Matsushita Electric Industrial Co., Ltd. Matsushita Battery Industrial Co., Ltd.

SPECIFICATIONS OF SEALED NICKEL METAL HYDRIDE BATTERIES

FOR MESSRS:

MODEL: HHR-30SCPY06

DATE: 31, JAN. 2001

SPECIFICATION No. : S1013180



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		Checked	
		Approved	11/14/10

APPROVED BY	SIGNATURE	DATE
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FORM No. : EAAEO6

MH

SPECIFICATIONS

1. APPLICATION

This specification applies to the Sealed Nickel-Metal Hydride rechargeable cell or battery :

Model

HHR-30SCPY06

for

2. RATINGS

 O1EC Designation
 HR23/43

 ONominal voltage
 1.2
 V

 ORated (Minimum) capacity *1
 2800
 mAh

 OAverage capacity (for reference only)
 3050
 mAh

 OStandard charge rate
 300
 mA × 16 h

 ORapid charge rate
 3000
 mA (with the following)

charge condition)*2

Trickle current

ODischarge cut-off voltage $\begin{array}{rcl}
100 \text{ to } 150 \text{ mA} & \text{(Need timer)} \\
(n \times 1.0) \text{ V} & (n=1 \sim 6) \\
((n-1) \times 1.2) \text{ V} & (n=7 \sim 10)
\end{array}$

[(n-1) × 1.2} V (n=1~10) (n:cell number)

OMaximum continuous discharge current 30000 mA (at 20 °C)

(single cell)

OOperating temperature range (Humidity: +65 %±20 %)

 Standard charge
 0 to +45 °C (32 to 113 °F)

 Rapid charge
 0 to +40 °C (32 to 104 °F)

 Discharge
 -10 to +65 °C (14 to 149 °F)

Discharge -10 to +65 °C (14 to 149 °F)

within 1 week -20 to +65 °C (-4 to 149 °F)

- *1 Rated capacity figures are based on single cell performance.
- *2 All rapid charge systems should be discussed with our engineer.
- *3 We recommend cells or batteries are charged at least once every 6 months.

When operation falls outside these parameters please contact our engineer.

3. ASSEMBLY & DIMENSIONS

as per attached drawing

drawing number

C21302394-1

4. PERFORMANCE

4-1. TEST CONDITIONS

All tests are carried out on new cells or batteries. (within one month after delivery)
Ambient conditions:

Temperature

+20 °C±5 °C

Humidity

+65 %±20 %

4-2. TEST METHOD & PERFORMANCE

4-2-1. Outer appearance :

Cells and batteries shall be free from any stains, scratches or deformations which may reduce the commercial value of the product when visually inspected.

- 4-2-2. Capacity:

 Following a 16hour charge period at 300 mA, the cell shall be stored for a period of 1hour. The discharge duration shall exceed 4 hour(s) 40 min(s) when discharged at 600 mA down to a terminal voltage of 1.0 V. The capacity returned may 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 specified value.
- 4-2-3. Open circuit voltage : (0. C. V.)

 Following a 16hour charge period at 300 mA, the open circuit voltage of the cell or battery shall be checked within 1hour. The 0. C. V. shall exceed 1.25 V per cell.
- 4-2-4. Closed circuit voltage: (C.C.V.)
 Following a 16hour charge period at battery shall be checked with a 0.40 Ω per cell load within 1hour. The C.C.V. shall exceed 1.2 V per cell within 1sec.
- 4-2-5. Internal impedance:
 Following a 16hour charge period at 300 mA, the Internal impedance of the cell or battery shall be checked at 1000 Hz within 1hour. The internal impedance shall be less than 7 mΩ per cell.
- 4-2-6. High rate discharge:
 Following a 16hour charge period at <u>300</u> mA, the cell or battery shall be stored for a period of 1hour. The discharge duration shall exceed <u>46</u> min(s) when discharged at 3000 mA.
- 4-2-7. Low temperature discharge:
 Following a 16hour charge period at 300 mA, the cell or battery shall be stored for a period of 24hours at 0 °C±2 °C. The discharge duration shall exceec 2 hour(s)
 48 min(s) when discharged at 600 mA at ambient temperature of 0 °C±2 °C.
- 4-2-8. Self discharge:
 Following a 16hour charge period at 300 mA, the cell or battery shall be stored on open circuit for a period of 28 days. The subsequent discharge duration shall exceed 3 hour(s) 02 min(s) when discharged at 600 mA.
- 4-2-9. Storage:

 The cell shall be stored on open circuit for a period of 12months at discharged state.

