperature $20 \pm 5^\circ\text{C}$ and relative humidity : $65 \pm 20\%$

Test Item	Test Conditions	Requirements
(1) Standard Charge	Charge for 16 hours at constant current of 0.1C after pre-discharge at the constant current of 0.2C until cut-off voltage of 1.0V	N/A
(2) Capacity	Capacity of the charged battery specified in item (1) is measured by discharge the battery at 0.2C until cut-off voltage of 1.0V after rest for 15 minutes. Up to 3 cycles is allowed.	$\geq 4000\text{mAh}$
(3) Open-circuit Voltage	Voltage between terminals of the charged battery specified in item (1) is measured after rest for 1 hour	$\geq 1.25\text{V}$
(4) Initial Impedance (for reference only)	The initial impedance is measured at 1KHz within one hour after standard charge	No required
(5) Charge retention	Standard charge as item (1), store for 28 days, then discharge at 0.2C to 1.0V	$\geq 2600\text{mAh}$
(6) Overcharge	Continuous charging for 28 days at a current of 0.1C .	No leakage, explosion
(7) IEC cycle life	According to IEC61951-1 (2003) 7.4.1.1, see note 1	≥ 500 cycles

(8) Leakage test	After charging at 0.1C and storage for 14 days at room temperature, no leakage nor deformation.	No leakage, deformation
(9) Safety Device Operation	The cell shall be forced discharged at an ambient temperature of $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$ at a constant current of 0.2C to a final voltage of 0 V. The current shall then be increased to 1C and maintained in direction at the same ambient temperature of $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for 60 min.	No explosion, but Leakage and deformation may occur
(10) Drop test	This means the endurance of the cell against drop Height: 1m Direction: 1 drop along each direction of the 3 mutually perpendicular axes Surface: Wooden board, 5cm thick	No leakage, venting or functional loss.
(11) Vibration test	This means the endurance of the cell against vibrations 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	No leakage, venting or functional loss.
(12) Permanent charge endurance	Initial charge efficiency test (3 cycles) at $+ 55^{\circ}\text{C} \pm 2^{\circ}\text{C}$ Cycle 1: Charge 48 hours at 0.05C; Discharge at 0.25C to a final voltage of 1.0V Cycle 2: Charge 24 hours at 0.05C Discharge at 0.25C to a final voltage of 1.0V Cycle 3: Charge 24 hours at 0.05C Discharge at 0.25C to a final voltage of 1.0V	Cycle 2, Cycle 3 capacity $\geq 75\%$
	Ageing period at $70^{\circ}\text{C} \pm 2^{\circ}\text{C}$ Continuous charge 0.05C for 28 days. Discharge at 0.25C.	N/A
	Final charge efficiency test (3 cycles) at $55^{\circ}\text{C} \pm 2^{\circ}\text{C}$ Cycle 1: Charge 48 hours at 0.05C; Discharge at 0.25C to a final voltage of 1.0V Cycle 2: Charge 24 hours at 0.05C Discharge at 0.25C to a final voltage of 1.0V Cycle 3: Charge 24 hours at 0.05C Discharge at 0.25C to a final voltage of 1.0V	Cycle 2, Cycle 3 capacity $\geq 75\%$

* Note 1: IEC61951-1 (2003) 7.4.1.1 Cycle life

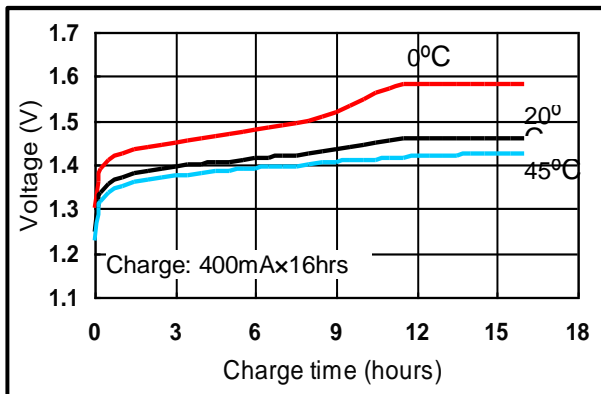
Cycle no	Charge	Rest	Discharge
1	0.1C X 16h	None	0.25C X 2h20min
2-48	0.25C X 3h10min	None	0.25C X 2h20min
49	0.25C X 3h10min	None	0.25C to 1.0V / cell
50	0.1C x 16h	1-4h	0.2C to 1.0V / cell

Cycles 1 to 50 shall be repeated until the discharge duration of any 50th cycles becomes less than 3hrs

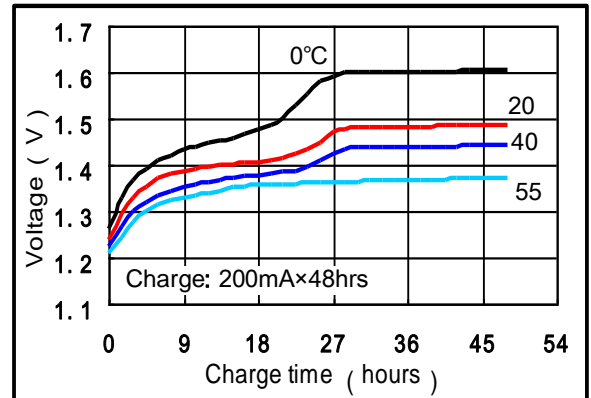
(5) Typical characteristic curves

● Typical Characteristics

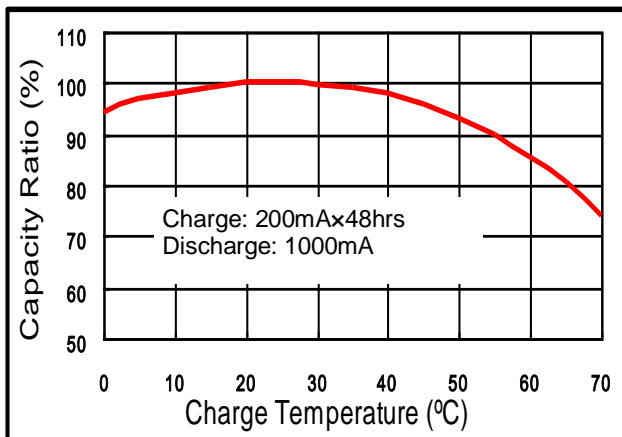
● Standard charge characteristics



● Trickle charge characteristics



● Discharge characteristics



(6) Caution

- ✚ Do not reverse charge
- ✚ Charge before use. The cells/batteries are delivered in an uncharged state
- ✚ Do not charge/discharge with more than our specified current
- ✚ Do not short circuit the cell/battery. Permanent damage to the cell/battery may be resulted
- ✚ Do not incinerate or mutilate the cell/battery
- ✚ Do not solder directly to the cell/battery
- ✚ The life expectancy may be reduced if the cell/battery is subjected adverse conditions like: extreme temperature, deep cycling, excessive overcharge/ over-discharge
- ✚ Store the cell/battery uncharged in a cool dry place. Always discharge batteries before bulk storage or shipment.

Notes:

- ✚ The information (subject to change without prior notice) contained in this document is for reference only and should not be used as a basis for product guarantee or warranty. For applications other than those described here, please consult your nearest Great Energy sales representatives.
- ✚ Manufacturer reserves the right to modify the design, model and specification without prior notice.