CHANGHONG® Ni-Fe Battery

Operation and Maintenance

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Application

Nickel Iron rechargeable battery （hereinafter referred to as rechargeable battery） can be used as the DC power for lighting tele-communication and drawing electric motor at the ambient temperature of -20～+50℃.

1. Instruction Features and Performance

2.1 The active materials of the pocket plate battery are retained in pockets formed from steel strips double perforated by a patented process.

These pockets are mechanically linked together, cut to the size corresponding to the plate width and compressed to the final plate dimension. This process leads to a plate which is not only mechanically very strong but also retains its active material within a steel containment which promotes conductivity and minimizes electrode swelling.

These plates are then welded to a current carrying bus bar assembly which further ensures the mechanical and electrical stability of the product.

1.2 The cell voltage of nickel-cadmium cells results from the electrochemical potentials of the nickel and the iron active materials in the presence of the potassium hydroxide electrolyte. The nominal voltage for this electrochemical couple is 1.2 volts.

1.3 Capacity: The real capacity of the rechargeable battery is bigger than the nominal capacity. Example: TN350 rechargeable batteries' real capacity should be more than 350 Ah.

1.4 Life time: The charge and discharge cycles should be more than 750 times. During the life time, the average discharge capacity should not be less than nominal capacity. The minimum discharge capacity should be more than 90% of the nominal capacity.

1.5 Storage period: Rechargeable battery can keep the life time performance after storage for 4 years under the required storage conditions. If new battery were stored over 4 years, please carry out 3 to 5 charge and discharge cycles before capacity inspection. If the capacity can reach the nominal capacity and no rustiness, the battery can be put in use.

1.6 The battery can be over charged and over-discharged. They also can be discharged with the current of 1I₅A. But it is inadvisable for the battery to be discharged with the current of 1I₅A over 30 min.

1.7 If the operation temperature is -20℃, the discharge capacity of the battery will be less than nominal capacity.

3. Operation and Maintenance

3.1 Preparation, storage and apply of electrolyte

3.1.1 Requirement of preparation of electrolyte (see table 1)

Table 1

No.	Operation temperature	Gravity	Electrolyte dry powder	Weight ratio (Dry powder：Water)
1	+31℃～+45℃	1.18±0.02	KOH+20 g/L ($LiOH.H_2O$)	1：5
2	-10℃～+30℃	1.20±0.02	KOH+40 g/L ($LiOH.H_2O$)	1：3
3	-25℃～-11℃	1.25±0.02	KOH	1：2

Note:

②Please dissolve the $LiOH.H_2O$ with some electrolyte in a separate vessel and add the mixed solution into the pure KOH solution。

③For No. 3 electrolyte, the potassium carbonate in KOH powder should not be over 4%. NaOH is prohibited from interfusing into the KOH.

④Ensure that the mixing vessel is clean and that it can contain the total quantity of liquid electrolyte to be prepared. IMPORTANT: neither copper, aluminium or galvanized steel made vessels, nor vessels or containers with (welding) seams can be used for this purpose.

⑤the person making those operations has to wear safety goggles, protective gloves and adequate working clothes (protective apron) or similar protective clothes and shoes, ensuring the safe handling of the materials. In case of contact of any of the referred materials (either solid components or liquid electrolyte), the body surfaces eventually affected have to be immediately cleaned and washed up with abundant fresh water. In case eyes have been affected, an immediate eye wash with copious quantities of fresh clean water shall be done. In any case, in the eventuality of such an incident, the worker has to immediately be treated by the nearest medical or sanitary staff.

Technical requirements of the water for preparing electrolyte

No.	Item	Standard
1	Physical specification	Achromatic color、unpalatable、transparent、No impurity
2	Resistance (Å)	≥200000
3	Fe (g/L)	≤0.00005
4	$SO4^{2-}$ (g/L)	≤0.0005
5	Cl- (g/L)	≤0.001
6	Heavy Metal Pb (g/L)	≤0.00005
7	Ca 、Mg Mg (g/L)	≤0.0006
8	SiO_3^{2-} (g/L)	≤0.0001

3.1.2Storage of electrolyte

The electrolyte should be stored in the sealed alkali resistance container.

3.1.3Please chose the property electrolyte according to the operation temperature.