 Following completion of the storage period, the cell shall be charged for 16hours at

 300 mA. The subsequent discharge duration shall exceed 3 hour(s) 58 min(s) when discharged at 600 mA. The test may be repeated a further two or three times to reach the specified capacity.
- 4-2-10. Over-charge # 1:

 Following a 48hour continuous overcharge period at 300 mA, the cell or battery shall be stored for a period of 1hour. The subsequent battery discharge duration shall exceed 4 hour(s) 40 min(s) when discharged at 600 mA. The cell or battery shall not be externally deformed and no leakage of electrolyte in liquid form shall be observed.
- 4-2-11. Life time (Based on IEC):
 Based on 50 charge -discharge cycles as outlined in the table below, the discharge time of the 50th, 100th, 150th, 200th, 250th, 300th, 350th, 400th, 450th and 500th shall exceed

 2 hour(s) 48 min(s). (Ambient temperature is 20 °C±5 °C)

300 mA for 16 hours

Cycle number	Charge	Rest	Discharge
1	300 mA for 16 hours	none	750 mA for 2.33hours
2~48	750 mA for 3.17hours	none	750 mA for 2.33hours

1-4h | 600 mA to 1.0 V per cell

4-2-12. Life time (Rapid charge) :

For the 300th cycle the cell or battery shall supply more than ___35__min(s) under the following test conditions.

Test conditions :

1.6	St Conditions .	#
	charge	using the rapid charge condition specified in clauses "2.RATINGS"
	discharge	3000 mA to 1.0 V per cell

4-2-13. Humidity :

No leakage of electrolyte in liquid form shall be observed during 14days of storage under the following storage conditions :

33 °C±3 °C (91.4 °F±5.4 °F) Relative humidity of 80 %±5 %. (Salting is permitted)

4-2-14. Vibration :

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 discharge duration shall exceed 4 hour(s) 40 min(s) when discharged at 600 mA and the cell or battery shall not be externally deformed and no leakage of electrolyte in liquid form shall be observed.

4-2-15. Free falling : (Drop)

Following a drop test from 450 mm (17.717 inches) on to a hard-wood board in a vertical axis 2 times on each of 2 mutually perpendicular axes, the discharge duration shall exceed 4 hour(s) 40 min(s) when discharged at 600 mA and the cell or battery shall not be externally deformed and no leakage of electrolyte in liquid form shall be observed.

4-2-16. Short :

The cell or battery shall not explode during or at the end of a lhour short-circuit test. However, leakage of electrolyte, external deformation or outer sleeve cracking is permitted.

4-2-17. Incorrect polarity charging:

The cell or battery shall not explode during or at the end of a 1hour period of incorrect polarity charging at 3000 mA. However, leakage of electrolyte, external deformation or outer sleeve cracking is permitted.

4-2-18. Over charge # 2 :

The cell or battery shall not explode during or at the end of a 5hour charging period at 3000 mA. However, leakage of electrolyte, external deformation or outer sleeve cracking is permitted.

5. OTHERS

5-1. The cell or battery shall be charged state at shipping.

5-2. Cut-off voltage :

OWe recommend a cut-off voltage of 1.0 to 1.1 V per cell.

Olf the cut-off voltage is above 1.1 V per cell, the battery may be underutilized resulting in insufficient use of the available capacity.

Olf the cell voltage drops below 1.0 V per cell, the battery may become over discharged or reverse charged.

