



JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS C 8705 : 1998

**Sealed nickel-cadmium cylindrical
rechargeable single cells**

ICS 29.220.99

Descriptors : nickel-cadmium batteries, storage batteries, electric cells, electric enclosures, electronic power supplies

Reference number : JIS C 8705 : 1998 (E)

C 8705 : 1998

Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of International Trade and Industry through deliberations at Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law. Consequently **JIS C 8705 : 1994** is replaced with **JIS C 8705 : 1998**.

This revision has been made based on **IEC 60285 : 1993** *Alkaline secondary cells and batteries—Sealed nickel-cadmium cylindrical rechargeable single cells*, in order to make it easy to compare with the International Standard; to establish Japanese Industrial Standard in conformity with the International Standard; and to propose a draft of International Standard which is based on Japanese Industrial Standard.

Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

Date of Establishment: 1969-12-01

Date of Revision: 1998-02-20

Date of Public Notice in Official Gazette: 1998-02-20

Investigated by: Japanese Industrial Standards Committee

Divisional Council on Electricity

JIS C 8705:1998, First English edition published in 1999-02

Translated and published by: Japanese Standards Association
4-1-24, Akasaka, Minato-ku, Tokyo, 107-8440 JAPAN

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Printed in Japan

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Sealed nickel-cadmium cylindrical rechargeable single cells

Introduction This Japanese Industrial Standard has been prepared based on **IEC 60285**, *Alkaline secondary cells and batteries—Sealed nickel-cadmium cylindrical rechargeable single cells* published in 1993 as the third edition and Amendment 1 (1995), but additionally includes items and contents not specified in the International Standard, and does not specify designations of terminals which are specified in the International Standard. The amendment is compiled into the text.

The portions underlined with dotted lines mean the matters prepared by modifying the original International Standard or additionally stated. The IEC Standard number is based on the new numbering system of IEC Standards put in force in January 1st 1997, and the Standard published before the said date is numbered by adding 60000 to the former number. This is only the change in the number and the contents remain unchanged.

1 General

1.1 Scope This Japanese Industrial Standard specifies the test methods and requirements of sealed nickel-cadmium cylindrical rechargeable single cells (hereafter referred to as “cells”).

1.2 Normative references The following standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. If the indication of the year of coming into effect (or publishing) is given to these referred standards, only the edition of indicated year constitutes the provision of this Standard but the revision and amendment made thereafter are not applied. The normative references without the indication of the year of coming into effect (or publishing) apply limiting only to the most recent edition (including the amendment).

JIS B 7411 *Etched-stem liquid-in-glass thermometers, total immersion type*

JIS B 7507 *Vernier, dial and digital callipers*

Remarks : **ISO 3599** : 1976 *Vernier callipers reading to 0.1 and 0.05 mm* and **ISO 6906** : 1984 *Vernier callipers reading to 0.02 mm*, are corresponding to this Standard.

JIS C 1102-2 *Direct acting indicating analogue electrical measuring instruments and their accessories Part 2 : Special requirements for ammeters and voltmeters*

JIS C 1202 *Circuit testers*

JIS C 1302 *Insulation resistance testers*

Remarks : **JIS C 1102-2**, **JIS C 1202** and **JIS C 1302** are corresponding to **IEC 60051** *Direct acting indicating analogue electrical measuring instruments and their accessories*.

JIS C 0042 *Basic environmental testing procedures Part 2: Tests Test Eb and guidance: Bump*

Remarks : IEC 60068-2-29 : 1987 *Environmental testing—Part 2 : Tests—Test Eb and guidance : Bump*, coincides with this Standard.

JIS C 8500 *Primary batteries: General*

JIS C 8501 *Manganese dry cells and batteries*

JIS C 8511 *Alkaline primary cells and batteries*

Remarks : JIS C 8500, JIS C 8501 and JIS C 8511 are corresponding to IEC 60086 *Primary batteries*.

JIS Z 9015 *Sampling inspection procedures and tables by attributes with severity adjustment (receiving inspection where a consumer can select suppliers)*

Remarks : IEC 60410 : 1973 *Sampling plans and procedures for inspection by attributes* is corresponding to this Standard.

JIS C 1003 *Testing methods for digital voltmeters*

Remarks : IEC 60485 : 1974, *Digital electronic d.c. voltmeters and d.c. electronic analogue-to-digital converters* is corresponding to this Standard.

1.3 Definitions For the purpose of this Standard, the following principal definitions apply.

1.3.1 sealed nickel-cadmium rechargeable single cells Sealed rechargeable cells which employ nickel oxide as positive electrode, cadmium as negative electrode and aqueous solution of potassium hydroxide or the like as the electrolyte. A sealed rechargeable cell remains closed and does not release either gas or liquid when operated within the limits of charge and temperature specified by the manufacturer. The cell shall be equipped with a safety device to prevent dangerously high internal pressure. The cell is so designed that it does not require supplement of electrolyte and operates under original sealed state during its life.

1.3.1A cylindrical cell A cylindrical cell whose height is larger than or equal to the diameter.

1.3.1B general cell A cell which has the standard characteristics of sealed nickel-cadmium rechargeable cell and represents the cylindrical sealed nickel-cadmium rechargeable cell.

1.3.1C high temperature type cell A cell which is suitable for continuous charging at a very small current under relatively high ambient temperature (hereafter denoted by symbol T).

1.3.1D quick charge type cell A cell which is suitable for charging of short time as compared with general cell. The cell is suitable for such operation that it is charged with a charger capable of controlling the charge by detecting the changes in the cell voltage and cell temperature, so that it is initially charged at a large current and

the current is changed over to a small current or stopped. Generally the cell is charged in 1 h to 2 h (hereafter denoted by symbol R).

