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

SPECIFICATIONS OF

SEALED NICKEL METAL HYDRIDE BATTERIES

FOR MESSRS : PIE

MODEL: HHR-210AAZ2B

ENT ON

2 1. JUL. 2003

ALKALINE STORAGE BATTERY DIV.

DATE: 18. JUL. 2003

SPECIFICATION No. : S3071844

AMENDMENT	DATE OF ISSUE	Drawn 7. Boert
		Checked Stree-
		Checked Thomas
	±	Checked Z. Achi
		Approved A. Matsuki

APPROVED BY	SIGNATURE	DATE
Panasonic Industrial Europe GmbH Postfach 540849 22508 Hamburg	R	25.07.03
Winsbergring 15		

FORM No. : EAAEO6

MH	SPECIFIC	ATIONS
1. APF	PLICATION This basification applies to the Secl	ad Nishal Madal Undaida
	This specification applies to the Seal rechargeable cell or battery :	ed Nickel-Metal Hydride
	· · · · · · · · · · · · · · · · · · ·	1700
	Model HHR-210A	AZZB
	for	· · · · · · · · · · · · · · · ·
2. RAT	TINGS	
	OIEC Designation	HR15/51
	ONominal voltage	1.2 V
	ORated (Minimum) capacity *1	2000 mAh
	OAverage capacity (for reference only)	2080mAh
	OStandard charge rate	<u>200</u> mA × 16 h
	ORapid charge rate	MAX 1200 mA (with the following
		charge condition)*2
	* Value of dT/dt (for reference only)	<u>1 to 2</u> °C/min
	Value of -△V per cell	<u>5 to 10</u> mV
	Value of Tco	<u>55</u> °C
	Trickle current	<u>67 to 100 mA</u> (Need timer)
	ODischarge cut-off voltage	$(n \times 1, 0) V$ $(n=1 \sim 6)$
		$[(n-1) \times 1.2] V (n=7 \sim 10)$
		(n:cell number)
	OMaximum continuous discharge current (single cell)	4000mA (at 20 °C)
		Humidity : +65 %土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)
		(Humidity : +65 %±20 %)
	within 1 year *3	-20 to +35 °C (-4 to 95 °F)
	within 6 months	-20 to +45 °C (-4 to 113 °F)
	within 1 month	-20 to +55 °C (-4 to 131 °F)
	within 1 week	-20 to +65 °C (-4 to 149 °F)
*1	Rated capacity figures are based on sin	gle cell performance
	All rapid charge systems should be disc	승규는 것은 것은 것 같은 것은 것은 것은 것은 것은 것을 수 있는 것을 수 있다. 것을 것 같이 것 같이 않는 것 않는 것 같이 않는 것 않는
	We recommend cells or batteries are cha	이 가슴 가슴 다 가지 않는 것 같은 것 같
Wb	en operation falls outside these parame	ters please contact our engineer
3. ASS	SEMBLY & DIMENSIONS	
	as per attached drawing	
	drawing number	<u>C21213025</u>
1. PEF	RFORMANCE	
	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 %
-2. TEST	METHOD & PERFORMANCE	
	ter appearance :	
	이 이렇게 잘 잘 잘 잘 잘 하는 것이 같다. 이 것은 것은 것은 것은 것은 것은 것은 것은 것은 것이 같다. 이 가지 않는 것은 것은 것은 것이 가지 않는 것이 같다. 것이 같이 많이	any stains, scratches or deformations which may
	reduce the commercial value of the pro	그 사람이 많은 것 같은 것 같아요. 같이 많은 것은 것 같아요. 같이 집에서 이 것 같아요. 것은 것 같아요. 그는 것이 집에 가지 않는 것 같아요. 것이 같아요. 같아요. 것이 같아요. ????????????????????????????????????