* In case of over 20 mA discharge a cut-off voltage should be 0.8 V per cell.

Specification can be changed upon mutual agreement between

METABO and Matsushita Battery Industrial Co., Ltd.

Ni-MH Battery; Example on rapid charge system

1. Basic charge system

1 Rapid charge current

2 Charge current to voltage for rapid charge

3 Start voltage of rapid charge

4 Upper limit voltage (to trickle charge)

⑤ Value of minus delta V (-∆V)

6 Temperature increase rate (dT/dt)

① Upper limit temperature (Tco)

(B) Initial non-detection timer of minus delta V(- ∆ V)

9 Trickle charge current

10 Transfer timer to rapid charge

1 Total rapid charge timer

(12) Total charge timer

(13) Ambient temperature for rapid charge

: 0.5C to 1.0C mA

: 0.2C to 0.3C mA

: above 0.8 V per cell

: 1.8 V per cell

: 5 to 10 mV per cell

: 1 to 2 °C/min

: 60 °C

: 5 to 10 min

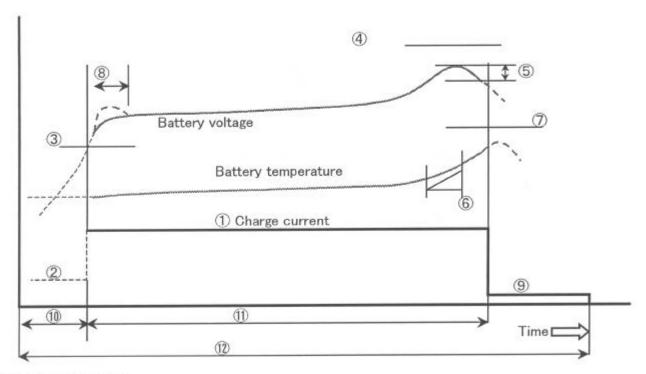
: 1/20C to 1/30C mA

: 60 min

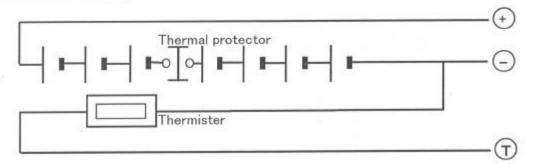
: 1.5 h

: 10 to 20 h

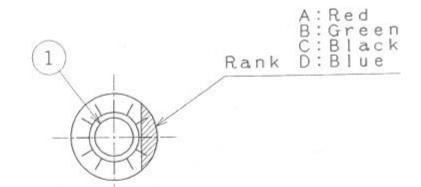
: 0 to 40 °C

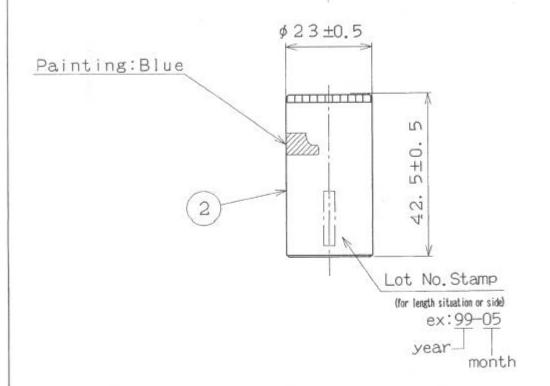


2. Basic pack circuit



ĺ	Commercial Tolerance	Sym,	Date	Revision	Drawn	Checked	Approved
1	101214110	Δ					





Nominal voltage 1.2 V 2800 mAh Rated capacity (Minimum) Average capacity 3050 mAh (for reference only) 55 g Approx. weight

2	Sleeve	Paper			1		
1	Battery	HHR-300SCP	,		1		21221.312
Sym.	Item or Code No.	Mat	erial & Siz	e	qt.	Process	Remark
			-			25	
				Name		Nickel Metal H	
S	cale Designed Drawn	Checked Litaliuma lij	Approved	Name		Nickel Metal H	