

## Ni-Cd Battery Product Specification

### D4500HT

1. This specification governs the performance of the following Nickel-Cadmium Cylindrical cell and its stack-up battery.

D BATTERY 45NC70 (To include all D-type 4.5Ah 70 degree battery packs)

Cell Size: D

2. Data of stack-up batteries:

All data involves voltage and weight to stack-up battery are equal to the value of unit cell times the number of unit cell which consisted in the stack-up batteries.

Example:

Stack-up battery consisting unit cells (number dependent on specification)

Nominal voltage of unit cell = 1.2V

Nominal voltage of stack-up batteries = 1.2V x 2 = 2.4V for example

3. Ratings:

Description	Unit	Specification	Conditions
Nominal Voltage	V/ Cell	1.2V per cell	
Nominal capacity	mAh	4500	Standard Charge/Discharge
Standard Charge	mA	450 (0.1C)	Ambient Temperature Ta= 20± 5°C
	Hour	16	
Trickle Charge		(0.03C)~(0.05C)	Ta = 0~70°C
Standard Discharge	mA	900 (0.2C)	Ambient Temperature/ Ta = 0~70°C Humidity: Max. 85%
Discharge cut-off voltage	V/ Cell	1.0	
Storage Temperature	°C	-	Charged state of 30%, Humidity Max. 85% (see note (3))
Typical weight	Gram	Approx. 115 per cell	Unit cell

#### 4. Performance

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

Ambient Temperature: T 20 +/-5°C

Relative Humidity: 50 +/- 15%

Test	Unit	Specification	Other condition	Remarks
Min. Capacity	mAh	> 4500	Standard Charge Discharge	Up to 3 cycles are allowed
Open Circuit Voltage (OCV)	V/ Cell	> 1.25	Within 2 weeks after Standard Charge	
Internal Impedance	m $\Omega$ / Cell	< 80	Upon fully charged (1 KHz)	
High rate discharge (0.5C)	minute	>108	Standard charge, 1 hour rest before discharge by 0.5C to 2.0V	Up to 3 cycles are allowed
Charge Efficiency (55°C)	mAh	> 4050 (90%)	Cycle 1: 0.05C Charge 48 Hrs, Discharge by 0.02C to 2.0V Cycle 2: 0.07C Charge 24 Hrs, Discharge by 0.02C to 2.0V Cycle 3: 0.07C Charge 24 Hrs, Discharge by 0.02C to 2.0V	Cycle 2/Cycle 3 Capacity Discharge > 90% Nominal capacity
Overcharge		No leakage nor explosion	0.1C Charge 10 days/ 0.1C	
Charge Retention	mAh	> 3150 (70%)	Standard charge, Storage: 7 day rest at 45°C Ambient Temperature, Standard Discharge	
Permanent Charge Endurance	min	For A	IEC61951-1(2006) 7.4.2.3	Permanent Charge Endurance
IEC Cycle Life	Cycle	>500	IEC 61951- (2003) 7.4.1.1	See note (4)
Leakage Test		No leakage nor deformation	Fully charged at 0.5C for 2.5 hour stand for 14 days	

Security Test		No explosion, but leakage or deformation is allowed	Charge the cell 0.1C 16 hrs, Then <100 m $\Omega$ Impedance short circuit for 1 hour	Ambient Temperature: Ta = 20 +/- 5°C
Impact Resistance		Change of voltage should be under 0.02V/ Cell Change of impedance should be under 5 m $\Omega$ / Cell/ <20mV	Charge the cell 0.1C 16hrs Then leave for 1-4 hrs, check battery before/after dropped. Height 50cm, wooden board thickness 30mm. Direction not specified, 3 times.	Ambient Temperature Ta = 20+/- 5°C
Vibration Resistance		Change of voltage should be under 0.02V/ Cell. Change of impedance should be under 5 milli-ohm/cell/<0.02V	Charge the battery 0.1C 16hrs, then leave for 24 hrs, check battery before/after vibration Amplitude 1.5mm vibration 3000 CPM Any direction for 60 mins	Ambient Temperature Ta = 20+/- 5°C

### 1. Configuration, Dimensions and packing:

Please refer to the attached drawing.

### 2. External appearance

The cell/battery shall be free from cracks, scars, breakage, rust, discolouration, leakage nor deformation.

