

Alkaline Manganese Dry Battery AM4/LR03

1. Scope

This specification is applicable to the “Vinnic” brand Alkaline Manganese Mercury Free Dry Batteries supplied by CHUNG PAK BATTERY WORKS, LTD.

2. Technical Specification

2.1 Name (Designation) : AM4 (Mercury free)

(IEC Designation) : LR03

2.2 Dimensions:

Diameter : 10.5mm

Height : 44.5mm

2.3 Weight (approx) : 11.4g

2.4 Nominal voltage : 1.5V

2.5 Typical capacity : 1250 mAh at 75Ω 4h/day, E.V.0.9V(The average discharging time of 9pcs batteries)

2.6 Typical duration : 600 min at 100mA 1h/day , E.V.0.9V(The average discharging time of 9pcs batteries)

75 hrs at 75Ω 4h/day, E.V.0.9V(The average discharging time of 9pcs batteries)

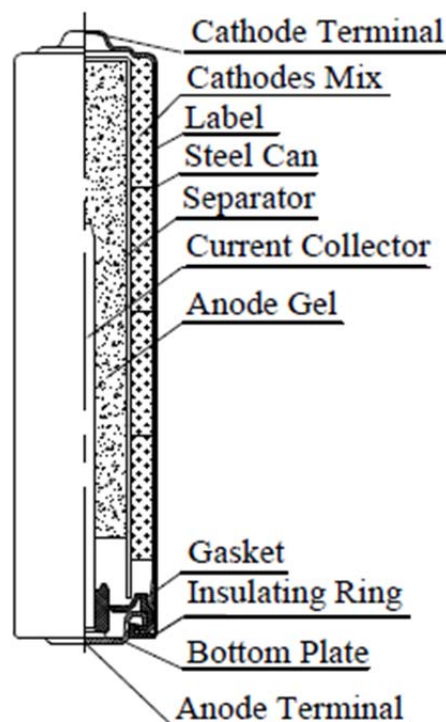
2.7 Retention 93% after 12 months storage(20℃)

88% after 24 months storage(20℃)

85% after 36 months storage(20℃)

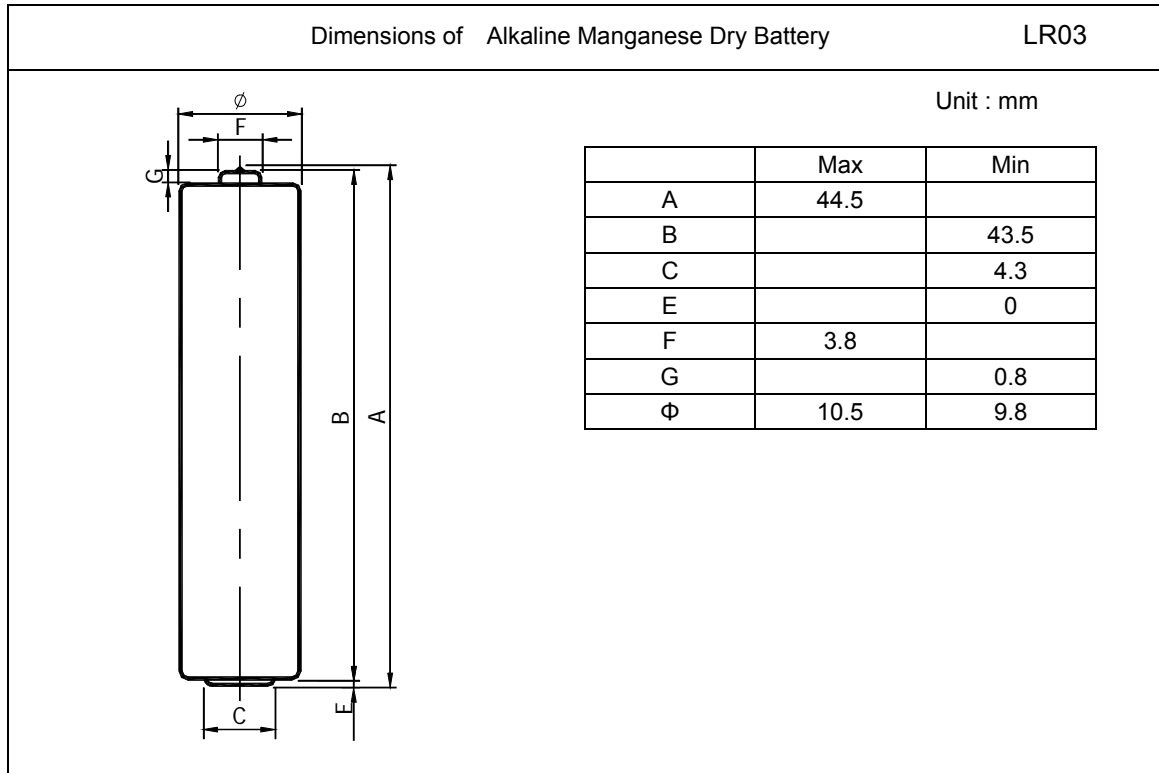
80% after 60 months storage(20℃)

