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TITLE	SPECIFICATION FOR NICKEL CADMIUM BATTERY	REFERENCE	REV
		CP_TSSPEC_151	2
		DATE: JULY 2024	
		PAGE: 1	OF 14

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## TABLE OF CONTENTS

	Page
FOREWORD .....	3
INTRODUCTION .....	4
1 SCOPE .....	4
2 NORMATIVE REFERENCES .....	4
3 DEFINITIONS AND ABBREVIATIONS .....	4
4 SERVICE CONDITIONS AND PARAMETER MEASUREMENT TOLERANCE .....	5
5 GENERAL REQUIREMENTS .....	5
6 TESTS .....	6

**SPECIFICATION FOR NICKEL CADMIUM  
BATTERY**

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PAGE

**2**

OF

REV

**2**

**14**

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7	MARKING, LABELLING, PACKAGING .....	7
8	DOCUMENTATION .....	7
9	STORAGE.....	7
10	TRAINING .....	7
11	QUALITY MANAGEMENT .....	8
12	HEALTH AND SAFETY .....	8
13	ENVIRONMENTAL MANAGEMENT.....	8
	Annexure A - Bibliography.....	9
	Annexure B - Revision information .....	10
	Annexure C - Technical Schedules A and B.....	11
	Vented nickel-cadmium prismatic rechargeable single cell .....	11
	Annexure D - Stock Items.....	14

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## **FOREWORD**

This specification was prepared by the following work group members:

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## INTRODUCTION

DC supply forms an integral part of City Power network; it's used for substation backup supply for Protection Power System. Nickel cadmium batteries are part of this supply and are required for the stable supply of electricity.

## 1 SCOPE

The purpose of this specification is to detail the technical requirements for vented prismatic nickel cadmium battery cells in City Power's substations.

## 2 NORMATIVE REFERENCES

The following standards and specifications contain provisions that, through reference in the text, constitute requirements of this specification. At the time of publication, the editions indicated were valid. All standards and specifications are subject to revision and parties to agreements based on this specification are encouraged to investigate the possibility of applying the most recent editions of the standards and specifications listed below.

Reference	Description
SANS 60623	Secondary cells and batteries containing alkaline or other non-acid electrolytes – Vented nickel-cadmium prismatic rechargeable single cells
IEC 60417	Graphical Symbols for Use on Equipment

## 3 DEFINITIONS AND ABBREVIATIONS

3.1 The definitions below shall apply to this specification.

3.1.1 **Vented cell** - a secondary cell having a cover provided with an opening through which gaseous products may escape.

NOTE: The opening may be fitted with a venting system.

3.1.2 **Nominal voltage** - the nominal voltage of a vented nickel-cadmium rechargeable single cell is 1,2 V.

3.1.3 **Rated capacity** - quantity of electricity C 5Ah (ampere-hours) declared by the manufacturer which a single cell can deliver when discharged at the reference test current of 0,2 I<sub>r</sub>A to a final voltage of 1,0 V at +20 °C after charging, storing and discharging under the conditions specified in clause 4 in accordance to SANS 60623.

3.1.4 **Prismatic** – having rectangular sides and base.

3.2 The abbreviations below shall apply to this specification.

**V** - Volts

**Ah** - ampere-hours

## **4 SERVICE CONDITIONS AND PARAMETER MEASUREMENT TOLERANCE**

- 4.1 The vented prismatic nickel cadmium battery cells shall be designed for use under the following service conditions:
- 4.1.1 Indoors.
  - 4.1.2 Pollution level: very heavy
  - 4.1.3 Maximum temperature: 50 °C
  - 4.1.4 Minimum temperature: -10 °C
  - 4.1.5 Relative humidity:  $\pm 90\%$
  - 4.1.6 Altitude: 1800 m (Above sea level)
  - 4.1.7 Area: High lightning area
- 4.2 The overall accuracy of controlled or measured values, relative to the specified or actual values shall be within the following:
- 4.2.1 Voltage -  $\pm 1\%$ .
  - 4.2.2 Current -  $\pm 1\%$ .
  - 4.2.3 Temperature -  $\pm 2\text{ }^{\circ}\text{C}$ .
  - 4.2.4 Time -  $\pm 0.1\%$ .
  - 4.2.5 Capacity -  $\pm 1\%$ .
- 4.3 These tolerances comprise the combined accuracy of the measuring instruments, the measurement techniques used, and all other sources of error in the test procedure.