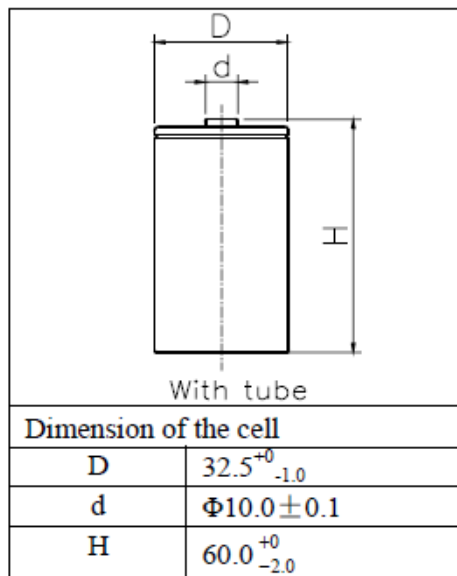
### 3. Caution

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

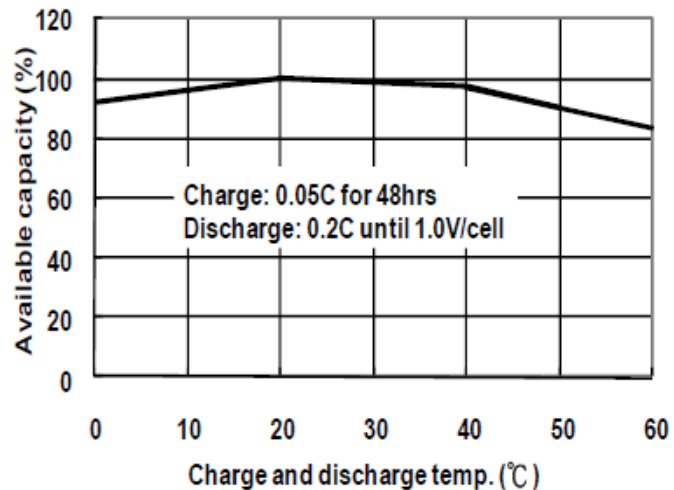
Notes:

- (1) Ta: Ambient Temperature
- (2) Approximate charge time from discharged state is for reference only
- (3) If the battery or battery packs are subjected to storage for such a long term more than 3 months, it is recommended to recharge the battery or battery packs periodically e.g. every 3 months or before the open circuit voltage (OCV) of the batteries comes down to 1.1Volts in order to obtain reasonably good capacity recovery and prevent battery performance degradation.
- (4) IEC61951-1(2003)7.4.1.1 Cycle life

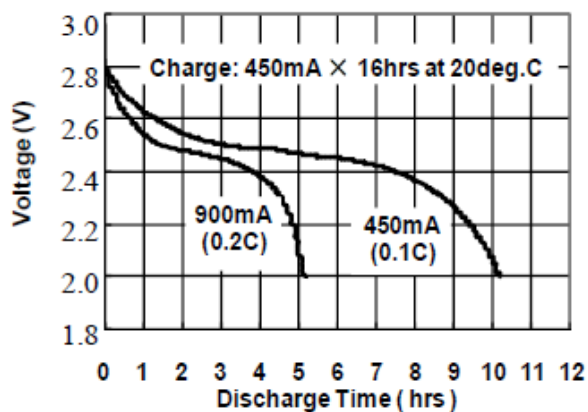
Cycle No.	Charge	Rest	Discharge
1	0.1C x 16h	None	0.25C x 2h 20min
2-48	0.25C x 3h 10 min	None	0.25C x 2h 20 min
49	0.25C x 3h 10 min	None	0.25C to 1.0V/Cell
50	0.1C x 16h	1-4h	0.2C to 1.0V/Cell
Cycles 1 to 50 shall be repeated until the discharge duration on any 50 <sup>th</sup> cycle becomes less than 3h			



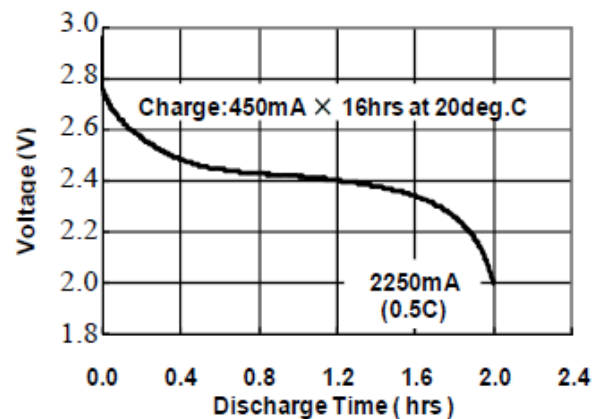
Charge & Discharge efficiency Vs. temp.