2.8 The Drawing of The Finished Battery :



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2.9 Outside shape dimensions and terminals:



Remarks :

A: Overall height of battery

B: Height between contact terminals without pip

C: Outer diameter of negative terminal Contact area

E: Negative terminal protrusion

F: Diameter of positive terminal within The specified projection height

G: Height of projected area of positive terminal, exclusive part

Ø: Diameter of battery

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3. Performance (For all test method, refer to Appendix 1)

3.1 Open-circuit voltage:

Storage Time	OCV (V) Open-circuit Voltage
Initial	1.600 ~ 1.720V
After 12 months storage	1.540 ~ 1.680V
After 24 months storage	1.520 ~ 1.650V
After 36 months storage	1.510 ~ 1.630V
After 60 months storage	1.500 ~ 1.600V

3.2 Service out-put:

Reference Requirement	Discharge Condition			Average Minimum duration				
	Load resistance	Discharge method	End point Voltage(V)	Initial	After 12 months storage	After 24 months storage	After 36 months storage	After 60 months storage
REF	3.9Ω	Continuous	0.90 V	155 min	144 min	136 min	131 min	124 min
IEC	5.1Ω	1hrs/day	0.80 V	260 min	241 min	228 min	221 min	208 min
IEC	5.1Ω	*	0.90 V	235 min	218 min	206 min	200 min	188 min
IEC	24Ω	**	1.00 V	19.0 hrs	17.6 hrs	16.7 hrs	16.1 hrs	15.2 hrs
IEC	75Ω	4hrs/day	0.90 V	68.0 hrs	63.2 hrs	59.8 hrs	57.8 hrs	54.4 hrs
IEC	50mA	***	0.90 V	19.0 hrs	17.6 hrs	16.7 hrs	16.1 hrs	15.2 hrs
IEC	100mA	1hrs/day	0.90 V	9.0 hrs	8.4 hrs	7.9 hrs	7.6 hrs	7.2 hrs

“*”: 4min on, 56min off for 8h per day;

“***”: 15s on, 45s off for 8h per day;

“****”: 1h on, 11h off for 24h per day.

The word“initial”is applicable to the products elapsed one month or less after production , including those , to which tests have been started in less than three month after production.

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Satisfaction Standard:

- 1) 9 piece of battery will be tested for each discharging standard;
- 2) The result of the average discharging time from each discharging standard shall be equal to or more than the average minimum time requirement; and no more than one battery has a service output less than 80% of the specified requirement.
- 3) One re-test is allowed to confirm the previous result.

3.3 Overdischarge electrolyte leakage resistance:

No deformation and no external electrolyte leakage shall be observed.

3.4 High temperature electrolyte leakage resistance:

No deformation and no external electrolyte leakage shall be observed.