## **5 GENERAL REQUIREMENTS**

### **5.1 Cells and battery banks**

- 5.1.1 The nominal voltage of each vented nickel-cadmium rechargeable single cell shall be 1,2 V as defined in SANS 60623.
- 5.1.2 Only cells in plastic containers with two terminals and no lugs shall be accepted.
- 5.1.3 Dimensions for vented nickel-cadmium prismatic cells in plastic containers shall comply to table 1b and table 2 in clause 3 of SANS 60623.
- 5.1.4 The battery banks shall be designed for the following voltages as and when required by City Power:
  - 5.1.4.1 30 V
  - 5.1.4.2 48 V
  - 5.1.4.3 110 V

5.1.4.4 220 V

## **5.2 Cell designation**

5.2.1 Vented nickel-cadmium prismatic rechargeable single cell shall be designated by the letter “**K**” followed by a letter “**L, M, H** or **X**” in accordance to clause 2.1 of SANS 60623, which signifies the following:

5.2.1.1 Low rate of discharge - L (up to 0,5 **I<sub>t</sub>A**)

5.2.1.2 Medium rate of discharge - M (up to 3,5 **I<sub>t</sub>A**)

5.2.1.3 High rate of discharge - H (up to 7,0 **I<sub>t</sub>A**)

5.2.1.4 Very high rate of discharge - X (up to and above 7,0 **I<sub>t</sub>A**)

5.2.2 This group of two letters shall be followed by a group of figures indicative of the rated capacity of the cell in ampere-hours. For example: KH 185.

5.2.3 Cells in cases of plastic material shall be designated by the letter "P" after the figures. For example: KH 185 P.

## **5.3 Markings**

5.4.1 Each cell shall carry durable markings giving the following minimum information:

5.4.1.1 Type of cell as specified in clause 6.2.2.1, and it is also permissible for manufacturer to use their type designation.

5.4.1.2 Name or identification of the manufacturer and/or supplier.

5.4.1.3 Positive terminal: either a red washer and an indented or raised symbol in accordance to graphical symbol 5005 of EIC 60417.

## **5.4 Safety and maintenance**

5.5.1 The manufacturer shall provide recommendation for the safe handling of the cells.

5.5.2 The manufacturer shall provide recommendations for the maintenance of the cells.

## **6 TESTS**

The vented nickel-cadmium rechargeable single cell type tests; routine test and sample test set out in SANS 60623 shall apply to this specification.

### **6.1 Type Test**

6.1.1 Type tests shall be carried out in accordance with SANS 60623.

6.1.1.1 General

6.1.1.2 Mechanical tests

6.1.1.3 Electrical tests

### **6.2 Routine Test and Factory Acceptance Test (FAT)**

6.2.1 Routine Tests shall be carried out in accordance with SANS 60623.

6.2.2 Factory Acceptance Test (FAT) shall be carried out in accordance with SANS 60623 unless stated otherwise, with the presence of City Power Personnel before vented nickel-cadmium rechargeable single cell are released from the manufacturer if necessary.

6.2.3 List of tests to be witnessed shall be as follows:

- 6.2.3.1 Discharge performance test at 20 °C
- 6.2.3.2 Discharge performance test at +5 °C
- 6.2.3.3 Discharge performance test at -18 °C
- 6.2.3.4 High-rate current test
- 6.2.3.5 Charge retention test
- 6.2.3.6 Endurance test in cycles
- 6.2.3.7 Permanent charge endurance
- 6.2.3.8 Charge acceptance at constant voltage test
- 6.2.3.9 Electrolyte retention test

Note: City Power reserves the right to request to approve prototype testing before any ordering can commence.

### **6.3 Sample Test**

6.3.1 Sample Tests shall be carried out in accordance with clause 7 of SANS 60623.

- 6.3.1.1 Type approval
- 6.3.1.2 Batch acceptance

6.3.2 Physical appearance tests

- 6.3.2.1 Visual inspection shall be performed on cells. No cracking, damage or corrosion shall be apparent. Any deformation shall be within the tolerances of the dimensions specified in the manufacturer's drawings.

## **7 MARKING, LABELLING, PACKAGING**

Marking, labelling and packaging shall comply with the requirements of SANS 60623.

## **8 DOCUMENTATION**

Documentation shall be submitted in a catalogue format (Both physical and electronic). In addition, relevant test results and certificates confirming compliance clause 6 of this document shall be submitted.

## **9 STORAGE**

Cells storage shall comply to clause 4.9 of SANS 60623.

## **10 TRAINING**

10.1 The Service Provider shall provide training to City Power's resource that might be exposed to Nickel Cadmium battery, which includes but not limited to the following.

- a. The nature of the work.
- b. The safe handling of Nickel cadmium Battery.
- c. The use of protective clothing.
- d. Information on the hazards associated with the work.

10.2 The training shall be repeated, refreshed or updated at least once a year.

10.3 Training shall form part of the scope and be factored into the pricing.

## **11 QUALITY MANAGEMENT**

A quality management system/plan shall be set up to assure the quality during manufacture, installation, removal, transportation, and disposal. Guidance on the requirements for a quality management system may be found in the following standards: ISO 9001:2015. The details shall be subject to an agreement between the purchaser and supplier.