Low Rate Discharge 2 cell pack

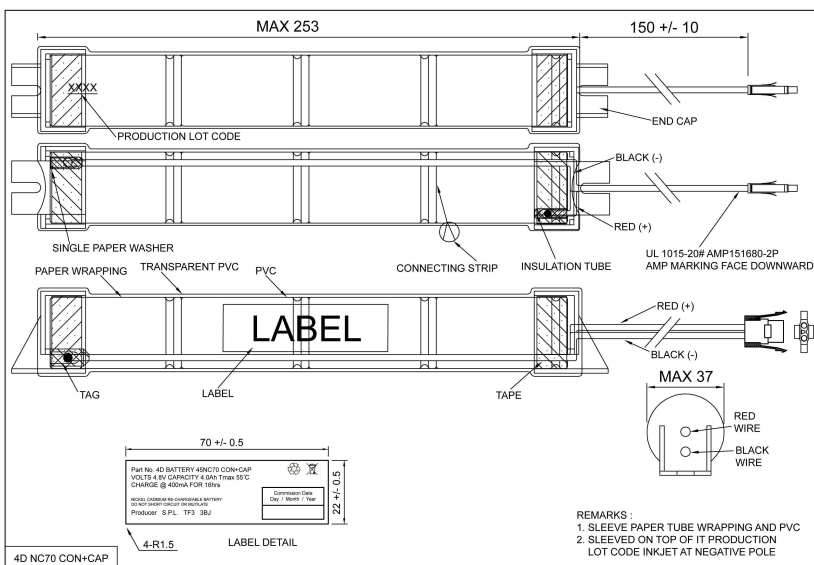
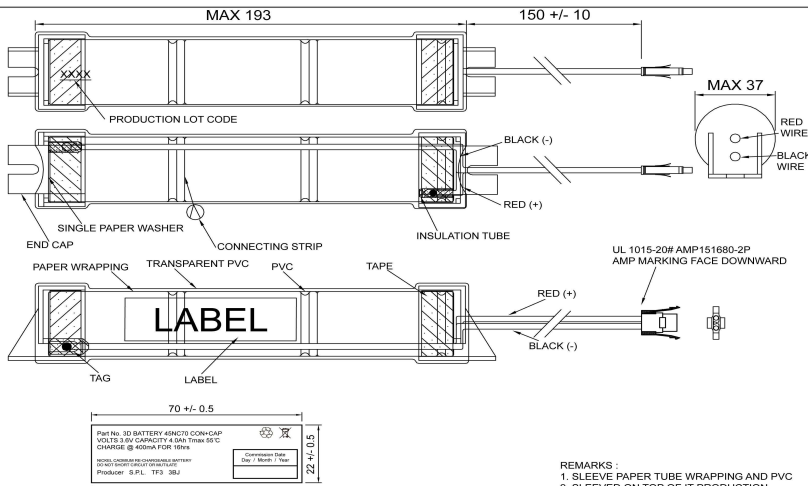
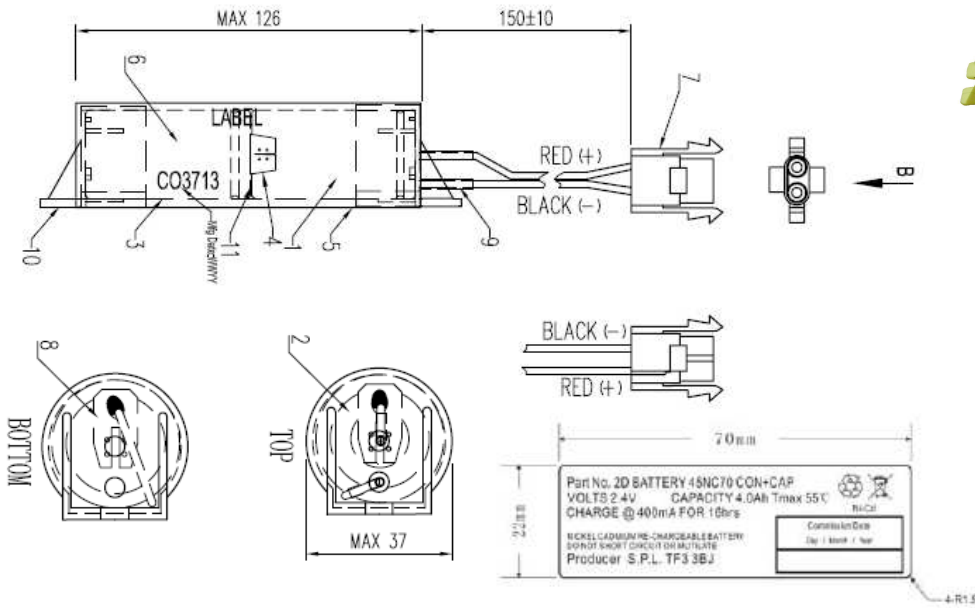


