

ENGINEERING SPECIFICATION

Product: R20P, Zn/MnO₂, 1.5 Volts

Date: March 9, 2005

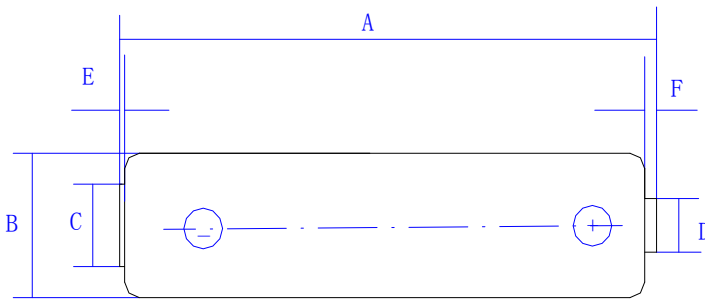
SCOPE :

This specification defines the technical requirements for dry cells distributed by BAO TONG. If not otherwise specified, the cells should meet or exceed the requirements of **IEC 60086-1,2**

If not otherwise specified in the drawing, the cell shall meet the dimensional requirements of standards listed in the scope.

1. Dimensions

in accordance with attached drawing.



| Dimensions | Max | Min |
|------------|------|------|
| A | 61.5 | 59.5 |
| B | 34.2 | 32.3 |
| C | -- | 18 |
| D | 9.5 | -- |
| E | 1.0 | -- |
| F | -- | 1.5 |

2. Electrical Requirement

O.C.V. : Min 1.5000V Max 1.725V

C.C.V. $\geq 1.400V$ After 0.2sec \pm 0.01sec by R=5.0 Ω

3. Service Life:

3.1

| | | | | |
|---------------------------------|---|-----------|----------|----------|
| Load Resistance ($\pm 0.5\%$) | 3.9 Ohms | | | |
| Cycle Time | 24h/d | | | |
| Cutoff Voltage | 0.9Volt | | | |
| Storage Condition | +20°C\pm2°C and 60\pm10%RH | | | |
| Minimum Average Duration | <30days | 12 months | 24months | 36months |
| | 720 mins | 612 mins | 576 mins | |

3.2

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| | | | | |
|--------------------------|-------------------------------|-----------|----------|----------|
| Load Resistance (±0.5%) | 3.9 Ohms | | | |
| Cycle Time | 1h/d | | | |
| Cutoff Voltage | 0.9Volt | | | |
| Storage Condition | +20°C±2°C and 60±10%RH | | | |
| Minimum Average Duration | <30days | 12 months | 24months | 36months |
| | 15hours | 12.8hours | 12hours | |

3.3

| | | | | |
|--------------------------|-------------------------------|-----------|----------|----------|
| Load Resistance (±0.5%) | 2.2 Ohms | | | |
| Cycle Time | 1h/d | | | |
| Cutoff Voltage | 0.8Volt | | | |
| Storage Condition | +20°C±2°C and 60±10%RH | | | |
| Minimum Average Duration | <30days | 12 months | 24months | 36months |
| | 7.8hours | 6.6hours | 6.2hours | |

3.4

| | | | | |
|--------------------------|-------------------------------|-----------|----------|----------|
| Load Resistance (±0.5%) | 2.2 Ohms | | | |
| Cycle Time | 4min/d 8h/d | | | |
| Cutoff Voltage | 0.9Volt | | | |
| Storage Condition | +20°C±2°C and 60±10%RH | | | |
| Minimum Average Duration | <30days | 12 months | 24months | 36months |
| | 400 mins | 340 mins | 320 mins | |

3.5

| | | | | |
|--------------------------|-------------------------------|-----------|----------|----------|
| Load Resistance (±0.5%) | 10 Ohms | | | |
| Cycle Time | 1h/d | | | |
| Cutoff Voltage | 0.9Volt | | | |
| Storage Condition | +20°C±2°C and 60±10%RH | | | |
| Minimum Average Duration | <30days | 12 months | 24months | 36months |
| | 40hours | 34hours | 32hours | |

4. Leakage Resistance

4.1 High heat and humidity storage test

High Temperature Exposure

When exposed to a temperature of 45 ±2°C
for a period of
no leakage shall occur during the test

20 days

5. Safety Requirement

5.1 Short Circuit Test

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When a continuous short circuit is applied to the cell terminals at Standard Environment, the case temperature must not exceed the specified limit and no explosion may occur. - Leakage is tolerable.
Max Case Temperature

Test Duration

When 4 cells are connected in series with a load resistor and one of the 4 cells is connected with reverse polarity no explosion may occur. - The safety valve must operate.

Load Resistor

Test Duration

24 hours

5.3 Forced Over Discharge Test

When one drained cell is connected in series with 3 fresh cells and a load resistor, no explosion may occur. - Leakage is tolerable.

The drained cell is prepared by discharging a fresh cell through a 3.9 Ohm resistor until its CCV reaches 0.9 V.

Load Resistor

Test Duration

3days

6. Heavy Metal Contents

The heavy metal contents of the cell shall conform to

Mercury limit (per cell weight)

1 ppm max

Cadmium limit (per cell weight)

100ppm max