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Sealed nickel-metal hydride cells and
batteries for use in industrial applications
— Part 2: Safety

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Foreword

This Japanese Industrial Standard has been established by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee according to the proposal for establishment of Japanese Industrial Standard submitted by Battery Association of Japan (BAJ)/Japanese Standards Association (JSA) with a draft being attached, based on the provision of Article 12, paragraph (1) of the Industrial Standardization Act.

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Sealed nickel-metal hydride cells and batteries for use in industrial applications — Part 2 : Safety

Introduction

This Japanese Industrial Standard has been prepared based on **IEC 63115-2 : 2021**, Edition 1, by making some changes in the technical contents in light of the unique condition of use of nickel-metal hydride cells and batteries in Japan.

In this Standard, Annex JA, and those subclauses and tables whose numbers are followed by capitalized Latin letters (A, B, C...) contain requirements not included in the corresponding International Standard. In these parts, vertical lines on both sides and dotted underlines, normally given to indicate changes from the corresponding International Standard, are omitted.

In other parts than the above, changes from the corresponding International Standard are marked with vertical lines on both sides and dotted underlines. A list of modifications with the explanations is given in Annex JB.

1 Scope

This Standard specifies designations, tests and requirements for the safe operation of sealed nickel-metal hydride cells and batteries (hereafter referred to as cells and batteries, respectively) used in industrial applications excluding road vehicles.

When a **JIS** or **IEC** Standard specifying test conditions and requirements for cells used in special applications exists and is in conflict with this Standard, the former takes precedence. For example, **IEC 62675** exists for sealed nickel-metal hydride prismatic secondary cells and batteries.

Since this Standard covers batteries for various industrial applications, it includes those requirements which are common and minimum to the various applications.

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

IEC 63115-2 : 2021 *Secondary cells and batteries containing alkaline or other non-acid electrolytes — Sealed nickel-metal hydride cells and batteries for use in industrial applications — Part 2 : Safety* (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

Part or all of the provisions of the following standards, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (in-

cluding amendments) indicated below shall be applied.

JIS C 60695-11-10 Fire hazard testing — Part 11-10 : Test flames — 50 W horizontal and vertical flame test methods

JIS Z 8051 Safety aspects — Guidelines for their inclusion in standards

NOTE Normative reference in the corresponding International Standard :
ISO/IEC Guide 51 *Safety aspects — Guidelines for their inclusion in standards*

3 Terms and definitions

For the purpose of this Standard, the following terms and definitions, and those given in **JIS Z 8051** apply.

3.1

safety

freedom from unacceptable risk

3.2

risk

combination of the probability of occurrence of harm and the severity of that harm

3.3

harm

physical injury or damage to the health of people, or damage to property or the environment

3.4

hazard

potential source of harm

3.5

intended use

use of a product in accordance with the specifications, instructions and information provided by the supplier

Note 1 to entry This term is synonymous with “normal use”.

3.6

reasonably foreseeable misuse

use of a product for a purpose or conditions not intended by the supplier, but which may result from human behaviour readily predictable by the supplier

3.7

sealed nickel-metal hydride cell

cell containing a nickel hydroxide compound for the positive electrode, a hydrogen absorbing alloy for the negative electrode, and potassium hydroxide or other alkaline solution as electrolyte, consisting of negative and positive electrodes separated by a separator, and maintaining its sealed state without releasing either gas or liquid when operated within the limits specified by the manufacturer

Note 1 to entry A sealed cell may be equipped with a safety device to prevent a dangerously high internal pressure and is designed to operate during its life in its original sealed state.

3.8

cell

basic manufactured unit providing a source of electrical energy by direct conversion of chemical energy to electrical energy performed by charging, that consists of electrodes, separators, electrolyte, container, terminals and other components

3.9

cell block

group of cells connected together in parallel configuration [with or without protective devices, e.g. fuse or PTC (positive temperature coefficient), and monitoring circuitry provided at the connections]

3.10

monobloc

battery with multiple separate but electrically connected cell compartments each of which is designed to house an assembly of positive and negative electrodes, separators, electrolyte and terminals or interconnections

3.11

module

group of cells connected together either in series and/or parallel configuration

Note 1 to entry A module may be with or without protective devices (e.g. fuse or PTC) and monitoring circuitry.

3.12

battery pack

energy storage device comprised of one or more cells, cell blocks, monoblocs or modules electrically connected

Note 1 to entry A battery pack may have a monitoring circuitry which provides information (e.g. cell voltage) to a battery system.

