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This is a PROVISIONAL SPECIFICATION just only for technical reviewing on our product herein. Also, this is a reference document for reviewing our product's characteristics, which is for prevention any troubles or misuse in customers. Since this is just a reference material for customers, all description for warranty herein shall be handled with the formal specification, which shall be agreed upon between the customer and Panasonic Corporation Energy Company. Please note that all descriptions specify this product has possibility of revision by Panasonic without notifications.

PROVISIONAL SPECIFICATION	
Alkaline Button Battery	
Ordering Code :	LR-44PA/1B
Model Code :	LR44

Approved by
Division/Department
Name
Title
Signature/date

Established date: Sep.9.2010

Energy Solution Business Unit
Panasonic Corporation Energy Company

Approved	Checked	Checked	Drafted
			<i>J. J. J. J.</i>



Revision history		
No.	Date	Revision
1	Sep.9.2010	Provisional Specification Established
2		
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Panasonic Corporation Energy Company

1. Applicable range

This specification applies to alkaline batteries which are delivered from Panasonic Corporation Energy Company

2. Nominal specification

- 2.1.1 Model code LR44
- 2.1.2 Order code LR-44PA/1B
- 2.2. Nominal voltage 1.50 V
- 2.3. Nominal capacity 120 mAh
- 2.4. Operation temperature From -10 to 45 °C
- 2.5. Mass 2.0 g
- 2.6. Dimension Refer to drawing 1
- 2.7. Terminal Plus terminal material : Nickel Plated Steel
Minus terminal material : Copper, Nickel Clad Stainless Steel
- 2.8. Battery composition Alkaline battery composed of cathode from manganese dioxide, anode from zinc and electrolyte from potassium hydroxide.

3. Battery characteristics

Table 1. LR44 characteristics

	Items	Test method	Atmosphere	Discharge condition	Initial	After 60°C 20days
1	Open circuit voltage	Refer to 5.2 (Min.)	23±2°C		1.50V	-
2	Close circuit voltage	Refer to 5.3 (Max.)	-10±2°C	Load:200Ω After 5sec	1.25V	-
3	Discharge duration	Refer to 5.4 (Min.)	23±2°C	Load:4.7kΩ cut off V:0.9V	390h	-
		Refer to 5.4 (Std.)			435h	420h

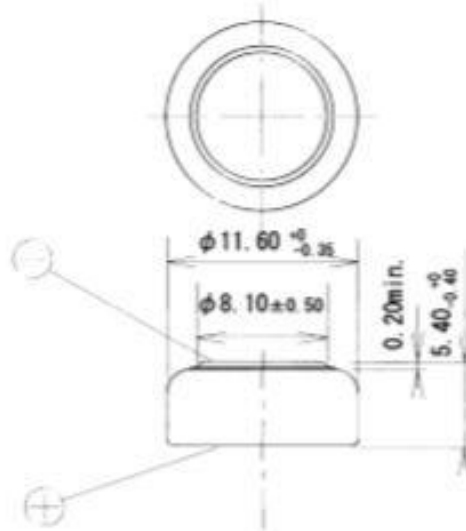
4. Indication

Below items are indicated on battery or its package.

- Model code LR44
 - Plus polarity +
 - Manufacturer brand Panasonic
 - Production date Indicated on its package
- (Design of indication can be changed without notice)



Drawing 1. Dimensions (unit : mm)



5. Test condition and performance

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|---------------------------------------|--|
| 5.1. External dimensions
(Initial) | This shall be measured with caliper described in item 6.3.(1). Do not short cells by caliper. Dimensions should confirm to drawing 1. |
| 5.2. Open circuit voltage | After storage in measuring atmosphere at least 2 hours, this shall be measured with voltage meter described in item 6.3.(2). Open circuit voltage should conform to table 1. |
| 5.3. Close circuit voltage | After storage in measuring atmosphere at least 2 hours, batteries are discharged under condition described in table 1 and this shall be measured with voltage meter described in item 6.3.(2). Close circuit voltage should conform to table 1. |
| 5.4. Discharge duration | After storage in measuring atmosphere at least 2 hours, batteries are discharged by load resistance described in table 1. Discharge duration is time from initial until closed circuit voltage reaches 1.2V. Discharge duration should conform to table 1. |
| 5.5. Anti-leakage | After 30days storage at 45±2°C below 70%RH., battery should not have leakage or salting by visual inspection. |
| 5.6. Storage characteristics | |
| (1) Open circuit voltage | After storage term described on table 1, sample batteries should be storage in measuring atmosphere at least 2 hours. Then open circuit voltage should be measured with voltage meter described in item 6.3.(2). This should conform to table 1. |
| (2) Close circuit voltage | After storage term described on table 1, sample batteries should be storage in measuring atmosphere at least 2 hours. Then batteries are discharged under condition described in table 1 and the close circuit voltage shall be measured with voltage meter described in |