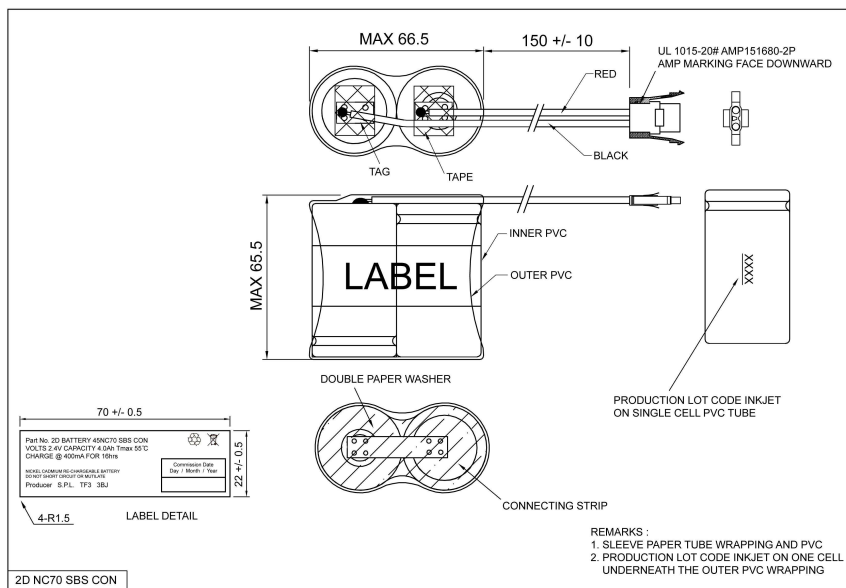
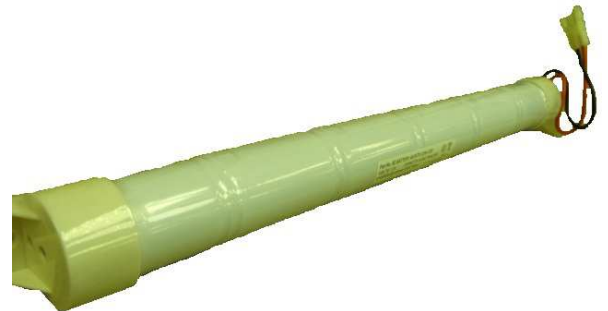
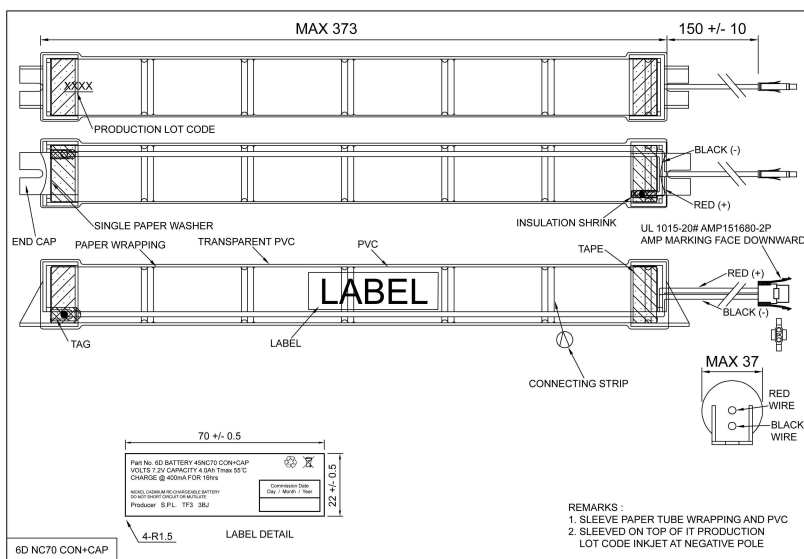
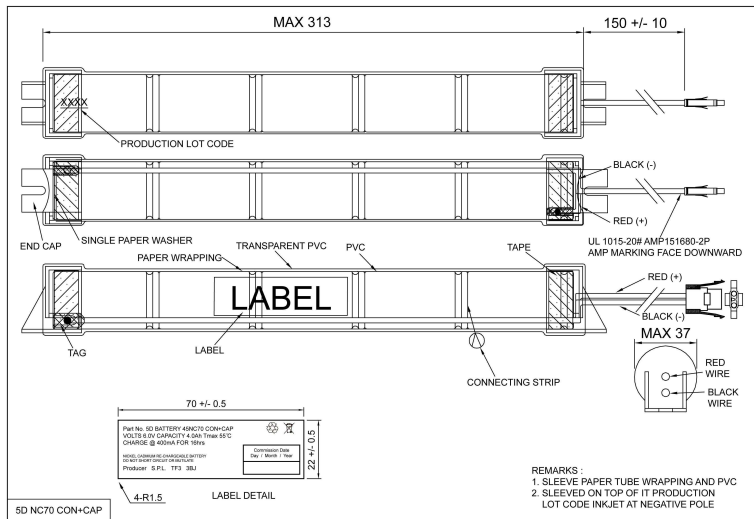
High Rate Discharge 2 cell pack



