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**Stationary nickel-cadmium
rechargeable single cells**

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by Battery Association of Japan (BAJ)/ Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently **JIS C 8706:2003** is replaced with this Standard.

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Stationary nickel-cadmium rechargeable single cells

Introduction

This Japanese Industrial Standard has been prepared based on the fourth edition of **IEC 60623** published in 2001 with some modifications of the technical contents by adding matters not specified in the corresponding International Standard to append the specifications for the rechargeable cells distributed in Japan.

The portions given sidelines or dotted underlines, and Annex JA are the matters in which the contents of the original International Standard have been modified. A list of modifications with the explanations is given in Annex JB.

1 Scope

This Standard specifies the marking, characteristics and test methods of stationary nickel-cadmium rechargeable single cells for use in electric telecommunication, electric machinery and apparatus, emergency power supply, etc. (hereafter referred to as “rechargeable cells”).

Vented nickel-cadmium prismatic rechargeable single cells specified in the corresponding International Standard shall be defined in the text of this Standard. Catalytic-plug sealed nickel-cadmium rechargeable cells not specified in the corresponding International Standard shall be defined in Annex JA of this Standard.

NOTE : The International Standard corresponding to this Standard and the symbol of degree of correspondence are as follows.

IEC 600623:2001 *Secondary cells and batteries containing alkaline or other non-acid electrolytes—Vented nickel-cadmium prismatic rechargeable single cells* (MOD)

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21-1**.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) listed below shall be applied.

JIS B 7516 *Metal rules*

JIS R 3505 *Volumetric glassware*

JIS Z 9015-1 *Sampling procedures for inspection by attributes—Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

3 Terms and definitions

For the purposes of this Standard, the following terms and definitions apply.

3.1 stationary nickel-cadmium rechargeable single cells

cells of structure that nickel oxide is used for positive pole, cadmium for negative pole and aqueous solution of potassium hydroxide or the like for the electrolyte, to be used for telecommunication, control and operation of power station, building emergency power supply, etc. while being installed stationary

3.2 single cell

a rechargeable cell of an elementary functional unit which serves as an electric energy source by the direct conversion of chemical energy

3.3 assembled battery

a rechargeable cell where two or more single cells are assembled

3.4 vented cell

a rechargeable cell in which suitable splash guard vent plug is used so that alkaline mist does not escape

Addition of water is necessary during service.

3.5 pocket type plate

such a plate that necessary number of pockets made of perforated thin nickel-plated steel plate containing active materials are held in a framework

3.6 sintered type plate

such a plate that the active materials are buried in holes of base material made of sintered metal powder

3.7 rated capacity

the quantity of electricity which can be delivered when discharged under the specified conditions, which is declared by the manufacturer

The unit is ampere-hour (Ah).

3.8 capacity

the quantity of electricity which can be delivered under the specified conditions

3.9 discharge current at the n hour discharge rate I_n

the discharge current that the duration of discharge becomes n h when the rechargeable cell is discharged under the specified conditions until the final voltage per a single cell reaches 1.00 V

The unit of I_n shall be ampere (A). n shall be 1 or 5.

3.10 rated capacity at the n hour discharge rate C_n

the quantity of electricity which can be delivered from a rechargeable cell declared by the manufacturer when the rechargeable cell is discharged at a discharge current of I_1 to the final voltage per a single cell under the specified conditions

The unit of C_n shall be ampere-hour (Ah). n shall be 1 or 5. The relation between C_n and I_n shall be $C_n = n I_n$.

3.11 nominal voltage

the voltage used for marking of the voltage of rechargeable cell

In general, a value somewhat smaller than the electromotive force. The nominal voltage of rechargeable cell is 1.2 V per single cell.

3.12 final voltage

the terminal voltage of a rechargeable cell at which the discharging is stopped

3.13 high rate discharge characteristics

the discharge characteristics of a rechargeable cell when discharged at a comparatively large current relative to its capacity

3.14 maximum discharge current

the maximum current capable of being discharged without generating deformation, abnormality on appearance, fusion of pole, etc.

3.15 charge retention characteristics

such a characteristics in which the capacity is still retained by a rechargeable cell that has been allowed to stand in the open circuit state under the specified conditions

3.16 splash guard characteristics

such a characteristics in which the escape of alkaline mist produced in a rechargeable cell at its charging to the outside is suppressed

3.17 catalytic plug

a plug which has a function to return the oxygen gas and the hydrogen gas produced at charging of a rechargeable cell to water by means of catalytic reaction

In general, the explosion guard configuration and the splash guard configuration are provided.

3.18 cell with catalyst plug

a cell in which the reduction of liquid is made small and the water refilling during use is made small by attaching a catalyst plug instead of the vent plug of a vented cell

3.19 gas recombination efficiency

the efficiency of such a catalytic reaction that the oxygen gas and the hydrogen gas produced by the decomposition of water are returned to water

In the case of the catalytic plug system, it is also called the reduction efficiency.

