SANYO Ni-MH BATTERY SPECIFICATIONS

DATE : Apr. 20, 2001

FILE No. : A-2070

Battery Model No. : HR-4/3AU

This specification applies to the SANYO Sealed Nickel-Metal Hydride Rechargeable Battery (Twicell) of the above mentioned model for RS COMPONENTS LIMITED.

SANYO ELECTRIC CO., LTD.
SOFT ENERGY COMPANY CRM DIVISION
Technical CRM Business Unit
Battery Technical Department
Twicell Battery Section

Drw	M. Uematsu
Chk	F. Ueda
App	T. Sugiyama

Specification alteration history

No.	Date	Class*	Main altered item		
	Apr. 20. 2001	-	New issue	Drw	M. Uematsu
				Chk	T. Ueda
				App	T. Imagawa

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

1. BATTERY MODEL

HR－4／3AU

2. NOMINAL SPECIFICATION

2－1. Nominal Voltage	1.2 V
2－2. Nominal Capacity*1	4000 mAh
2－3. Minimum Capacity*1	3500 mAh
2－4. Charging Current*2	2000 mA
2－5. Charging Time	About 130 min
2－6. End Voltage of Discharge	1.0 V
2－7. Temperature (Recommended)	
Charge:	±0～+40℃
Discharge:	±0～+50℃
Storage: Less than 30days	－20～+50℃
Less than 90days	－20～+40℃
Less than 1year	－20～+30℃
2－8. Humidity	65±20%
2－9. Weight	About 55g

*1 : Typical discharge capacity when a single cell is discharged at 0.2C after being charged at 0.1C for 16 hours.
*2 : Use recommended charging systems

3. DESIGN, CONSTRUCTION, PHYSICAL DIMENSIONS

A battery unit shall be of the design, construction and physical dimensions shown in the attached drawing.

4. APPEARANCE

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

5. ELECTRICAL CHARACTERISTICS

5－1. Full Charge

Full charge is defined as charged up to controlled fast charge by a specified fast charger. Specified fast charger is as follows.

- ·Charging Current : 2000mA
- ·Full charge detection : Peak Voltage

5－2. Terminal Voltage (O. C. V)

Open circuit voltage shall be a minimum voltage of 1.25V within 14 days after fully charged.

5－3. Capacity

①A battery unit shall be capable of supplying 700mA continuous discharge current for a minimum of 287 minutes to 1.0V end voltage within 1 hour after fully charged.

②A battery unit shall be capable of supplying 2000mA continuous discharge current for a minimum of 93 minutes to 1.0V end voltage within 1 hour after fully charged.

③A battery unit shall be capable of supplying 700mA continuous discharge current for a minimum of 300 minutes to 1.0V end voltage within 1 hour after following process.

- ·Charge with 350mA for 16 hours after discharged with 700mA to 1.0V.

Remarks : Item③ is applied only for the capacity measurement. Please do not use item③ for the design of the charger.

5－4. Cycle Life

A battery unit shall be capable of 300 minimum cycles under the conditions as follows.

Charge	: Paragraph 5-1
Rest	: 1 hour
Discharge	: Paragraph 5-3-②
Rest	: 1 hour

After 300 cycles, discharge time as specified in paragraph 5-3-② shall be a minimum of 56 minutes.

5－5. Over Discharge

Capacity of fully charged battery unit, when discharged with 2Ω load for 8 hours, shall not cause damage, leakage, salting or degradation in performance characteristics as specified herein.

5－6. Temperature Characteristics

①Within 1 hour after fully charged at 40℃, discharge time shall be a minimum of 79 minutes at 20℃ as specified in paragraph 5-3-②.

②Within 1 hour after fully charged at 20℃, discharge time shall be a minimum of 56 minutes at ±0℃ as specified in paragraph 5-3-②.

5－7. Self Discharge

①After fully charged unit is stored for 28 days at 20℃, discharge time shall be a minimum of 60 minutes as specified in paragraph 5-3-②

②After fully charged unit is stored for 7 days at 40℃, discharge time shall be a minimum of 60 minutes as specified in paragraph 5-3-②

5－8. Safety

①A battery unit shall not rupture when charged at 2000 mA for 5 hours. However, it is acceptable for the battery unit to sustain leakage of battery fluid and show a change in appearance.

②A battery unit shall not rupture when reverse charged at 2000 mA for 5 hours. However, it is acceptable for the battery unit to sustain leakage of battery fluid and show a change in appearance.

5－9. Vibration

A battery unit shall not sustain damage to its battery performance, when tested under the following conditions.

Conditions : Amplitude ····· 4 mm
Cycle ····· 16.7Hz
Direction ····· optional
Time ····· 60 minutes

5－10. Supply

A battery unit shall be shipped at discharged state.

6. STANDARD TEST CONDITIONS

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

Above mentioned specifications are tested at 20±2℃ temperature and 65±5% humidity.

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, bursting, fire and serious personal injury!

- Never dispose of Twicell batteries in a fire or heat them.
- Do not connect the (+)positive and (-)negative terminals of Twicell batteries together with electrically conductive materials, including lead wires. Do not transport or store Twicell 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.
- Only charge Twicell batteries using those specific chargers that satisfy Sanyo's specifications. Only charge batteries under the conditions specified by Sanyo.
- Never disassemble Twicell 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, bursting and fire. Also, this is dangerous as it may cause splashing of alkaline fluid.
- Never modify or reconstruct Twicell batteries. Protective devices to prevent danger are built into batteries(single cell or packed cells). If these are damaged, excessive current flow may cause loss of control during charging or discharging of the battery, leakage of battery fluid, heat generation, bursting and fire.
- Never solder lead wires directly on to Twicell batteries.
- The (+)positive and (-)negative terminals of Twicell batteries are predetermined. Do not force the terminals to connect to a charger or an equipment. If the terminals can not 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 Twicell battery. For this reason, never deform this section or cover or obstruct its gas release structure.
- Do not directly connect Twicell batteries to a direct power source or the cigarette lighter socket in a car.
- Do not use Twicell batteries in any equipment other than those specified by Sanyo.

