

Model No.: LR20

1. Scope:

This specification is applicable to Pairdeer alkaline cell, LR20 Super (Mercury and Cadmium free) distributed by ZHONGYIN (NINGBO) BATTERY CO., LTD.

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 | LR20 |
| ANSI | 13A |
| Common | D |

3.2 Chemical system: Zn/KOH-H₂O/MnO₂

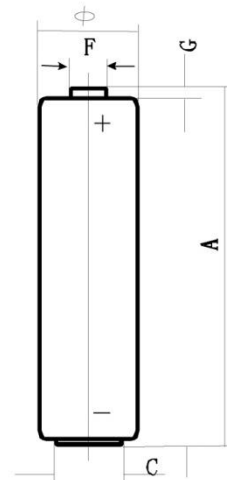
3.3 Nominal voltage: 1.5 V

3.4 Weight: Approximate 140 g

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 | 33.0 | 34.0 |
| A | 59.6 | 61.0 |
| C | 26.0 | 27.0 |
| F | 8.0 | 9.0 |
| G | 2.5 | 3.0 |



3.6 Capacity: Approximate 18000mAh (25mA, 24h/d, 20 \pm 2 $^{\circ}$ C, e.v.= 0.8V)

3.7 Operation temperature : -18 $^{\circ}$ C~50 $^{\circ}$ C
 Recommend storage temperature : Not exceed 30 $^{\circ}$ C

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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
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 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 1.0Ω, 0.3S)

| / | | OCV(V) | CCV(V) | S.C.(A) (reference) |
|---------------|--------|--------|--------|---------------------|
| Initial | Min | 1.57 | 1.30 | 7.5 |
| | Normal | 1.60 | 1.38 | 12.0 |
| Stored 1 year | Min | 1.55 | 1.20 | 5.5 |
| | Normal | 1.57 | 1.30 | 9.0 |

5.2 Service output

| Load | | 2.2Ω | 600mA | 1.5Ω | 2.2Ω | 10Ω |
|------------------|--------|-----------|--------------------|----------------------|------|-------|
| Test mode | | 24h/d | 2h/d | 4m/15m, 8h/d | 1h/d | 4h/d |
| End voltage | | 0.9V | 0.9V | 0.9V | 0.8V | 0.9V |
| Unit | | h | h | h | h | h |
| Applications | | Reference | Portable stereo | Portable lighting | Toy | Radio |
| Initial | MAD | 17.5 | 14.5 | 12.5 | 21.5 | 122 |
| | Normal | 19.0 | 16.0 | 14.0 | 24.0 | 126 |
| Stored 1 year | MAD | 17.0 | 13.5 | 11.5 | 20.0 | 120 |
| | Normal | 18.0 | 15.0 | 13.5 | 23.0 | 123 |

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 room temperature conditions.

2) Lot release service output test is conducted by 2.2Ω continuous discharging to 0.9volts

- The batteries shall not leak during the service life test before the end voltage reached.

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6. Leakage Resistance

6.1 Over discharge leakage test

Test conditions: $20\pm 2^{\circ}\text{C}$ & RH $60\pm 15\%$, 2.2Ω 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.

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 1 m 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 or leakage after 1hour OCV maintenance rate is 95% over

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:

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 date code followed by month and year of expiry for export. (Shelf life 5 years)

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

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11. Component / Information of 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) | ~41.5 | 1313-13-9 | Brass | ~1.3 | 12597-71-6 |
| Zinc Powder (Zn) | ~16.5 | 7440-66-6 | Fe | ~15.0 | 7439-89-6 |
| Water (H ₂ O) | ~11.5 | 7732-18-5 | Ni-plating | ~0.18 | 7440-02-0 |
| Potassium Hydroxide (KOH) | ~7.2 | 1310-58-3 | Bi | <0.005 | 7440-69-9 |
| Carbon | ~2.5 | 7782-42-5 | In | <0.005 | 7440-74-6 |

Chart 1. Discharge diagram