3.2Charge and discharge

3.2.1Charge methods (See table 3)

Table 3

Charge type Condition	Normal Charge	Over Charge	Fast Charge
Current	0.25I.A	0.25 I.A	0.5 I.A
Time	8hrs	12 hrs	4 hrs

3.2.2Discharge methods (See table 4)

Table 4

Discharge Rate	End voltage（V）	Time（h）	Remark
$1I_t$	≥0.5	Approximate 1h	
$0.5I_t$	≥0.7	Approximate 2h	
$0.33I_t$	≥0.9	Approximate 3h	
$0.2I_t$	≥1.0	Approximate 5h	
$0.125I_t$	≥1.10	Approximate 8h	
$0.1I_t$	≥1.10	Approximate 10h	
$0.05I_t$	≥1.15	Approximate 20h	

3.3 Operation Instruction

3.3.1 Rechargeable battery was formatted and discharged before leaving factory. Since the battery is delivered without electrolyte, it should be filled with electrolyte. The electrolyte level must be 15~30mm higher than the top of electrodes group. Before operation, the battery shall be charged according to the over-charge method for one time, if the battery was stored within one year or the battery is new. Otherwise, 2~3 cycles of charge and discharge should be carried out.

3.3.2 During daily operation, the battery shall be charged and discharged according to the normal charge and discharge method. If it is necessary, the battery can be fast charged.

3.3.3 The electrolyte will absorb the carbon dioxide in the air and create carbonate easily during operation. When carbonate in the electrolyte is over 50g/L, the performance of the battery will be badly effected. After charge and discharge for 150~200 cycles or operate for 1 year, please check the carbonate in the electrolyte. If the carbonate in the electrolyte is over 50g/L, please replace the electrolyte.

3.3.4 Do not operate together with the Lead Acid battery.

3.4 Trouble Shooting

Trouble	Causes	Replace the electrolyte.
The capacity of the battery decreases	1.The electrolyte has been used of a long time and the carbonate content in it is too high.	Replace the electrolyte.
	2.The electrolyte is improperly used.	Replace the electrolyte.
	3.The electrolyte isn't enough, and the level of the electrolyte is below the top of the plates.	Add distilled water, and adjust the density, then overcharge it.
	4.Hurmful impurities contained in the electrolyte is too high.	Replace the electrolyte after cleaning.
	5.The charge/discharge mechanism isn't correct.	Use the correct charge/ discharge mechanism.
	6.Short-circuit or slight-short circuit in the cell	Replace the short-circuit cell.
	7.Short-circuit or slight-short circuit occurs out of the cell	Keep the cells in a dry temperature.
	8.The instruments used is not correct.	Check and rectify the galvanometer and voltmeter.
Voltage is Un-correct.	1.The inner circuit of the cell is short or cut, the electrolyte has been run out.	Clean the cell, or change the electrolyte.
	2.The out circuit of the battery is short or cut.	Keep the cell dry, and check.
	3. Contact fault.	Check and repair.
The cell container swells	1.The positive plate swells.	If necessary, change the cell.
	2.The vent is blocked up.	Clean with hot water or replace it.
	3.The inner circuit of cell is short, or there are too many impurities in the electrolyte.	Check and replace the electrolyte.
Bubbles appear in the inside of the cell	The electrolyte contains organic impurities.	Replace the electrolyte.
Creeping of electrolyte	1. The level of electrolyte is too high.	Drain out the superfluous electrolyte.
	2. The vent of terminal is unsealed.	Replace the sealing parts and screw tightly.
	3.electrolyte overflow	Clean and keep dry.

Cell Types	Nominal voltage (V)	Nominal capacity (Ah)	Max. External Dimension (mm)			Pole size	Dry Weight (Kg)	Material of cell case
			L	W	H			
TN10-(2)	1.2	10	38	84	135	M6	0.8	
TN20-(2)	1.2	20	32	113	223	M6	1.2	
TN30-(2)	1.2	30	68	134	245	M10×1	2.5	PP
TN40-(2)	1.2	40	68	134	245	M10×1	2.5	
TN45-(2)	1.2	45	68	134	245	M10×1	2.5	
TN50-(2)	1.2	50	70	134	285	M16	2.9	
TN60-(2)	1.2	60	70	134	285	M16	3.4	
TN80-(2)	1.2	80	80	141	370	M10×1	4.0	
TN100-(2)	1.2	100	80	141	370	M10×1	5.0	
TN150-(2)	1.2	150	106	164	345	M20	7.0	
TN200-(2)	1.2	200	106	164	345	M20	8.5	
TN250-(2)	1.2	250	138	276	420	M16	13.5	
TN400-(2)	1.2	400	138	276	450	M16	19.0	
TN600-(2)	1.2	600	176	291	510	M20	28.0	
TN700-(2)	1.2	700	176	291	510	M20	30.0	
TN800-(2)	1.2	800	186	398	570	M20	40.0	
TN1000-(2)	1.2	1000	186	398	570	M20	45.0	