- Twicell batteries contain a strong colorless alkaline solution (electrolyte). The alkaline solution is extremely corrosive and will cause skin damage. If any fluid from a Twicell 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 Twicell 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 Twicell batteries, as this can cause rust and heat generation. If a battery becomes rusted, the gas release vent may no longer operate, and can result in bursting.
- Do not over-charge Twicell batteries by exceeding the predetermined charging period specified by the battery charger's instructions or indicator. If Twicell batteries are not fully charged after the battery charger's predetermined charging period has elapsed, stop the charging process. Prolonged charging may cause leakage of battery fluid, heat generation, and bursting. Be sure to handle recharged batteries carefully as they may be not.
- Twicell batteries contain a strong colorless alkaline solution (electrolyte). If the skin or clothing comes in contact with fluid from a Twicell battery, thoroughly wash the area immediately with clean water from the tap or another source. Battery fluid can irritate the skin.
- Do not connect more than 21 Twicell batteries in series, as this may cause electrical shocks, leakage of battery fluid and heat generation.
- 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, bursting and fire.
- If Twicell batteries leak fluid, change color, change shape, or change in any other way, do not use them, otherwise they may cause heat generation, bursting and fire.
- Keep Twicell 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 Twicell 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 Twicell batteries.

●Store Twicell 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 charge Twicell batteries within a temperature range of 0 to 40 ℃ (degrees Celsius).

●Be sure to use the recommended charging method for Twicell batteries, read the battery charger's instruction manual carefully.

●Do not use or store battery at high temperature, such as in strong direct sunlight, in cars during hot weather, or directly in front of a heater. This may cause leakage of battery fluid. It could also impair performance and shorten operating life of Twicell batteries.

●Be sure to turn off the equipment after use of Twicell batteries, otherwise may result in leakage of battery fluid.

●After removed from equipment, store Twicell 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. (Sanyo recommends the storage temperature range from -20 to +30℃ for longer service life).

●To use batteries for the first time after purchase or having not used them for a long period of time, be sure to charge them.

●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 the battery for a few times.

●Do not use old and new batteries mixed together, or batteries at different charge levels. Do not use the Twicell battery mixed together with a dry cell or other batteries of different capacity, type, or bland name. This may cause leakage of battery fluid and heat generation.

●If the Twicell battery terminals become dirty, clean 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.

WARRANTY

SANYO will be responsible for replacing the battery against any defects or poor workmanship for one year from the date of shipping.

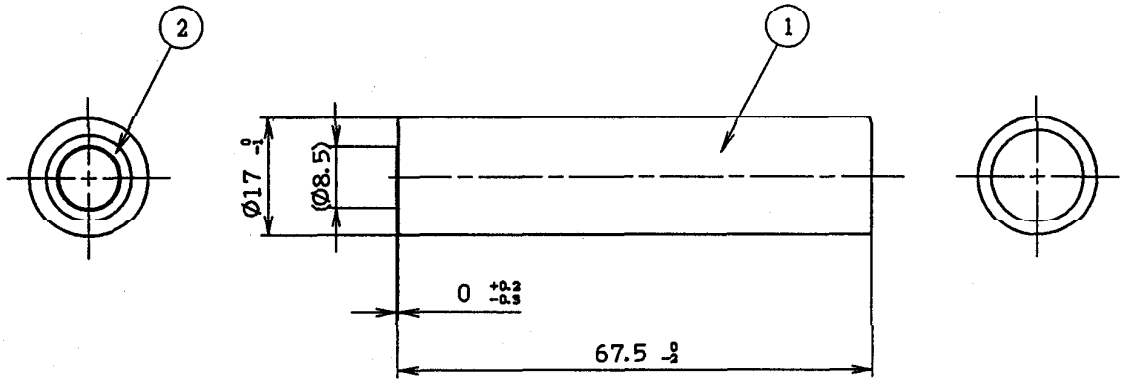
Any other problems caused by malfunction of the equipment or misuse of the battery is not under this warranty.

SAFETY

To assure safety, please consult to the SANYO technical staff for your applications including electrical specifications, mechanical designs, protective devices and any special specification.

1	2	3	4	N

NO.	PART NAME	APPLICATION·PART CODE	QTY.	MATERIAL·SPECIFICATION	NOTE
	BATTERY		1	HR-4/3AU	4000mAh
1	TUBE		1	P.V.C.	SANYO PRINTED
2	INSULATION RING		1	FISH PAPER, 0.25t	



NOTES.

1. STAMP LOT NO. ON THE TUBE. (XXH)

DRAWING NOT TO SCALE

DATE	REMARK	SYM	DATE	DESCRIPTION
MAR. 26. 2001		⚠2		
		⚠1		

D R	J. Yamamoto	MODEL: HR-4/3AU-RSC		材料・基準	
CHK		CUSTOMER CODE: RSC		MATERIAL	
CHK	K. Ishihara	TOLERANCE	WEIGHT	処理・加工	
		250< L ±5	Approx. 55 g	FINISH	
ENG		< L ≤ ±	UNIT mm	部品名	完成電池
		50< L ≤250 ±4		PART NAME	BATTERY PACK(finish goods)
APP	Y. Hibino	18< L ≤ 50 ±3	QTY 1	PART CODE	
		L ≤ 18 ±2	SCALE 1/1	DRAWING NO	HR4/3AU-15501

Sanyo Electric Co., Ltd. Soft Energy Company