

# ***Energivm***

SPECIFICATION for  
Alkaline battery

Battery Model	LR03HP
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**1. Scope**

This specification is applicable to alkaline cell LR03 HP type (Mercury and Cadmium free)

**2. Law & Regulation Compliances**

This product complies with EU's battery directive (2006/66/EC)

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-H<sub>2</sub>O/MnO<sub>2</sub>

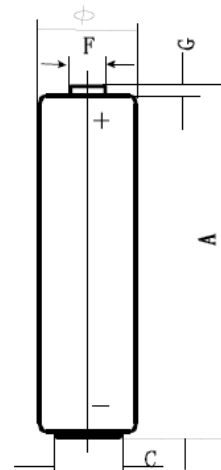
3.3 Nominal voltage: 1.5V

3.4 Weight: Approximate 12g

3.5 Dimension (mm)

The dimension shall be in accordance with the below figures both prior to and after service output test. Measuring equipment shall be with an accuracy ±0.05mm at least.

/	min	max
Φ	9.9	10.4
A	43.8	44.5
C	6.2	6.6
F	3.2	3.6
G	0.85	1.2



3.6 Capacity: Approximate 1300mAh (10mA, 24h/d, 20°C, e.v.=0.8V)

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

**4. Appearance**

The battery visually inspected by unaided eye at 30cm away from battery. The battery shall be free from dents, scratch, rust and extruded internal compounds, such as sealing compounds 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, 60±15% 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 MΩ). 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
After 1 year	Min	1.55	1.37	4.5
	Normal	1.57	1.40	6.0

5.2 Service output

Load	20Ω	600mA	600mA	5.1Ω	10Ω	24Ω	75Ω	
Test mode	24h/d	24h/d	10s/m, 1h/d	4m/h,8h/d	1h/d	15s/m 8h/d	4h/d	
End voltage	0.9V	0.9V	0.9V	0.9V	0.9V	1.0v	0.9V	
Unit	h	m	pulse	m	h	h	h	
Initial	MAD	17.5	30.0	280	220	8.0	19.5	70.0
	Normal	18.5	37.0	350	240	8.5	20.5	73.0
After 1 year	MAD	16.4	25.0	250	200	7.6	18.5	67.0
	Normal	17.5	30.0	300	225	8.2	19.5	70.0

m: minute    h: hour    d: day

- \* The initial discharge test shall commence within 30 days of manufacture. During storage period, the cells shall be stored under room temperature conditions
- \* Lot release service output test is conducted by 20Ω continuous discharging to 0.9V
  - The batteries shall not leak during and service life test before the end voltage reached
  - The load resistor, including all parts of the external circuit, shall be within ±0.5% of the stated value

## 6. Leakage Resistance

### 6.1 Over discharge leakage test

No. of test samples: 9 pcs

Test conditions:  $20\pm 2^{\circ}\text{C}$ , RH  $60\pm 15\%$ ,  $20\Omega$  continuous discharge 48h

Requirement: No visible leakage; No explosion

### 6.2 High temperature leakage test

No. of test samples: 24 pcs

Test conditions: store 20 days under  $60\pm 2^{\circ}\text{C}$ , RH  $90\pm 5\%$ , then store 4~24h under standard environment

Requirement: No visible leakage; No explosion

## 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 hour afterwards

No. of test samples: 5 pcs

Requirement: No fire, explosion or leakage after 1 hour. OCV maintenance rate is above 95%

### 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 24h or until the battery case temperature has

returned to ambient temperature. The resistance of the inter-connecting circuitry shall not exceed  $0.1\Omega$

No. of test samples: 5 pcs

Requirement: No fire and no explosion; Leakage is allowed

### 7.3 Reverse polarity 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

4<sup>th</sup> battery is connected with reversed polarity with respect to others. The circuit is maintained until venting occurs or the reversed battery temperature has returned to ambient temperature

No. of test samples: 20 pcs (in 5 group)

Requirement: No fire and no explosion; Leakage is allowable

## 8. Expiry Date

5 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 datecode followed by month and year of expiry

for export (shelf life 5 years)

