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Thyristor rectifiers for floating charge

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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 4402 : 2004** is replaced with this Standard.

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Thyristor rectifiers for floating charge

Introduction

This Japanese Industrial Standard was established in March 1980. In the last revision in 2004, a thorough review was made which resulted in changes of normative references, enlargement of direct current range, changes in requirements of battery accommodation system and outside dimensions of cabinet, etc. related to the addition of valve regulated lead-acid batteries. The revision at this time is principally aimed at expanding the scope so as to include small valve-controlled lead-acid batteries, and seeking harmonization with the revised Fire Defense Law.

1 Scope

This Standard specifies the thyristor rectifiers for floating charge (hereafter referred to as “rectifiers”) of batteries specified in JIS C 8702-1, JIS C 8702-2, JIS C 8702-3, JIS C 8704-1, JIS C 8704-2-1, JIS C 8704-2-2 and JIS C 8706, of which the nominal d.c. voltage is 200 V or less and the rated d.c. current is 600 A or less. Rectifiers used for communication equipment are excluded.

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) indicated below shall be applied.

JIS B 0405 *General tolerances — Part 1 : Tolerances for linear and angular dimensions without individual tolerance indications*

JIS C 1102-1 *Direct acting indicating analogue electrical measuring instruments and their accessories — Part 1 : Definitions and general requirements common to all parts*

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

JIS C 1102-8 *Direct acting indicating analogue electrical measuring instruments and their accessories Part 8 : Special requirements for accessories*

JIS C 1103 *Dimensions of electrical indicating instruments for switchboards*

JIS C 1509-1 *Electroacoustics — Sound level meters — Part 1 : Specifications*

JIS C 2552 *Non-oriented magnetic steel sheet and strip*

- JIS C 2553 *Grain-oriented magnetic steel sheet and strip*
- JIS C 3103 *Annealed copper wires for winding wires*
- JIS C 3104 *Rectangular copper wires for electrical purposes*
- JIS C 3202 *Enamelled winding wires*
- JIS C 3204 *Fiber or paper covered copper winding wires*
- JIS C 3307 *600 V Polyvinyl chloride insulated wires*
- JIS C 3316 *Polyvinyl chloride insulated wires for electrical apparatus*
- JIS C 8201-2-1 *Low-voltage switchgear and controlgear — Part 2-1 : Circuit-breakers*
- JIS C 8702-1 *Small-sized valve regulated lead-acid batteries — Part 1 : General requirements, functional characteristics — Methods of test*
- JIS C 8702-2 *Small-sized valve regulated lead-acid batteries — Part 2 : Dimensions, terminals and marking*
- JIS C 8702-3 *Small-sized valve regulated lead-acid batteries — Part 3 : Safety recommendations for use in electric appliances*
- JIS C 8704-1 *Stationary lead-acid batteries — General requirements and methods of tests — Part 1 : Vented types*
- JIS C 8704-2-1 *Stationary lead-acid batteries — Part 2-1 : Valve regulated types — Methods of test*
- JIS C 8704-2-2 *Stationary lead-acid batteries — Part 2-2 : Valve regulated types — Requirements*
- JIS C 8706 *Stationary nickel-cadmium rechargeable single cells*
- JIS C 60068-1 *Environmental testing Part 1 : General and guidance*
- JIS G 3101 *Rolled steels for general structure*
- JIS G 3131 *Hot-rolled mild steel plates, sheets and strips*
- JIS G 3141 *Cold-reduced carbon steel sheet and strip*
- JIS G 3350 *Light gauge steel sections for general structure*
- JIS H 3140 *Copper bus bars*
- JIS Z 8721 *Colour specification — Specification according to their three attributes*
- JIS Z 8741 *Specular glossiness — Method of measurement*

3 Terms and definitions

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

3.1 thyristor rectifier

a semiconductor static power converter which converts a.c. power to d.c. power using

reverse blocking triode thyristors (hereafter referred to as “thyristors”) or a combination of thyristors and rectifier diodes

3.2 floating charge

a charging system in which the battery and the load are connected in parallel to the d.c. output of the rectifier, and while the battery is always kept in charged conditions with a constant voltage applied, the electric power is supplied to the load from the rectifier, and the battery supplies electric power to the load without interruption when the power interruption or load fluctuation occurs

3.3 equalizing charge

battery charging carried out for equalizing the charged condition by eliminating the unevenly charged condition between individual batteries generated due to the self-discharge or others by charging at the voltage slightly higher than the floating charge voltage where many batteries are used as a group for a long period

3.4 floating charge voltage

the applied voltage when the floating charge is carried out

3.5 equalizing charge voltage

the applied voltage when the equalizing charge is carried out

3.6 rated a.c. voltage

an a.c. voltage which is specified for the a.c. input terminal of a rectifier as the basis of ratings

3.7 rated a.c. current

the current at the a.c. input when the rectifier is operated under the rated a.c. voltage, rated frequency and rated output

3.8 nominal d.c. voltage

a d.c. voltage used for designation of rectifiers

It is generally expressed by the rated voltage of load apparatus connected to the rectifier.

3.9 rated d.c. voltage

a voltage which is specified for the battery terminal of a rectifier as the basis of ratings

It is expressed as the equalizing charge voltage (floating charge voltage, for batteries which do not require equalizing charge voltage) per one cell to be connected, multiplied by the number of cells in a battery of series connections.

3.10 rated d.c. current

the limit of d.c. output current (mean value) which can be passed continuously without exceeding the temperature rise limit prescribed in this Standard under specified conditions

3.11 rated output

the product of the rated d.c. voltage and the rated d.c. current

3.12 rated input capacity

the apparent power at the a.c. side when the rectifier is operated under the rated a.c. voltage, rated frequency and rated output

3.13 accuracy of constant voltage

a fluctuation range of d.c. voltage which is assured under the conditions without transient fluctuations of a.c. input voltage and d.c. output current

It is expressed as the ratio to the set d.c. voltage (floating charge voltage, equalizing charge voltage) (%). It is expressed in percentage (%).

3.14 drooping characteristic

such a characteristic for protection of a rectifier from damage due to overload that the output current of the rectifier of not less than a constant current is restricted so as not to flow

3.15 efficiency

the ratio (%) of the rated output power to the input a.c. effective power at the rated a.c. voltage and rated frequency

It is expressed in percentage (%).

4 Classification

4.1 Classification by nominal d.c. voltage and rated d.c. current

The classification by nominal d.c. voltage and rated d.c. current is given in table 1.

Table 1 Classification by nominal d.c. voltage and rated d.c. current

Nominal d.c. voltage V	Rated d.c. current A
24, 48, 100, 200	5, 10, 15, 20, 30, 50, 75, 100, 150, 200, 300, 400, 500, 600

4.2 Classification by construction

The classification by construction shall be as follows.

- a) **Separate battery type** A type of rectifier in which only a rectifier is housed in a metal cabinet.
- b) **Built-in battery type** A type of rectifier in which a rectifier and batteries are housed in a metal cabinet.