- item 6.3.(2). This should conform to table 1.
- (3) Discharge duration After storage term described on table 1, sample batteries should be storage in measuring atmosphere at least 2 hours. Then batteries are discharged by load resistance described in table 1. Discharge duration is time from initial until closed circuit voltage reaches 1.2V. Discharge duration should conform to table 1.
- 5.7. Appearance Any dirt, scratch, deformation or bruise which cause any trouble at usage, does not show on the battery.
6. Test conditions
- 6.1. Initial test Initial test must be done within 2 months from delivery.
- 6.2. Temperature and humidity Unless otherwise specified, test should be carried out in room temperature (20 +/- 15 °C) and room humidity (65 +/- 20%RH).
- 6.3. Measuring equipment's
- (1) Dimension Micrometer defined by JIS B7502 or equivalent or more accurate one must be used for dimension measurement. For one digit decimals tolerance, caliper with 0.05mm accuracy which is defined JIS B7507 or higher accuracy equipment must be used.
- (2) Voltage Voltage meter defined by JIS C1102 class 0.2 or higher, and more than 10Mohm impedance must be used.
- (3) Load resistance includes all resistance of discharge circuit, and tolerance is less than 0.5%.
- (4) Visual inspection is carried out by naked eyes.
7. Operation and modification of this specification
Modification must be carried out under mutual agreement. Any accidents caused by non-described items in this specifications must be discussed and solved mutually.
8. Important Notes (Warranty)
- (1) The Batteries are warranted to conform to the description contained in this Specifications for a period of twelve [12] months from the ex-factory date and any claim by customer (apparatus manufacturer or distributor) must be made within such period. During that warranty period, if the Batteries are proved to become defective, non-defective and conforming Batteries will be supplied in due course at sole expense of Matsushita Battery Industrial Co., Ltd. (MBI) upon MBI's own determination that this is apparently caused by negligence of MBI.
- (2) Confirm and assure the matching and reliability of batteries to actual set or unit application with customer's responsibility.
- (3) MBI shall not warrant or be responsible in any case where customer fails to carry out proper handling, operating, installation, testing, service and checkout of the batteries and/or to follow the instructions, cautions, warnings, notes provided in this Specifications, or other MBI's reasonable instructions or advice.
- (4) When this specification is not returned until either 6 months from specification issued date or first delivery date whichever comes first, this specification is deemed to be approved by customer.
9. Precautions for use
- 9.1 Caution for storage
- * A battery shall not be stored at temperatures in excess of 45°C. Storage at less than 35°C is recommended.
 - * Storage at less than -10°C can deform the plastic parts and may cause a leakage.



- * To prevent self-discharge caused by corrosion or decrease of insulation, humidity during storage shall be less than 85%RH, without dewing on battery.
- * Do not place near the boiler or radiator, not expose to the direct sunlight.

9.2 Warning for safety

To ensure complete safety, observe the following.

Failure to observe these precautions may result in explosion or leakage.

- * Do not use except in applicable model or equipment.
- * Do not mix fresh and used batteries.
- * Do not mix different types (chemistries) of batteries.
- * Do not short circuit.
- * Do not charge.
- * If button-type batteries are kept in contact with each other. The (+) and (-) terminals may short-circuit. Greatly shortening their serviceable life.
- * Do not dispose in fire
- * Do not heat batteries.
- * Do not solder direct to battery.
- * Do not disassemble.
- * Do not soak in water.
- * Do not deform.
- * Do not inadequately modify and remodel for installation.
- * Insert the batteries in correct polarity position.

When designing equipment, give careful consideration to prevent children from easily removing the batteries. Should a battery be swallowed, consult a doctor immediately.

9.3 Caution for better usage.

- * Use gold-plated or nickel-plated steel or stainless steel strips for battery terminal contacts. Terminals made of gold-plated phosphor bronze will ensure contact with long-term stability.
- * For ensuring stable contact, apply a contact pressure of 2~10N.
- * Before inserting batteries, check to confirm that the terminal contact surfaces on both the equipment and the batteries are clean and that they are not deformed. If the contact surfaces are dirty, clean and dry them thoroughly before inserting batteries.
- * Batteries of the same size and shape may differ in type and grade. When exchanging batteries, confirm that they are the correct types by checking the identification symbol (designated by I.E.C. standards) provided on the battery.
- * Alkaline primary batteries continue to register high voltage even toward the end of their serviceable life. As such, they may be mistakenly judged as yet being strong. If one of several batteries being used in a set is found to be exhausted. It can be assumed that there is very little life remaining in the other even though they may continue to register high voltage. It is therefore advisable to exchange all of the batteries at the same time.
- * The direction of polarity in a battery may reverse as it nears the end of its serviceable life. This occurs when it is the first among several batteries being used in a set to be exhausted. It is not due to an abnormality in the battery itself.
- * When a battery is short-circuited, even slightly. A certain amount of time is required for its voltage output to recover completely. If the electrical characteristics of the



battery are measured before a sufficient amount of time has passed. The battery may appear to be malfunctioning when actually it is merely in a state of recovery.

- * Antistatic conductive materials include packing bags, trays, mats, sheets, film and resin cases. Sheets, for example, have a resistance of 10^3 to $10^6 \Omega$, which means that when they contact the positive and negative terminals of a battery, they will discharge the battery. In a lithium battery, a current flow of several μA to several mA reduces its voltage and electrical capacity. We recommend constant attention when using batteries around protective materials.
- * Since the battery thickness after use may expand slightly (approximately 0.2mm), please make consideration at the design time of apparatus.
- * Most suitable in applications that consume battery capacity in a short period. The life of battery is depended on the battery size, the way of use, and the surrounding atmosphere, etc. Please consult with Panasonic Corporation Energy Company
- * When the batteries are dead, remove batteries from the equipment immediately and dispose of them. Any battery left in the equipment for extended periods may cause battery leakage

Notice for equipment design

- * Keep away from heat source or flame, water.
- * Please contact us in case of plurality cells use.