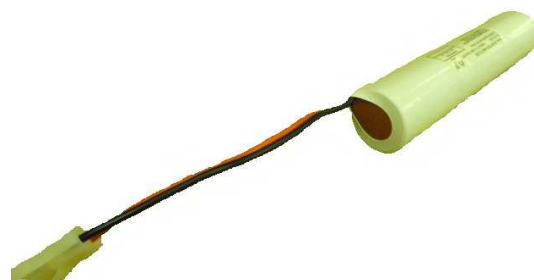
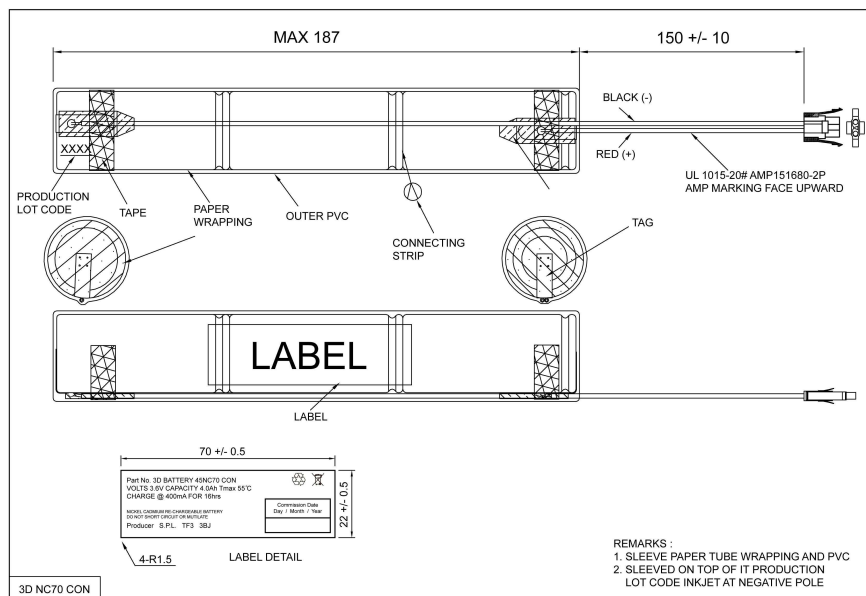
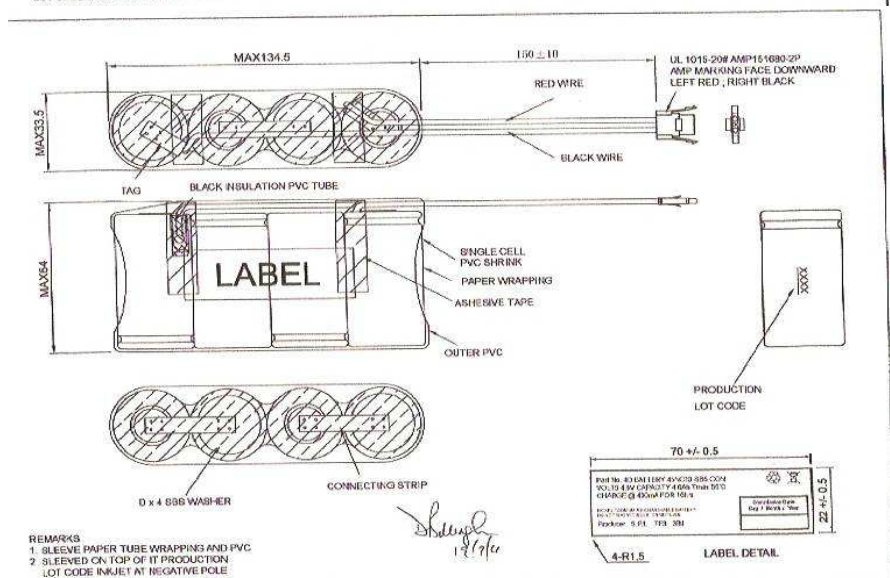
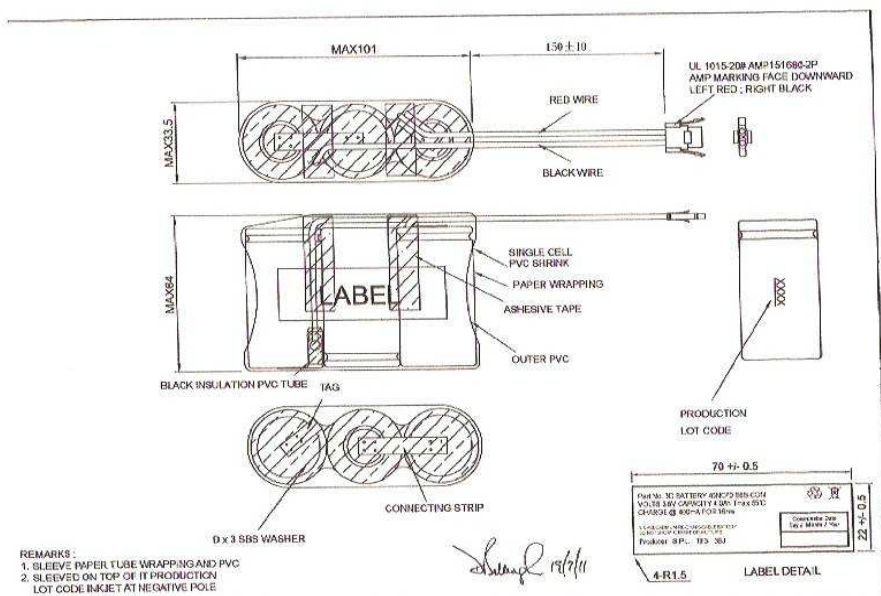
1. The information (subject to change without prior notice) contained in this document is for reference only and should not be used as a basis for product guarantee or warranty. For applications other than those described here, please consult your nearest Tamtec/Tamlite Lighting office.
2. Manufacturer reserves the right to alter or amend the design, model and specification without prior notice.

