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# Технические характеристики на никелевые аккумуляторы серии VRNM

# VRNM Ni-Cd batteries

## Type VRNM

## Installation and operating instructions


**Important recommendations**

- **WARNING: Risk of fire, explosion, or burns. Do not disassemble, heat above 70°C, or incinerate**
- **Never smoke while performing any operation on the battery.**
- **For protection, wear rubber gloves, long sleeves and appropriate splash goggles or face shield.**
- **The electrolyte is harmful to skin and eyes. In the event of contact with skin or eyes, wash immediately with plenty of water. If eyes are affected, flush with water, and obtain immediate medical attention.**
- **Remove all rings, watches and other items with metal parts before working on the battery.**
- **Use insulated tools.**
- **Avoid static electricity and take measures for protection against electric shocks.**
- **Discharge any possible static electricity from clothing and/or tools by touching an earth-connected part "ground" before working on the battery.**
- **Ventilation, in accordance with the IEC 62485-2 standard, is mandatory during commissioning and operation.**

### 1.Receiving the shipment

Upon receipt of the goods, any transportation damage, electrolyte spillage or irregularities must be reported to the carrier and to . The battery is shipped filled and charged and is ready for immediate use. Storage of cells must not exceed the maximum storage time indicated on the packing case (first in, first out).

### 2. Storage

The battery must be stored in a dry indoor location, on open, well ventilated shelves away from direct sunlight between 0°C and +30°C (+32°F and 86°F).

**VRNM** batteries are supplied filled with electrolyte and charged condition.

They can be stored in this condition for maximum 12 months below 25°C from date of shipment in accordance with the recommendations set forth in this I&O.

Storage of a filled battery at temperatures above +30°C (+86°F) can result in permanent change and loss of product performance, depending on the duration of the storage above the maximum recommended temperature.

Never drain the electrolyte from the cells.

To ensure maximum protection of the cells always store the product in its original packaging.

### 3. Installation

#### 3.1. Location

Install the battery in a dry and clean room.

Avoid direct sunlight and heat.

The battery will give the best performance and maximum service life when the ambient temperature is between +10°C to +30°C (+50°F to +86°F).

#### 3.2. Mounting

Verify that cells are correctly interconnected with the appropriate polarity and with the connectors are correctly torque. Connections between the battery and the load shall be made with nickel plated cable lugs. Tightening torque for the terminals must be:

• M10 = 12 – 15 N m (105 - 135 lbf.in)

The connectors and terminals should be corrosion-protected by coating with a thin layer of anti-corrosion oil, DW330.

#### 3.3. Ventilation

During operation the battery emits an amount of gas mixture (oxygen and hydrogen).

Ventilation inside the battery room must be adequately managed, comply with IEC 62485-2 and local regulations.

#### 3.4. Electrolyte

As VRNM cells are delivered filled and charged condition, check for spillage. If spilling is noticed, the spilled cells must be refilled with TYPE-3 (density:1.17 ± 0.01) electrolyte to the same level as the other cells in the string.

When checking electrolyte levels, a fluctuation in level between cells is normal. This is caused by a small difference in internal pressure in each cell. Normally there is no need to adjust the electrolyte level.

Do not top-up cells prior to an initial charge.

After commissioning, when the level is stabilized, the electrolyte level should be between the maximum mark and 5mm below.

### 4. Commissioning

**Verify that ventilation, in accordance with the IEC 62485-2 standard, is provided during this operation.**

A good commissioning is important.

Charge at constant current is preferable.

**If the current limit is lower than $0.1C_5$A rate, extend the charge time proportionally.**

After commissioning, the battery shall be charged permanently according to section 5.

- **Cells stored up to 6 months:**
  A commissioning charge is not mandatory and the cells are ready for immediate use.
  However, the product's full performance will only be achievable after completion of the procedures dedicated to 'Cells stored more than 6 months and up to 1 year', refer to Section 4.
- **Cells stored more than 6 months and up to 1 year:**
  A commissioning charge is necessary:

- **Commissioning at ambient temperature between + 10°C to + 30°C (+ 50°F to + 86°F)**

**- Constant Current charge:**
**• 10 hours at 0.2 $C_5$ A recommended.**

**Notice:** At the end of charge, the cell voltage may reach about 1.80 V, thus the charger shall be able to supply such a voltage.

When the charger maximum voltage setting is too low to supply constant current charging, divide the battery into two parts to be charged individually at constant current.

**- Constant Potential charge:**
1.55 V/Cell for a minimum of 24 hours with current limit of 0.1 $C_5$ A.
If this voltage level is not available, then charging may be carried out at 1.50 V/cell for 36 hours.

- **Commissioning at ambient temperature above +30°C (+ 86°F)**

**- Only constant current charge for:**
• 10 hours at 0.2 $C_5$ A recommended
• 20 hours at 0.1 $C_5$ A possible

The temperature of battery container is to be monitored during charge. If the temperature exceeds + 45°C (+113°F) during charging, then it must be stopped to reduce the temperature. The charging can be resumed when battery container temperature drops below + 40°C (+ 104°F).

***Capacity Testing:***
*When full battery performance is required for capacity test purposes, the cells shall be charged in accordance with IEC62259 section 7 (7.1 & 7.2).*.