3.13

battery system, battery

system which comprises one or more cells, cell blocks, monoblocs, modules or battery

packs

- Note 1 to entry The battery system has a battery management system to control current in case of overcharge, overcurrent, overdischarge, or overheating.
- Note 2 to entry Overdischarge cut off is not mandatory if there is an agreement on this between the cell manufacturer and the customer.
- Note 3 to entry The battery system may have cooling and/or heating units.
- Note 4 to entry The battery system may be enclosed in a battery box.

3.14

battery enclosure, enclosure

physical construction which separates the battery or battery system from its external environment

3.15

battery management system, BMS

electronic system associated with a battery which has functions to control current in case of overcharge, overcurrent, overdischarge, and overheating

- Note 1 to entry The BMS monitors and/or manages its state, calculates secondary data, reports that data and/or controls its environment to influence the battery's safety, performance and/or service life.
- Note 2 to entry The function of the BMS can be assigned to the battery pack or to equipment that uses the battery (see Figure 2).
- Note 3 to entry The BMS can be divided and it can be found partially in the battery pack and partially on the equipment that uses the battery (see Figure 2).
- Note 4 to entry The BMS is sometimes also referred to as a BMU (battery management unit).

3.16

final voltage

specified voltage of a battery at which the cell or battery discharge is terminated

3.17

nominal voltage

suitable approximate value of the voltage used to designate or identify the voltage of a cell or battery

- Note 1 to entry The nominal voltage of a sealed nickel-metal hydride rechargeable single cell is 1.2 V.
- Note 2 to entry The nominal voltage of a battery of n series connected cells is equal to n times the nominal voltage of a single cell.

3.18

rated capacity

capacity value of a cell or battery determined under specified conditions and declared by the manufacturer

Note 1 to entry The rated capacity is the quantity of electricity in C_5 Ah (ampere-hours) declared by the manufacturer which a single cell or battery can deliver for 5 h when discharged at a current 0.2 times the reference test current to a final voltage specified by the manufacturer.

3.19**explosion**

failure that occurs when a cell, module, or monobloc container opens violently as a result of a sudden increase of pressure and temperature in cell due to exothermic reaction and major components are forcibly expelled

Note 1 to entry "Components" in this definition do not include liquid, gas or smoke.

3.20**rupture**

failure that occurs when a cell, monobloc or battery opens due to an internal or external cause, resulting in exposure or spillage

3.21**leakage**

unplanned, visible escape of liquid electrolyte from a battery

Note 1 to entry This does not include a leakage induced by safety function of venting.

3.22**venting**

release of excessive internal pressure from a cell, monobloc or battery by gas exhaust valve in a manner intended by design to preclude rupture or explosion

3.23**reference test current, I_t**

current expressed according to the formula $I_t A = C_5 \text{ Ah} / 1 \text{ h}$ corresponding to reference time 5 h

Note 1 to entry This is the current specified in 7.1 of JIS C 8711 as a current that takes 5 h when the specified rated capacity C_5 is charged and discharged under the specified conditions.

4 Parameter measurement tolerances

The overall accuracy of controlled or measured values, relative to the specified or

actual values, shall be within the following tolerances :

- a) ± 1 % for voltage;
- b) ± 1 % for current;
- c) ± 1 % for capacity;
- d) ± 2 °C for temperature;
- e) ± 0.1 % for time;
- f) ± 1 % for dimension.

These tolerances comprise the combined accuracy of the measuring instruments, the measurement techniques used and all other sources of error in the test procedure.

The details of the instrumentation used shall be provided in each report of results.

5 General safety considerations

5.1 General

The safety of sealed nickel-metal hydride cells or batteries requires the consideration of two sets of applied conditions :

- a) intended use;
- b) reasonably foreseeable misuse.

The manufacturer can use “cell block(s) or monobloc(s)” instead of “cell(s)” for any test that specifies “cell(s)”. The manufacturer can use “battery pack” instead of “battery” as the test unit in this Standard. The cell manufacturer shall clearly declare the test unit for each test.

Cells or batteries shall be so designed and constructed that they are safe under conditions of both intended use and reasonably foreseeable misuse. It may also be expected that cells or batteries subjected to intended use shall not only be safe but shall continue to be functional in all respects.

It is expected that cells or batteries subjected to reasonably foreseeable misuse may fail to function. However, even if such a situation occurs, they shall not present any significant hazards and shall meet the requirements given in 6.5.

Potential hazards which are the subject of this Standard are :

- a) fire,
- b) explosion,
- c) electrical shock hazards,
- d) venting (such as H₂ gas),
- e) rupture of the casing of a cell or battery with exposure of internal components,
- f) leakage.

5.2 Insulation and wiring