3.5 Expiry date : 5 years after manufactured.

3.6 Safety Test

3.6.1 Intended use tests and requirements (appendx : 1)

Test		Intended use simulation	Requirements
Electrical test A		Storage after partial use	No leakage (NL) No explosion (NE)
Environmental Tests	B-1	Transportation shock	No leakage (NL) No explosion (NE)
	B-2	Transportation vibration	No leakage (NL) No explosion (NE)
Climatic-temperature C		Climatic-temperature cycling	No explosion (NE)

3.6.2 Reasonably foreseeable misuse tests and requirements

Test		Misuse simulation	Requirements
Electrical tests	D	Incorrect installation	No explosion (NE)
	E	External short circuit	No explosion (NE)
	F	overdischarge	No explosion (NE)
Environmental test G		Free fall	No explosion (NE)

All of test (3.6) are meet IEC 60086-5 & GB 8897.5-2013.

4. Content of heavy metals

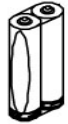
The following material content of heavy metals in the batteries:

Hg	Cd	Pb
<0.0001%	<0.002%	<0.004%

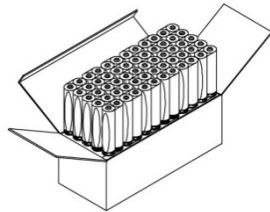
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5. Brand and packaging

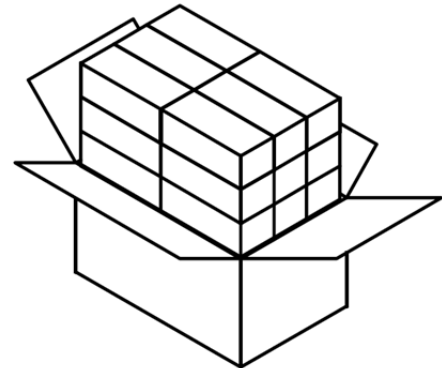
5.1 Appendix 1:Standard and packaging



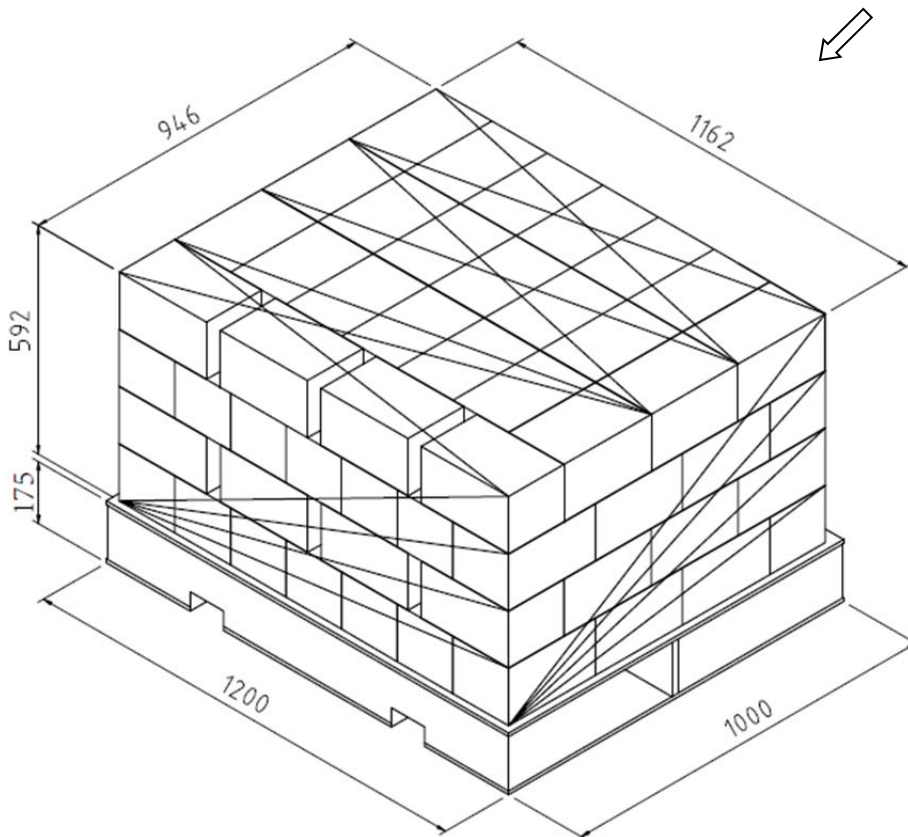
AM4/LR03 – SP2



60PCS Per Display Boxes
Boxes Measure : 126X52X46 mm



1080 PCS Per Display Carton
Carton Measure : 260X166X148 mm



Goods Dimension
Height : 592mm
Length : 1162mm
Widrth : 946mm

Plastic Pallet:
Pallet Height : 175mm
Pallet Measure : 1200X1000mm

Weight :
Pallet Weight : 22 kgs
Net Weight : 1256 kgs
Gross Weight With Pallet : 1292 kgs

Quantity :
1 Layer = 25 Cartons
4Layers X 25 Cartons = 100 Cartons / Pallet

5.2 Both OEM and ODM orders are welcome. Any specific design and packaging requirements will be accommodated as required.