## **12 HEALTH AND SAFETY**

A health and safety system/plan shall be set up to ensure proper management and compliance during manufacture, installation, removal, transportation, and disposal. Guidance on the requirements of a health and safety plan shall be found in ISO 45001:2018 standards. The details shall be subject to an agreement between City Power and the Supplier.

## **13 ENVIRONMENTAL MANAGEMENT**

An environmental management system/ plan shall be set up to ensure the proper environmental management and compliance is adhered to during manufacturing, installation, removal, transportation, and disposal. Guidance on the requirements for an environmental management system shall be found in ISO 14001:2015 standards. The details shall be subject to an agreement between City Power and the Supplier. This is to ensure that the asset created conforms to environmental standards and City Power SHERQ Policy.



## **Annexure A - Bibliography**

NA

### Annexure B - Revision information

DATE	REV. NO.	NOTES
June 2006	0	First issue
Oct 2019	1	Second issue General editing Detailing tests to be done Inclusion of Quality Management Inclusion of Health and Safety Management Inclusion of Environmental Management
July 2024	2	Third issue General editing Under health and safety ISO 18001 has been change to ISO 45001

**Annexure C - Technical Schedules A and B  
for**

**Vented nickel-cadmium prismatic rechargeable single cell**

**Schedule A: Purchaser's specific requirements**

**Schedule B: Guarantees and technical particulars of equipment offered**

Item	Sub-clause	Description		Schedule A Required	Schedule B
1		Name of manufacturer		XXXX	
2		Place of manufacturer		XXXX	
3		Manufacturer's identification reference		XXXX	
5		Year of manufacturer		XXXX	
6	4	<b>Service conditions</b>	Yes/No	Yes	
		Indoors	Yes/No	Yes	
		Pollution Level : Very Heavy	Yes/No	Yes	
		Maximum temperature : 50 °C	Yes/No	Yes	
		Minimum temperature : -10 °C	Yes/No	Yes	
		Relative humidity : ±90%	Yes/No	Yes	
		Altitude : 1800 m (Above Sea Level)	Yes/No	Yes	
7	5.1.2	Type of material for cell container		Plastic	
8	5.1.4.1	Battery bank for 30V	Yes/No	Yes	
9	5.1.4.2	Battery bank for 48V	Yes/No	Yes	
10	5.1.4.3	Battery bank for 110V	Yes/No	Yes	
11	5.1.4.4	Battery bank for 220V	Yes/No	Yes	
12	5.2	Cell designation complies?	Yes/No	Yes	
13	5.4	Markings	Yes/No	Yes	
14	5.5	Safety and maintenance	Yes/No	Yes	

NOTE: TICKS [✓✗], ASTERISK [\*], WORD [NOTED], OR TBA [TO BE ADVISED] WILL NOT BE ACCEPTED.

Tender Number: \_\_\_\_\_

Tenderer's Authorised Signatory: \_\_\_\_\_  
Name in block letters Signature

Full name of company: \_\_\_\_\_

**Annexure C - Technical Schedules A and B****for****Vented nickel-cadmium prismatic rechargeable single cell (Continues)****Schedule A: Purchaser's specific requirements****Schedule B: Guarantees and technical particulars of equipment offered**

Item	Sub-clause	Description		Schedule A Required	Schedule B
15	6.1	Type test	Yes/No	Yes	
16	6.2	Routine Test and Factory Acceptance Test (FAT)	Yes/No	Yes	
17	6.3	Sample Test	Yes/No	Yes	
17	7	Marking, Labelling, Packaging	Yes/No	Yes	
18	8	Documentation required	Yes/No	Yes	
19	9	Storage	Yes/No	Yes	
20	10	Training provided	Yes/No	Yes	
21	11	ISO 9001 accreditation	Yes/No	Yes	
22	12	ISO 45001 accreditation	Yes/No	Yes	
23	13	ISO 14001 accreditation	Yes/No	Yes	

**NOTE: TICKS [✓✗], ASTERISK [\*], WORD [NOTED], OR TBA [TO BE ADVISED] WILL NOT BE ACCEPTED.**

Tender Number: \_\_\_\_\_

Tenderer's Authorised Signatory: \_\_\_\_\_  
Name in block letters Signature

Full name of company: \_\_\_\_\_

**Technical schedule A and B for Vented nickel-cadmium prismatic rechargeable  
single cell  
Deviation schedule**

**Any deviations offered to this specification shall be listed below with reasons for deviation.  
In addition, evidence shall be provided that the proposed deviation will at least be more cost-  
effective than that specified by City Power.**

Item	Sub-clause	Proposed deviation

Tender Number: \_\_\_\_\_

Tenderer's Authorised Signatory: \_\_\_\_\_  
Name in block letters Signature

Full name of company: \_\_\_\_\_

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**Annexure D - Stock Items**

It is not intended that City Power should keep stock of these items.