## CERTIFICATE OF QUALITY

# Manganese Dioxide Lithium Primary Battery

<u>ITEM: CR2032</u>

| IJ | о. |  |  |
|----|----|--|--|
|    |    |  |  |
|    |    |  |  |
|    |    |  |  |

## **ADMISSION**

Date
Sign

September 8, 2004

FDK CORPORATION

FDK ENERGY CO., LTD.

# SPECIFICATION OF PRODUCTS

<u>TYPE:CR2032</u>

FDK ENERGY CO., LTD.

QUALITY CONTROL DEPARTMENT

K. YAMASHITA (GENERAL MANAGER)

### 1. Scope

This specification provides the certification of the quality for Manganese Dioxide Lithium Primary Battery CR2032 of FDK CORPORATION to .

### 2. Rated Standard

2.1 Type designation : CR 2 0 3 2 (UL FILE MH13421)

2.2 Nominal voltage : 3 V

2.3 Typical capacity : 220 mAh (Rated capacity at  $15k\Omega$  at  $20^{\circ}$ C)

(End-point voltage: 2.5V)

2.4 Shape and dimension : Refer to attached Fig.1.

2.5 Typical weight :  $3.2 \times 10^{-3}$  kg 2.6 Operating temperature range :  $-20^{\circ}$ C  $\sim 70^{\circ}$ C

(If the operating temperature exceeds 60°C, the operating time shall be within 2000 hours.)

### 3. Appearance

There shall be no dirt, flaw nor deformation detrimental to practical service on the appearance of a battery.

### 4. Marking

### 4.1 Symbols in year and month of manufacturing

The year and month of manufacturing shall be abbreviated by two numerals.

First numeral shows year as follows.

2001 = 1

2002 = 2

2003 = 3

Second numeral shows month as follows.

January = 1 October = 0

February = 2 November = Y

: December= Z

4.2 Marked Brand : It shall be FDK.

(Shown in attached Fig.2.)

4.3 Other Marking : Type designation, nominal voltage and polarity of +

Shall be marked.(Shown in attached Fig.2.)

### 5. Electric properties

#### 5.1 Off-load voltage

Test temp.20℃

|                              | 1000 001112.20                            |  |  |
|------------------------------|---|--|--|
| Initial                      | After 12 months storage at ordinary temp. |  |  |
| Imuai                        |   |  |  |
| $3.10 \sim 3.40  \mathrm{V}$ | $3.10 \sim 3.40  \mathrm{V}$              |  |  |

## $5.2\,On\text{-load voltage}(15\,k\,\Omega\,\text{, after 1 second})$

Test temp.20°C

| ,                            |                              |  |
|------------------------------|------------------------------|--|
| Initial                      | After 12 months storage at   |  |
| Illiuai                      | ordinary temp.               |  |
| $3.00 \sim 3.39  \mathrm{V}$ | $3.00 \sim 3.39  \mathrm{V}$ |  |

#### 5.3 Service output(Continuous discharge at 15 k $\Omega$ )

Test temp.20°C

| Initial            | After 12 months storage at |  |
|--------------------|----------------------------|--|
| (Minimum Average)  | ordinary temp.             |  |
| (Millimum Average) | (Minimum Average)          |  |
| Above 1020 Hours   | Above 1000 Hours           |  |

Notes: Discharge shall be tested in accordance with IEC publication (1987) 86-1, Sub-clause 8.8. End-point voltage is 2.5 V.

### 6. Leakage proof

No leakage of electrolyte that affects performance in actual use shall be found by visual check when the battery is subjected to the test of the following conditions.

1) Test temperature and humidity  $:45 \pm 2^{\circ}\text{C}$ , 70% or less

2) Test period : 30 days

3) Test method : Allow to stand

#### 7. Test condition and apparatus

#### 7.1 Voltmeter

The precision of the voltmeter shall be within  $\pm 0.005$ V per volt, and the internal resistance shall be  $10M\Omega$  or more.

### 7.2 Load resistance

The resistance of all external circuits shall be included in the load resistance and the tolerance on load resistance shall be  $\pm 0.5\%$ . Furthermore, the specified allowance shall not be exceed as a result of heat evolution in a resister due to discharge.

### 7.3 Apparatus for measuring dimensions

The venire calipers having the minimum graduation of 0.05 mm specified in JIS B 7507 or at least the equivalent in precision shall be used for measuring the height. A micrometer or dial gauge at least equivalent in precision may be used.

The micrometer specified in JIS B 7502 or a dial gauge at least equivalent in precision may be used as the measuring the diameter.

### 7.4 Temperature and humidity

Unless otherwise specified, temperature shall be  $20\pm2^{\circ}$ C and relative humidity shall be  $65\pm20\%$ .

#### 7.5 Initiation of discharge

Discharge test shall be started after the battery has been allowed to keep at a temperature of  $20\pm2^{\circ}$ C for at least 8 hrs.

#### 7.6 End of discharge

It is the time at which the on-load voltage drops below the end-point voltage (2.5V).

#### 8. Packaging

Packaging shall be a standard form of FDK CORPORATION.

### 9. Remark in handling

#### 9.1 For use

- (1) Use the battery only for the fixed equipments.
- ② Do not use the lithium battery with any other kinds of batteries.
- 3 Do not use together new and old batteries.
- 4 Do not short-circuit batteries.
- (5) Do not dispose of batteries in fire.
- ⑥ Do not overheat batteries.
- (7) Do not charge batteries.
- ® Do not inset batteries in reverse. Observe the + and markings on battery and equipment.
- (9) Do not dismantle batteries.
- ① Do not weld or solder directly to batteries.
- (1) Do not deform batteries..

#### 9.2 For transport and storage

- (1) Sore batteries in well ventilated, dry and cool conditions not in high temperature and high humidity conditions.
- (2) Avoid storing or displaying batteries in direct sun or in places where they get exposed to rain.
- (3) Store unused batteries in their original packaging and keep them away from metal objects which may short-circuit them.
- (4) Do not stack battery cartons on top of each other exceeding a specified height.

Fig.1 Shape and Dimension

C R 2 0 3 2

Unit: mm