1.3.2 nominal voltage The nominal voltage of the cell is 1.2 V.

1.3.3 rated capacity The quantity of electricity C_5 Ah (ampere hours) declared by the manufacturer, which a single cell can deliver at a constant current of $0.2C_5$ A to a final voltage of 1.0 V at 20 °C after charging, storing and discharging under the conditions specified in 4.1.

Remarks : Expression of charging and discharging current; the charging and discharging currents are expressed by the multiple to the numerical value when the rated capacity of the cell is expressed in ampere hours (C_5). For example, $0.1C_5$ A means a current equal to 0.1 times the numerical value of rated capacity.

1.3.3A trickle charge A continuous charge carried out at a small current which will not adversely affect the life of cell but capable of recovering the capacity, to maintain the cell always under charged state while the cell is disconnected from the load.

1.4 Measuring instruments The measuring instruments used for the tests shall be selected according to the magnitude of the parameters to be measured. Equipment shall be regularly calibrated to ensure that it shall at all times have the degree of accuracy given below.

1.4.1 Voltage measurement The instruments used for voltage measurement shall be voltmeters having an accuracy class of 0.5 or better as defined in JIS C 1102-2.

1.4.2 Current measurement The instruments used for current measurement shall be ammeters having an accuracy class of 0.5 or better as defined in JIS C 1102-2.

1.4.3 Temperature measurement The instruments used for temperature measurement shall be thermometers at least equal to those with tolerances of ± 1 °C specified in JIS B 7411 in accuracy.

1.4.4 Time measurement The instruments used for time measurement shall be hour meters of tolerance ± 0.1 % or better in accuracy.

1.4.4A Dimension measurement The instruments used for dimension measurement shall be the vernier, digital and dial callipers (with 0.05 mm scale) or those at least equivalent thereto in accuracy.

2 Designation and marking

2.1 Cell designation Sealed nickel-cadmium cylindrical rechargeable single cells shall be designated by the letter "KR" followed by a symbol L, M, J, H or X which denotes the classification according to the discharge performance in Table 1, and two groups of figures separated by a solidus. When a cell is intended for permanent charge at elevated temperatures, a letter "T" is inserted between the letter L, M, J or H and the two groups of figures. When the cell is quick charge type, a letter "R" shall be inserted between the letters of KR and the two groups of figures.

The two figures to the left of the solidus shall indicate the whole number equal to or immediately above the maximum diameter specified for the cell, expressed in millimeters.

The two figures to the right of the solidus shall indicate the whole number equal to or immediately above the maximum height specified for the cell, expressed in millimeters.

Table 1 Symbols for classification by discharge performance

Classification	Symbol
Low rate discharge performance	L
Standard rate discharge performance	M
Intermediate discharge performance between standard and high rate	J
High rate discharge performance	H
Extra-high rate discharge performance	X

Remarks : Numerals and symbols used for type designation have the following meanings.

Example : **KR L T 15/51**

- Denotes height of cell
- Denotes diameter of cell
- Denotes high temperature type cell
- Denotes low rate discharge performance
- Denotes sealed nickel-cadmium cylindrical rechargeable single cell

2.2 Cell termination

2.3 Marking Except when otherwise required by the purchaser, the following items shall indelibly marked on each cell.

- name expressing sealed nickel-cadmium rechargeable single cell
- cell designation as specified in 2.1
- rated capacity
- nominal voltage
- recommended charge rate and time or permanent charge current for “T” cells
- polarity
- year and quarter of manufacture (which may be in code)
- name of manufacturer or supplier (which may be abbreviated)
- marking for promotion of recycling of cells

Remarks : In general, cells forming a component of a battery need not be marked, in which case the battery itself is marked with the above information.

3 Dimensions

3.1 Dimensions The dimensions of cells (including insulating covering) shall be as given in Fig. 1.

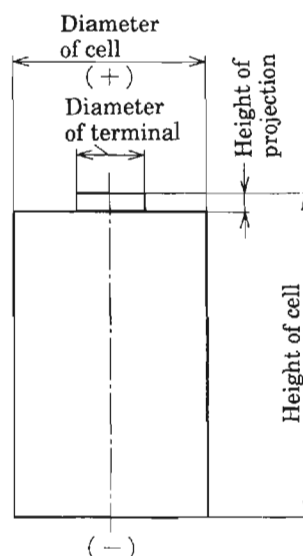


Fig. 1 Cylindrical cell (including insulating covering)

Table 2 shows the dimensions of cylindrical cells (including insulating covering) which are interchangeable with primary batteries.

Table 2 Sealed nickel-cadmium cylindrical rechargeable cells (including insulating covering) which are interchangeable with primary batteries

Unit : mm

Designation	Corresponding primary battery	Diameter	Height	Positive terminal	
				Diameter	Minimum height of projection
KR03	R03, LR03	10.5 ⁰ _{-1.0}	44.5 ⁰ _{-2.0}	2.0 to 3.8	0.8
KR6	R6, LR6	14.5 ⁰ _{-1.0}	50.5 ⁰ _{-1.5}	4.2 to 5.5	1.0
KR14	R14, LR14	26.2 ⁰ _{-1.5}	50.0 ⁰ _{-1.5}	5.5 to 7.5	1.5
KR20	R20, LR20	34.2 ⁰ _{-2.0}	61.5 ⁰ _{-2.0}	7.8 to 9.5	1.5

Remarks : Taking the interchangeability with primary batteries into account, the diameter and height of projection of positive terminal are specified.

Table 3 shows the dimensions of cylindrical cells (including insulating covering) which are not interchangeable with primary batteries.