# VRNM Ni-Cd batteries

## 5. Charging in service

The recommended charging voltages for continuous parallel operation, with occasional battery discharges, are:

■ **Two level charge:**

- Float level:
  1.40 to 1.43 V/cell with charge current limited to 0.1 $C_5$ A
- High rate (Boost) level:
  1.45 to 1.47 V/cell with charge current limited to 0.1 $C_5$ A

■ **Single level charge:**

1.40 to 1.43 V/cell:

During normal operation of VRNM batteries constant voltage (CV) charging with current limit at 0.1 $C_5$ A is recommended. Charging with current limit 0.2 $C_5$ A will increase the maintenance of the battery bank and may result non-compliance of product features.

To achieve low maintenance operation (in term of water topping-up), it is necessary to control the charge input to the battery to minimize water consumption during the entire life of the battery. Temperature Compensated Voltage (TCV) is generally mandatory. The conditions to apply TCV depend on charge voltage and ambient operating temperature.

1.42V/Cell:

TCV is mandatory from -20°C to +40°C (-4°F to +104°F) as mentioned in Section-7

## 6. Preventive Maintenance

**VRNM** is low maintenance battery under the recommended operating conditions, from -20°C (+4°F) to +40°C (+104°F) and requires only preventive maintenance.

Best practices include keeping the battery clean using only water. Dry the battery after cleaning.

Individual cell and total battery charge voltage must be checked and recorded once per year. Individual cells with voltages measured below 1.30 V during float charge must receive corrective action.

Under normal operating conditions the topping up requirement is minimum. In addition, it allows possibility of replenishment of water in severe conditions where excessive water loss in unavoidable.

If visual check from the outside is not possible, a level testing tube can be used to check the electrolyte level

Never let the level fall below the warning level mark. Use only distilled or de-ionized water as per BIS/IS: 1069 standard to top-up. Topping up of the VRNM cells shall be carried out when battery is fully charged.

Changing or measuring the electrolyte specific gravity is not required.

The connectors and terminals should be corrosion-protected by coating with a thin layer of anti-corrosion oil, DW330

To maximize the topping-up interval check the charging voltage and adjust as required.

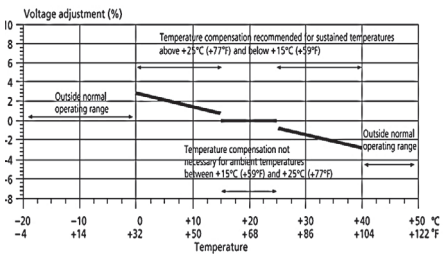
## 7. Temperature Effect

As the temperature increases the electrochemical behavior becomes more active and so, for the same floating voltage, the current increases. As the temperature is reduced then the reverse occurs.

Increasing the current increases the water loss and reducing the current creates the risk that the cell will not be sufficiently charged. It is important to maintain the same current through the cell, it is necessary to modify the floating voltage as the temperature changes.

The change in voltage required or "Temperature Compensation" value can be derived for VRNM battery as –2mV/°C/cell (–1.1 mV/°F/cell)

Temperature Compensated Voltage (TCV), is not required for an operating temperature between +15°C to +25°C. However, for an operating temperature below +15°C and above +25°C, the float voltage must be compensated or adjusted from 1.42V/cell with reference to +20°C, based on temperature compensation value.




## 8. Environment

To protect the environment all used batteries must be recycled. Contact your local representative for further information.

## 9. DO's and DON'Ts

### 9.1. DO's

- **Do** installation and maintenance of the battery system by trained professionals only.
- **Do** follow site safety regulation and use proper personal protective equipment, while working on battery system.
- **Do** follow safety rules and maintenance procedure as per installation and operation guidelines.
- **Do** use insulated tools to prevent short circuit.
- **Do** use isolator switch between Charger to Battery and between Battery to Load.
- **Do** use torque wrench for tightening cell terminal and terminal connections at specified values.
- **Do** periodically check battery charge voltage set in the charger to ensure Ultra-Low Maintenance features.

### 9.2. DON'Ts

- **Do not** expose the battery in direct sunlight or heat.
- **Do not** use wire or any hard brush to clean deposits on the inter cell connectors
- **Do not** reverse connect the power cables.
- **Do not** connect damaged cell(s) or different capacities and makes cells in one battery bank.
- **Do not** use any chemicals liquids for cleaning the cells and battery components.
- **Do not** mix hydrometer, funnel etc. used in Lead Acid battery for Ni-Cd battery maintenance
- **Do not** connect or disconnect any cell without isolating the battery bank from system.

## 10. Battery Racks

Based on contract terms, if supply of Battery Rack is in scope of India, VRNM batteries shall be supplied with either **Standard Rack** options.

**Recommendation for Battery Rack commissioning** (Unless specified otherwise in contract documents)

Features & Benefits

Urja - VRNM Nickel Battery - Low maintenance solution

VRNM is an exceptionally reliable low maintenance pocket plate nickel battery range that eliminates the risk of sudden death during the battery's long service life.

It operates with total reliability and high performance in extreme temperatures from – 20°C to + 40°C and from -50°C to + 70°C for a short duration.

Urja VRNM nickel batteries are eminently suitable for mixed load applications such as switching substation operations, where the system must be totally reliable and require minimum number of maintenance visits.

They are supplied as single cells of 1.2 V single and block cells in capacity range from 9 Ah up to 750 Ah and are IEC 62259, IEC 60623 and IS:10918 certified.

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