3.20 storage characteristics

the discharge characteristics when the rechargeable cell is re-charged after the storage under the specified conditions

4 Measuring instruments

Unless otherwise specified in this Standard, the following measuring instruments shall be used.

- a) **Thermometer** The thermometer with an accuracy of $\pm 2\text{ }^{\circ}\text{C}$ shall be used.
- b) **Voltmeter and ammeter** The voltmeter and the ammeter shall be those with an accuracy of $\pm 1\%$.
- c) **Burette or measuring cylinder** The burette or the measuring cylinder shall be those specified in **JIS R 3505**. The burette shall have a volume tolerance within $\pm 0.05\text{ ml}$, the measuring cylinder shall have a volume tolerances of $\pm 0.5\text{ ml}$ or those at least equivalent thereto in accuracy.
- d) **Measurement of time** The instrument for time measurement shall be the instrument with an accuracy of $\pm 0.1\%$.
- e) **Measurement of dimension** The instrument for dimension measurement shall be the metal rules of Grade 1 or better specified in **JIS B 7516** or those at least equivalent thereto in accuracy.
- f) **Measurement of volume** The instrument for volume measurement shall be the instrument with an accuracy of $\pm 1\%$.

The accuracy stated above means that in which all the errors caused by the instrument, measuring technique, and measuring method used are taken into account.

5 Type and marking of rechargeable cells

5.1 Type

5.1.1 Classification

The rechargeable cells shall be classified into classification I and classification II.

NOTE : The rechargeable cells specified in the corresponding International Standard are taken as classification I and the rechargeable cells specified uniquely in Japan are taken as classification II.

5.1.2 Classification I

The classification I shall be divided according to the discharge characteristics as given in table 1.

The type of classification I shall be expressed by the symbol that shows the division according to discharge characteristics and the numerical value indicative of the rated capacity of the rechargeable cell in ampere-hours (Ah) placed after the symbol. For the rechargeable cells in plastic containers, the letter "P" shall be placed after the numerical value.

Example : KH185P (rechargeable cell of classification I, high rate discharge characteristics, rated capacity: 185 Ah and plastic container)

NOTE : The initial letter K of the symbol that shows the division according to discharge characteristics indicates the rechargeable cell of classification I.

Table 1 Symbol for discharge characteristics in classification I and rated capacity division

Discharge characteristics	Symbol of discharge characteristics	Rated capacity division
Low rate discharge characteristics	KL	C_5
Standard rate discharge characteristics	KM	C_5
High rate discharge characteristics	KH	C_5
Very high rate discharge characteristics	KX	C_5
NOTE : The following discharge currents are recommended for the rechargeable cells of these types. KL : $2.5I_5$ ($0.5C_5$) A or under KM: $17.5I_5$ ($3.5C_5$) A or under KH: $35I_5$ ($7.0C_5$) A or under KX : Over $35I_5$ ($7.0C_5$) A		

5.1.3 Classification II

The classification II shall be divided according to the discharge characteristics as given in table 2.

The type of classification II shall be expressed by the symbol that shows the division according to discharge characteristics and the numerical value indicative of the rated capacity of the rechargeable cell in ampere-hours (Ah) placed after the symbol. When the negative pole and the positive pole are the pocket type plate or the sintered type plate, the following symbols shall be placed after the numerical value.

- negative pole and positive pole are pocket type plate: P
- negative pole and positive pole are sintered type plate: S

Example : AM100P (rechargeable cell of classification II, standard rate discharge characteristics, rated capacity: 100 Ah, negative pole and positive pole are pocket type plate)

NOTE : The initial letter A of the symbol that shows the division according to discharge characteristics indicates the rechargeable cell of classification II.

Table 2 Symbol for discharge characteristics in classification II and rated capacity division

Discharge characteristics	Symbol of discharge characteristics	Rated capacity division
Standard rate discharge characteristics	AM	C_5
Intermediate between standard rate discharge characteristics and high rate discharge characteristics	AMH	C_5
High rate discharge characteristics	AH	C_5
Very high rate discharge characteristics	AHH	C_1

5.2 Marking

The following items shall be suitably marked on each single cell or assembled battery.

- Type
- Rated capacity (hour rate)
- Nominal voltage
- Identification of positive pole
- Manufacturer's name or its abbreviation
- Year and month of manufacture or their abbreviation

6 Dimensions

6.1 Classification I

The dimensions of classification I shall be as given in table 3a and table 3b. The width, the overall height and the length shall be as given in figure 1.

- NOTE 1 The dimensions given in table 3a and table 3b represent the preferred values.
- NOTE 2 The widths given in table 3a and table 3b represent the overall width dimensions of the rechargeable cell excluding the thickness of the lug flanges. The negative tolerances thereof are given in table 4.
- NOTE 3 The overall height given in table 3a and table 3b represent the total height over the terminals or the closed vents of the rechargeable cell. No lower limit is specified.
- NOTE 4 The dimensions given in table 3a and table 3b are not associated with the capacity of the rechargeable cell. The dimensions shall apply to all types of rechargeable cells (KL, KM, KH and KX).