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6. Safety instructions

Warning	Danger
① Don't throw the batteries into fire or heat the batteries.	This may cause the batteries to disrupt or ignite.
② Don't directly solder the batteries.	This may damage their insulating tapes and protective installation.
③ Don't insert and use batteries with the \oplus & \ominus electrode inverse.	This can damage the batteries for being force charged, even may cause leakage, heat generation , disrupt, explosion or ignition.
④ Don't short-circuit the positive and negative terminals of a battery.	This may cause heat generation, leakage, explosion, fire and personal injury.
⑤ Don't expose the batteries to water.	This can cause heat generation or rust.
⑥ Don't charge and force discharge batteries.	This may cause leakage, heat generation, even explosion and ignition.
⑦ Don't disassemble or damage the external tubes of the batteries or modify the batteries(stack-up batteries) etc.	This easily results in short-circuit, leakage, even ignition.
⑧ Store unused batteries in their original packaging away from metal objects.	This can cause battery short-circuiting which may result in venting, leakage, and explosion and personal injury.
⑨ Don't crush, puncture, or otherwise mutilate to deform batteries.	This may cause venting, leakage, explosion and personal injury.
⑩ Immediately stop using the batteries if leakage, discolor or etc. with them are detected.	This may cause accidents to occur.
⑪ Don't drop or strongly strike the batteries.	This may result in leakage, heat generation, disrupt, even ignition.
⑫ To avoid using at high temperature and high /humidity ambient.	This may cause batteries early damage.
⑬ a. Be sure to use the batteries within a temperature range from 0°C to 40°C. b. Be sure to storage the batteries within a temperature range at 20±5°C.	a. Use the batteries beyond the temperature range may cause leakage, heat generation, impaired performance, and shortening of service life of the batteries. b. Storage the batteries beyond the temperature range may cause heat generation, impaired performance, and shortening of service life of the batteries.
⑭ Don't use old batteries with new ones.	Some batteries may be over-discharged. This can result in venting, leakage, explosion and personal injury.
⑮ Don't use our batteries with any other type or brand of batteries.	Mixed-matching of batteries may result in heat generation, leakage or explosion.
⑯ Remove batteries from equipment if it is not to be used for an extended period of time.	When batteries beyond expiry period, electrolyte leakage may occur causing damage to the equipment.
⑰ Exhausted batteries should be immediately removed from equipment.	When discharged batteries are kept in the equipment for a long time, electrolyte leakage may occur causing damage to the appliance and/or personal injury.
⑱ Keep the batteries out of the reach of children.	To avoid being swallowed. If swallowed, Please see doctor immediately.
⑲ Don't allow children to replace batteries without adult supervision.	This may cause wrong operation, even may occur accident.
⑳ Please use batteries within expiry period.	When batteries beyond expiry period, electrolyte leakage may occur causing damage to the equipment. And may impair batteries performance.
㉑ Don't take batteries by hand directly. Please wear finger cots.	This may cause rust.
㉒ Don't take batteries with iron tweezer. Please use plastic tweezer.	This can cause battery short-circuiting which may result in heat generation , leakage, and explosion.

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Appendix 1: Test

1. Storage and test conditions for samples

Unless otherwise specified, the storage and test conditions for samples shall be, as a general rule , at the temperature of $20\pm 2^{\circ}\text{C}$ and the humidity of $55\pm 20\%$.

2. Measuring instruments and devices

2.1 Voltmeter : The accuracy of the measuring equipment shall be $\leq 0.25\%$ and the precision shall be $\leq 50\%$ of the value of the last significant digit. The internal resistance of the measuring instrument shall be $\geq 1\text{M}\Omega$.