## Battery Drawings











## **Material Safety Data Sheet Information**

### **Section 1 – Manufacturer's Information**

Tamtec Electronics c/o Tamlite Lighting  
Stafford Park 12  
Telford  
Shropshire  
TF3 3BJ  
United Kingdom

Telephone Number:-  
(+44) 1952 299 399

### **Section 2 – Hazardous Ingredients/Identity Information**

Battery Model:	Nickel Cadmium Battery
Mercury:	Nil
Lead:	Nil
CdO (Cadmium Oxide):	22.5%
Ni(OH) <sub>2</sub> (Nickel Hydroxide) :	19.8%
30% KOH Solution (Potassium Hydroxide) :	14.4%
30% KOH	

### **Section 3 – Physical/Chemical Characteristics**

Boiling Point:	N/A	Specific Gravity (H <sub>2</sub> O=1):	N/A
Vapour Pressure (mm Hg):	N/A	Melting Point:	N/A
Vapor Density (AIR=1):	N/A	Evaporation Rate (Butyl Acetate=1):	N/A
Solubility in water:	N/A		
Appearance and Odour:	Cylindrical shape, odourless		

### **Section 4 – Hazard Classification**

Classification: N/A

### **Section 5 – Reactivity Data**

Stability:	UNSTABLE	
	STABLE	X
Conditions to Avoid:	N/A	
Incompatibility (Materials to Avoid):	N/A	
Hazardous Decomposition or Byproducts:	N/A	
Hazardous Polymerization:	WILL OCCUR	
	WILL NOT OCCUR	X

## Section 6 – Health Hazard Data

Route(s) of entry/Health Hazard/Toxicological Information:	Ingestion: N/A
Inhalation:	Inhalation of electrolyte vapors may cause irritation of the upper respiratory tract and lungs
Eye/Skin Contact:	In case of electrolyte leakage, can cause severe irritation and chemical burns, skin will be itchy.

## Section 7 – First Aid Measures

If electrolyte leakage occurs and makes contact with skin, wash with plenty of water immediately  
If electrolyte comes into contact with eyes, wash with copious amounts of water for fifteen (15) minutes, and consult a physician  
If electrolytes vapors are inhaled, provide fresh air and seek medical attention if respiratory irritation develops.  
Ventilate the contaminated area

## Section 8 – Fire and Explosion Hazard Data

Flash Point (Method Used):	N/A
Ignition Temp:	N/A
Flammable Limits:	N/A
LEL:	N/A
UEL:	N/A
Extinguishing Media:	Carbon Dioxide, Dry Chemical or Foam Extinguishers
Special Fire Fighting Procedures:	N/A
Unusual Fire and Explosion Hazards:	Do not dispose of battery in fire – may explode Do not short circuit battery – may cause burns

## Section 9 – Accidental Release/Spillage

Steps to be Taken in case Material is Released or Spilled:

- Batteries that have leakage should be handled with rubber gloves
- Avoid direct contact with electrolyte
- Wear protective clothing and a positive pressure Self-Contained Breathing Apparatus (SCBA).

## Section 10 – Handling & Storage

Batteries should be handled and stored carefully to avoid short circuits  
Do not store in disorderly fashion, or allow metal objects to be mixed with stored batteries  
Never disassemble a battery  
Do not breathe call vapors or touch internal material with bare hands  
Keep batteries between -30 C and 45 C for prolonged storage

## Section 11 – Exposure Controls/Personal Protection

Occupational Exposure Limits:

STEP:	N/A	
LTEP:	N/A	
Respiratory Protection (Specify Type) :	N/A	
Ventilation:	Local Exhaust:	N/A
	Special:	N/A
	Mechanical (General):	N/A
	Other:	N/A
Protective gloves:	N/A	
Eye Protection:	N/A	
Other protective clothing or equipment:	N/A	
Work/Hygiene practices	N/A	

## Section 12 – Ecological Information

N/A

## Section 13 – Disposal Method

Dispose of batteries according to government regulations

## Section 14 – Transportation Information

Tamtec batteries are considered to be “Dry cell” batteries and are unregulated for purposes of transportation by the U.S. Department of Transportation (DOT), International Civil Aviation Administration (ICAO), International Air Transport Association (IATA) and International Maritime Dangerous Goods Regulations (IMDG). The only DOT requirement for shipping these batteries is special provision 123 which states: “Batteries, dry are not subject to the requirement of this subchapter only when they are offered for transportation in a manner that prevents the dangerous evolution of heat (For example, by the effective insulation of exposed terminals). As of 1/1/97 IATA requires that batteries being transported by air must be protected from short-circuiting and protected from movement that could lead to short-circuiting.

## Section 15 – Regulatory Information

Special requirement is according to the local regulations

## Section 16 – Other Information

The data in this Material Safety Data Sheet relates only to the specific material designated herein.

## Section 17 – Measures for fire extinction

In case of fire, it is permissible to use any class of extinguishing medium on these batteries or their packing material. Cool exterior of batteries if exposed to fire to prevent rupture  
Fire fighters should wear self-contained breathing apparatus