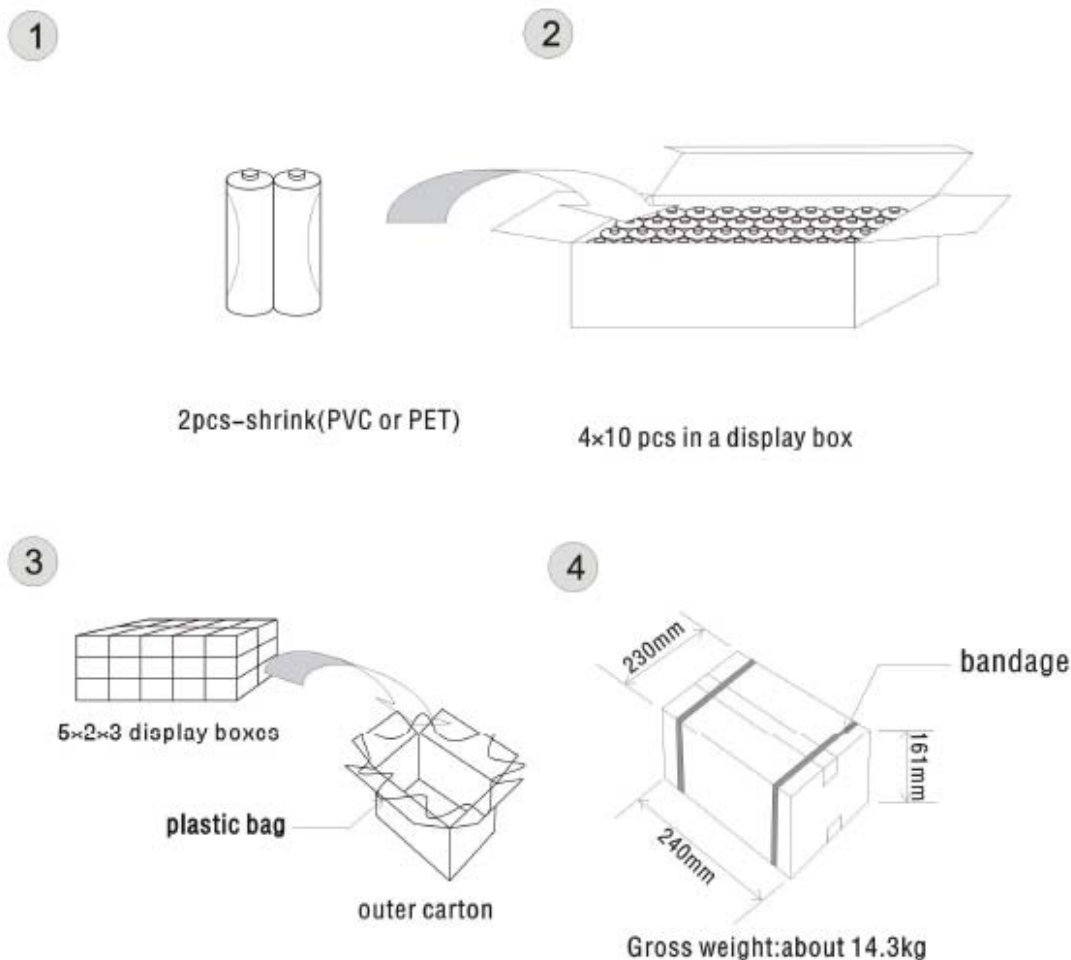
9.2 For private label, can mark according to customer's requirement

### 10. Packaging Requirement

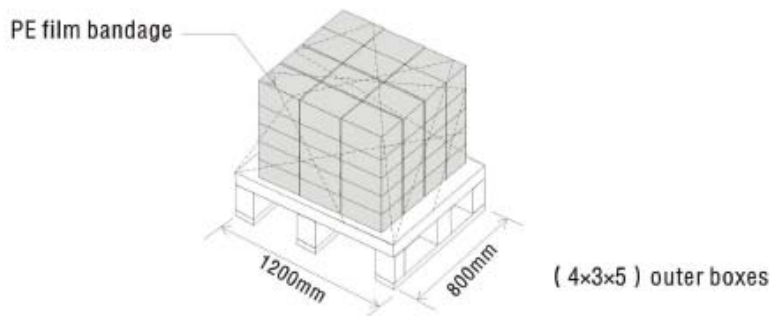
10.1 The total of heavy metal lead, cadmium and hexavalent chromium concentration shall not exceed 100ppm in Packaging materials and printing inks. Ozone depleting substances (ODS) shall not be used in the manufacturing of any packaging.

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 JSA. For example, 2 pcs battery 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 below:



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

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 <sub>2</sub> )	~42.0	1313-13-9	Brass	~3.0	12597-71-6
Zinc Powder (Zn)	~14.5	7440-66-6	Fe	~22.0	7439-89-6
Water (H <sub>2</sub> O)	~8.0	7732-18-5	Ni-plating	~0.3	7440-02-0
Potassium Hydroxide (KOH)	~5.0	1310-58-3	Bi	~0.004	7440-69-9
Carbon	~2.5	7782-42-5	In	~0.004	7440-74-6

Chart 1. Discharge diagram

