



PRODUCT SPECIFICATION

ALKALINE AAA SIZE BATTERY

Type Designation : LR03 ECO+ (AAA)

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1. Scope:

This specification is applicable to alkaline cell, LR03 ECO+ (Mercury & Cadmium & Lead free)

2. Law & Regulation Compliances:

This product complies with EU's battery directive (2013/56/EU).

Packaging materials comply with EU's directive on packaging materials and waste (94/62/EC)

3. General:

3.1 Type designation

IEC/ JIS	LR03
ANSI	24A
Common	AAA

3.2 Chemical system: Zn/KOH-H₂O/MnO₂

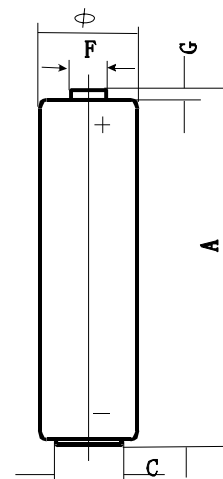
3.3 Nominal voltage: 1.5 V

3.4 Weight: Approximate 11.0g

3.5 Dimension (mm)

The dimensions shall be in accordance with the below figures both prior to and after service output test.
Measuring equipment shall be with an accuracy $\pm 0.05\text{mm}$ at least.

/	min	max
Φ	9.9	10.4
A	43.8	44.5
C	4.3	-
F	-	3.8
G	0.8	-



3.6 Capacity: Approximate 1170mAh (10mA, 24h/d, 20°C, e.v.= 0.8V)

3.7 Operation temperature : -18°C~50°C
Recommend storage temperature : Not exceed 30°C

4. Appearance

The battery visually inspected by unaided eye 30cm away from battery. The battery shall be free from dents, scratch, rust and extruded internal compounds, such as sealing compounds and etc, and serious displacement of artwork. Appearance defects shall not be observed that may adversely affect actual use or performance of batteries.

5. Electrical Characteristics

Unless otherwise stated, all measurements are to be performed at a **Standard Environment** of

20 ± 2°C
55 ± 20% RH.

All samples are normalized for 8 hours at least at the above environment prior to measurement. The digital voltmeter (DCM) is with the precision of 1mV (internal resistance not less than 1 Megohm). The load resistance of the total circuit is accurate within ±0.5% of the specified value.

5.1 Open circuit voltage and closed circuit voltage (Load resistance 3.9Ω, 0.3S)

/		OCV(V)	CCV(V)	S.C.(A) (reference)
Initial	Min	1.57	1.40	6.0
	Normal	1.60	1.45	8.0
Stored 1 year	Min	1.55	1.37	4.5
	Normal	1.57	1.40	6.0

5.2 Service output

Load	20Ω	600mA	5.1Ω	5.1Ω	100mA	24Ω	75Ω	50 mA,	
Test mode	24h/d	10s/m, 1h/d	1h/d	4m/h,8h/d	1h/d	15s/m 8h/d	4h/d	1h/12h 24h/d	
End voltage	0.9V	0.9V	0.8V	0.9V	0.9V	1.0v	0.9V	0.9 V	
Unit	h	pulse	m	m	h	h	h	h	
Applications	Reference	Photo flash	Toy	Portable lighting	Digital audio	Remote control	Radio/Clock	Digital Audio	
Initial	MAD	16.0	240	190	180	8.5	17.8	63.0	19.0
	Normal	17.5	300	230	220	8.9	18.5	67.0	20.0
Stored 1 year	MAD	15.3	220	175	170	8.3	16.8	61.0	17.5
	Normal	16.5	280	210	210	8.7	17.8	64.0	19.0

m: minute h: hour d: day

Remark: 1) The initial discharge test shall commence within 30 days of manufacture. During stored period, the cells shall be stored under 20±2°C, RH 55±20% conditions.

- 2) Lot release service output test is conducted by 20Ω continuous discharging to 0.9volts
- The batteries shall not leak during the service life test before the end voltage reached.

3) MAD : minimum average duration--our guarantee discharge value.

4)Normal : normal data, it's our normal daily value, battereis dicharge value are on this as base to be upper or lower.

6. Leakage Resistance

6.1 Over discharge leakage test

Test conditions: $20\pm 2^{\circ}\text{C}$ & RH $55\pm 20\%$, 20Ω continuous discharge 48h.

Number of test samples: 9 batteries

Requirement: No visible leakage; No explosion.

6.2 High temperature leakage test

Test conditions: store 20 days under $60\pm 2^{\circ}\text{C}$, then store 4~24h under standard environment.

Number of test samples: 24 batteries

Requirement: No visible leakage; No explosion.

6.3 At expiration, leakage rate of battery is no more than 0.05%.

7. Security Characteristics

7.1 User Drop Test

This test simulates the situation when a battery is accidentally dropped.

Test conditions: Undischarged test batteries shall be dropped from a height of 1m onto a concrete surface. Each test battery shall be dropped six times, twice in each of the three axes. The test batteries shall be stored for 1 h afterwards.

Number of test sets: 5 batteries

Requirement: No fire, No explosion .

7.2 Short-circuit explosion-proof characteristics

This test simulates an external short circuit of a battery during daily handling of batteries.

Test conditions: Positive and negative terminals of an undischarged battery shall be connected directly. The circuit shall be completed for 24 h or until the battery case temperature has returned to ambient. The resistance of the inter-connecting circuitry shall not exceed $0,1\Omega$.