2.2 Load resistance : The load resistance shall include all of the external circuit, and its allowance shall be within $\pm 0.5\%$.

2.3 Caliper : The caliper shall be the one having precision of 0.05 minimeters or the one having the same or superior precision to this.

3. Test method

3.1 Dimensions : Measurements shall be made by use of the calipers.

3.2 Appearance : Examination shall be carried out by visual inspection.

3.3 Open-circuit voltage: Measurements shall be carried out before the start of discharge of the sample by use of the voltmeter.

3.4 Service output

Discharge start time: After leaving in an atmosphere at a temperature of $20\pm 2^{\circ}\text{C}$ for at least 8 hours or more.

Discharge temperature and humidity: $20\pm 2^{\circ}\text{C}$, $55\pm 20\%$.

Discharge method : As defined in 3.2. However discharge shall be effected for more than 5 days during 7 days and when discharge is made twice a day, an interval of 4 hours shall be elapsed between two discharges.

Discharge end-point : The instant when the closed-circuit voltage has reached below the end-point voltage (as defined in 3.2, Page 3).

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3.5 Overdischarge electrolyte leakage resistance

The following conditions shall be adopted for the test.

- (a) Discharge start point: After keeping at the temperature of $20\pm 2^{\circ}\text{C}$ for at least 8 hours or more
- (b) Test temperature and humidity: $20\pm 2^{\circ}\text{C}$, $55\pm 20\%$
- (c) Load resistance : 15Ω
- (d) Test method : Continuous discharge for 48hours .

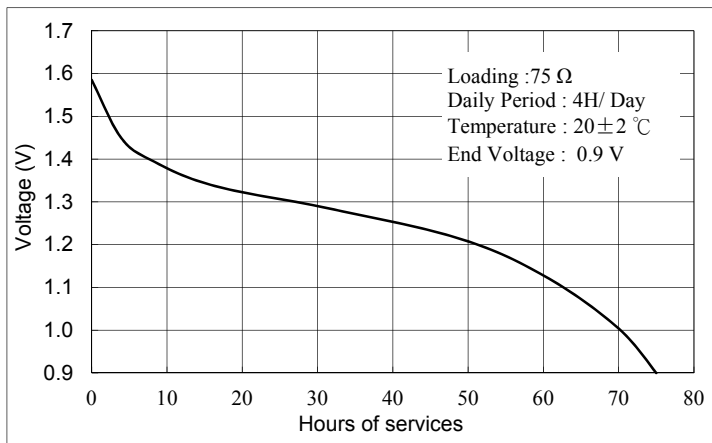
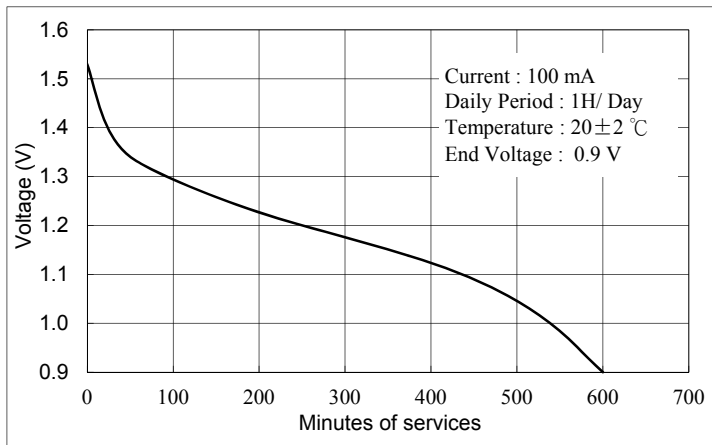
3.6 High temperature electrolyte leakage resistance

The following conditions shall be adopted for the test

- (a) Test temperature and humidity: $45\pm 2^{\circ}\text{C}$, below 70% RH.
- (b) Test period : 30 days
- (c) Test method : Leave to stand still.

Appendix 2 : Discharge characteristics

SRANDARD DISCHARGE CURVE:



TEMPERATURE CHARACTERISTICS: (Discharge continuously at various resistance)