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1hour. 400 attair	ving a 16hour charg The discharge dur mA down to a termi in the specified val	ation shall exceed 5 nal voltage of 1.0 V. The ue following the first ch	hour(s) capacit arge - d	shall be stored for a period of 00 min(s) when discharged at y returned may not initially ischarge cycle. In this event, attain the specified value.	
Follow		e period at <u>200</u> mA,		circuit voltage of the cell or cceed <u>1.25</u> V per cell.	
Follow	ed circuit voltage wing a 16hour charg ry shall be checked V per cell within	e period at <u>200</u> mA, with a <u>0.75</u> Ω per cell	the close load wit	ed circuit voltage of the cell or thin 1hour. The C.C.V. shall exceed	Ē.
Follow	rnal impedance : wing a 16hour charg ry shall be checked _mΩ per cell.	e period at <u>200</u> mA, at 1000 Hz within 1hour.	the Inter The inte	rnal impedance of the cell or ernal impedance shall be less than	
Follow	iod of 1hour. The d	e period at <u>200</u> mA. ischarge duration shall e	the cell xceed	or battery shall be stored for 48 min(s) when discharged at	
Follow a per	iod of 24hours at O	e period at 200 mA,	duration	or battery shall be stored for shall exceed 4 hour(s) rature of 0 °C ± 2 °C.	
Follow open of	discharge : wing a 16hour charg circuit for a perio hour(s) <u>15</u> min(s	e period at <u>200</u> mA, d of 28 days. The subseq) when discharged at <u>400</u>	the cell uent dis mA.	or battery shall be stored on charge duration shall exceed	
Follow 200 discha	ell shall be stored wing completion of mA. The subsequent	the storage period, the c discharge duration shall	ell shal exceed	12months at discharged state. I be charged for 16hours at <u>4</u> hour(s) <u>15</u> min(s) when rther two or three times to reach	
Follow stored 5	d for a period of 1 hour(s) 00 min(s	hour. The subsequent bat) when discharged at 400	tery dis mA. The	mA, the cell or battery shall be charge duration shall exceed a cell or battery shall not be id form shall be observed.	
Based the 50	0th, 100th, 150th, 200		h, 450th	able below, the discharge time of and 500th shall exceed 5 °C)	
T	est condition :				
	Cycle number	Charge	Rest	Discharge	
	2~48	200 mA for 16 hours 500 mA for 3.17hours	none	500 mA for 2.33hours 500 mA for 2.33hours	
	49	500 mA for 3.17hours	none	500 mA to 1.0 V per cell	
	50	200 mA for 16 hours	1-4h	400 mA to 1.0 V per cell	

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charge discharge	using the rapid charge condition specified in clauses "2. RATINGS" 2000 mA to 1.0 V per cell
discharge	
the following storage	yte in liquid form shall be observed during 14days of storage under conditions : 5.4 °F) Relative humidity of 80 %±5 %. (Salting is permitted)
(1000 cycles per minu shall exceed 5	ests over an amplitude of 4 mm (0.1575 inches) at a frequency of 16.7 ite) and repeated through any axes during 60mins, the discharge durati hour(s) 00 min(s) when discharged at 400 mA and the cell or externally deformed and no leakage of electrolyte in liquid form shall
axis 2 times on each o <u>5</u> hour(s) 00	p) from <u>450</u> mm(17.717 inches)on to a hard-wood board in a vertica of 2 mutually perpendicular axes, the discharge duration shall exceed min(s) when discharged at <u>400</u> mA and the cell or battery shall not and no leakage of electrolyte in liquid form shall be observed.
	all not explode during or at the end of a 1hour short-circuit test. ectrolyte,external deformation or outer sleeve cracking is permitted.
	all not explode during or at the end of a 1hour period of incorrect 2000 mA. However, leakage of electrolyte, external deformation or
	nall not explode during or at the end of a 5hour charging period at eakage of electrolyte,external deformation or outer sleeve cracking
. OTHERS	
-1. The cell or battery sh	all be charged state at shipping.
 -2. Cut-off voltage : OWe recommend a cut-o Olf the cut-off volta resulting in insuff 	off voltage of 1.0 to 1.1 V per cell. age is above 1.1 V per cell, the battery may be underutilized ficient use of the available capacity. drops below 1.0 V per cell, the battery may become over discharged
or reverse charged.	A discharge a cut-off voltage should be 0.8 V per cell.
Specification can be o	changed upon mutual agreement between
PIE and Matsushita Battery	/ Industrial Co., Ltd.

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Ni-MH Battery ; Example on rapid charge system

1. Basic charge system

1 Rapid charge current	: 950 to 1200 mA
2 Charge current to voltage for rapid charge	: 0.2It to 0.3It mA
③ Start voltage of rapid charge	: above 0.8 V per cell
④ Upper limit voltage (to trickle charge)	: 1.8 V per cell
(5) Value of minus delta V (-ΔV)	:5 to 10 mV per cell
⑥ Temperature increase rate (dT/dt)	: 1 to 2 °C/min
⑦ Upper limit temperature (Tco)	: 55 °C
(8) Initial non-detection timer of minus delta V($-\Delta$ V)	: 5 to 10 min
(9) Trickle charge current	: 1/20It to 1/30It mA
1 Transfer timer to rapid charge	: 60 min
(1) Total rapid charge timer	: 2 ~ 2.5 }
12 Total charge timer	: 10 to 20 h
Ambient temperature for rapid charge	: 0 to 40 °C







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