Number of test samples: 5 batteries

Requirement: No fire or explosion; Leakage is allowable.

7.3 Incorrect installation

This test simulates incorrect installation of a battery in a series application.

Test conditions: 4 undischarged batteries are used per test. 3 batteries are placed correctly in series; the 4th battery is reversed with respect to polarity. The circuit is maintained until venting occurs or the reversed battery temperature has returned to ambient.

Number of test sets: 5 (20 batteries)

Requirement: No fire or explosion; Leakage is allowable.

8. Expiry Date:

7 years

9. Expiry Date Marking:

9.1 Unless otherwise specified, each battery will carry a manufacturing date code followed by month and year of manufacturing for domestic and manufacturing date code followed by month and year of expiry for export. (Shelf life 3 years)

10. Packaging Requirements

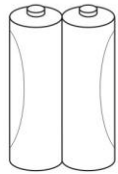
10.1 The total of heavy metal lead, cadmium, mercury, and hexavalent chromium concentration shall not exceed 100 ppm in Packaging materials and printing inks. Ozone depleting substances (ODS) shall not be used in the manufacturing of any packaging.

The printing on each cell label is legible and permanent. Label defects, if any, shall conform to mutually agreed upon limit samples.

10.2 It is recommended that packaging for shipment and sales according with Packaging Specification of LR03 alkaline cell. For example, 2pcs cells in a shrink, 20 shrinks in a display box, and 5*2*3 display boxes in a final outer carton , and 4*3*5 outer cartons on a pallet. Flow chart as next page:

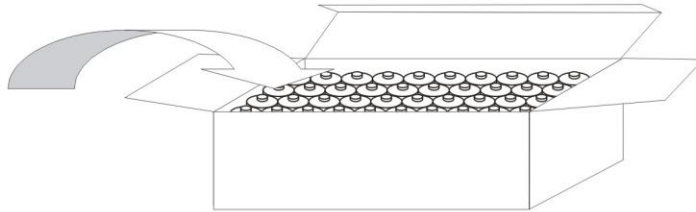
10.3 Otherwise packaging for shipment and sales shall conform to the mutually agreed to Packaging Specification of the designated customers.

1



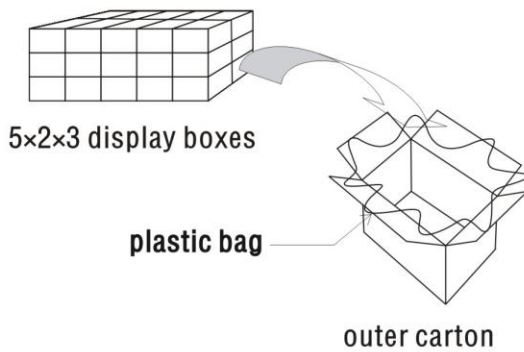
2pcs-shrink(PVC or PET)

2



4x10 pcs in a display box

3

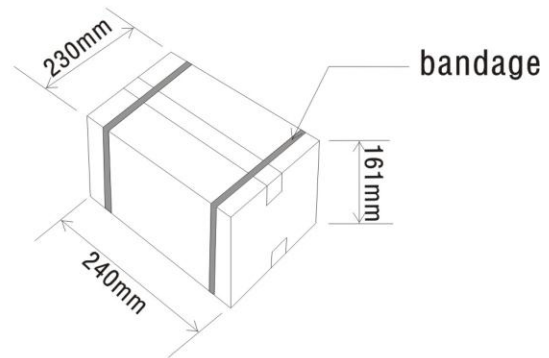


5x2x3 display boxes

plastic bag

outer carton

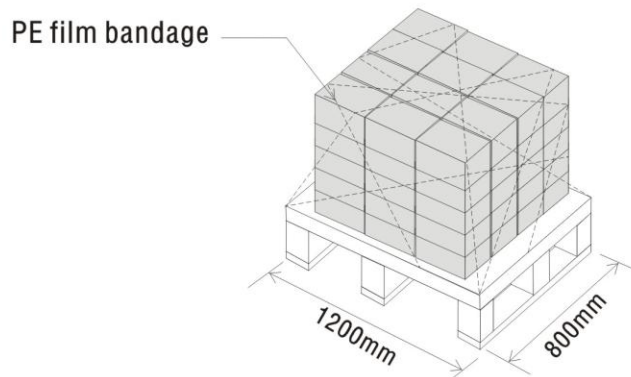
4



bandage

Gross weight: about 14.3kg

5



PE film bandage

1200mm

800mm

(4x3x5) outer boxes

11. Components / Information on Ingredients:

Chemical Nature: Alkaline zinc-manganese dioxide batteries

MATERIALS	APPROXIMATE PERCENT OF TOTAL WEIGHT (%)	CAS NO.	MATERIALS	APPROXIMATE PERCENT OF TOTAL WEIGHT (%)	CAS NO.
Manganese Dioxide (MnO ₂)	~40.5	1313-13-9	Brass	~3.0	12597-71-6
Zinc Powder (Zn)	~16.5	7440-66-6	Fe	~22.0	7439-89-6
Water (H ₂ O)	~9.5	7732-18-5	Ni-plating	~0.3	7440-02-0
Potassium Hydroxide (KOH)	~4.5	1310-58-3	Bi	~0.004	7440-69-9
Carbon	~3.0	7782-42-5	In	~0.004	7440-74-6

Chart 1. Discharge diagram

