

TPSODL	TP SOUTHERN ODISHA DISTRIBUTION LIMITED, BERHAMPUR		
	TECHNICAL SPECIFICATION		
Doc. Title	SPECIFICATION FOR SUBSTATION BATTERY VRLA TYPE (24V)		
Doc. No	ENG-ELC-024	Eff. Date: 20/05/2022	
Rev. No	00	Page 1 of 11	
Prepared by:	Reviewed by:	Approved by:	Issued by:

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1. SCOPE

This part of the specification covers the technical requirements of design, manufacture, testing at manufacturer's works, packing, forwarding, supply and unloading of 24V VRLA 100 AH Battery, spare and other accessories for efficient and trouble-free operation.

2. APPLICABLE STANDARDS

The equipment covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with the latest editions of the following Indian, International Standards and shall conform to the regulations of the local authorities:

Ref. IS	Description
IS 266-1993	Battery grade Sulphuric Acid
IS-1885 [Part-8] / 1986	Electro technical vocabulary: Part- 8-Secondary cells & batteries
BS-46290 (Part-4) / 1997	British standard specification for lead acid type valve regulated sealed type batteries
IEC 896-2/1995	Stationary lead-acid batteries, general requirements and methods of test (part-2, valve regulated types)
IS 1146-1981	Rubber and plastic container for lead acid storage batteries
IS 1069-1993	Water for storage batteries
IEC60896-21 & IEC60896-22 of 2004.	Valve Regulated Types - Methods Of Test Valve Regulated Types - Requirements
IS:15549	Stationary Regulated Lead Acid Batteries
IS 3116-2002	Sealing compound for lead acid batteries
IS 8320-2000	General requirements and methods of tests for lead acid storage batteries
ANSI, IEEE STD 450/1987	IEEE recommended practice for maintenance, testing and replacement of large lead storage batteries for generating stations and sub-stations.

3. CLIMATIC CONDITIONS OF THE INSTALLATION:

1	Maximum ambient temperature	50 deg C
2	Max. Daily average ambient temp	35 deg C
3	Min Ambient Temperature	0 deg C
4	Maximum Humidity	95%
5	Average Annual Rainfall	150cm
6	Average No. of rainy days per annum	120

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7	Altitude above MSL not exceeding	1000m
8	Wind Pressure	300 Km/hr.
9	Earthquakes of an intensity in horizontal direction	equivalent to seismic acceleration of 0.3g
10	Earthquakes of an intensity in vertical direction	equivalent to seismic acceleration of 0.15g (g being acceleration due to gravity)

TPSODL service area has heavy saline conditions along the coast and High cyclonic Intensity winds with speed up to 300 Kmph. The atmosphere is generally laden with mild acid, dust in suspension during the dry months, and is subjected to fog in cold months.

4. GENERAL TECHNICAL REQUIREMENTS:

The capacity of the batteries shall be as follows:

- i) Voltage. - 24V
- ii) Output at 27 deg. C - 100AH at 10 hrs. discharge rate.

The batteries shall normally remain under 'floating' condition with the 'trickle' charger supplying the continuous load. However, the batteries shall be capable of supplying the following loads under emergency conditions without any assistance from the chargers and without their terminal voltage falling below 21.6V [90% of rated voltage].

The number of cells for 24V batteries shall be so chosen that for the nominal floating voltage of the cells, the battery voltage shall be 25.92 V and for the minimum [discharged condition] voltage of the cells, the voltage of the battery shall not be less than 21.6V, while the assigned rating of the battery bank cannot lower below its rated voltage of 24V volts. It shall have 2 nos. of 12V battery & 100AH capacity. The life span of the battery shall be 5 years.

5. GENERAL CONSTRUCTIONS:

5.1 PLATES

Positive plates shall be made of flat pasted type using lead-cadmium antimony alloy for durability, high corrosion resistant, maintenance free, long life both in cyclic as well as in float applications. Negative plates shall be heavy duty, durable flat plate using lead calcium alloy pasted box grid. Negative plates shall be designed to match the life of positive plates and combination of negative and positive plates shall ensure long life, durability and trouble-free

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operation of battery. PLC (programmable logic control) operated equipment should be deployed for preparation of paste to ensure consistency in paste quality. Conventional / manual type of paste preparation is not allowed.

5.2 CONTAINER AND LID:

The container shall be made up of a special grade polypropylene copolymer material, which should be of flame-retardant. The container shall be enclosed in epoxy coated steel trays. The steel trays shall be so designed as to make both vertical and horizontal stacking of cells / batteries possible. They shall be sufficiently robust and not liable to deformation under internal operating pressures and within the temperature range naturally encountered, leak proof, non-absorbent and resistant to the acid with low water vapor permeability. The surface of the container shall be free from blisters, rough spots, scales, blow holes and other imperfections or deformations. The cell plates shall be suspended without touching the bottom of the container. It shall provide enough sediment space so that the plates can shed their active material without shorting the plates in the cell during the expected life of the battery without cell cleaning. The plastic container shall conform to all the requirements as mentioned in IS 1146. The covers shall be furnished with acid spray proof vent plugs. The cell post polarity shall be marked on the cover. The electrolyte level lines for upper and lower limits shall be marked on all four sides of each container.

5.3 SEPARATORS:

The separators shall be of synthetic material conforming to the latest edition of IS-6071-1986. These shall permit free flow of electrolyte and would not be affected by the chemical reaction inside the cell and shall last for indefinite time. The internal resistance factor of the separators shall assure high discharge characteristics under all operating conditions. Proper arrangement to keep end plates in position shall be furnished by the bidder along with his offer.

5.4 ELECTROLYTE:

The electrolyte shall be prepared from the battery grade Sulphuric acid conforming to IS-266. The battery shall be shipped uncharged with the electrolyte. Electrolyte for the first filling shall be supplied with 10% extra in non-returnable containers. The Sulphuric acid of battery grade shall be colorless liquid. The concentrated Sulphuric acid on dilution with an equal volume of distilled water shall be free from suspended matter and other visible impurities. The Sulphuric acid shall meet the requirements of columns – 4 and 5 Table –1 of IS-266.

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5.5 PLATE GROUP BAR WITH TERMINALS:

The plate group bar with terminals shall conform to IS-1652-1991. The positive and negative terminals shall be clearly marked for easy identification. The legs of the plates of like polarity shall be connected to the load, turned to a horizontal group bar having an upstanding terminal post adopted for connection to the external circuit. The group bars shall be sufficiently strong to hold the plates in position.

5.6 BUFFERS/SPRING:

Suitable buffers / springs shall be provided in the cells to keep the end plates in position. These shall have adequate length and strength.

5.7 CELL LIDS:

Lids used with sealed or closed type cells shall be of glass, plastic or ebonite and shall be provided with vent plugs. Terminal post shall be suitably sealed at the lid to prevent escape of acid spray, by means of rubber grommets, sealing compound or another suitable device. The positive and negative terminal posts shall be clearly and indelibly marked for easy identification. Sealing compound shall conform to IS 3116.

5.8 WATER:

Water used for preparation of electrolyte and also to bring the level of electrolyte to approximately correct height during operation / testing shall conform to relevant standards.

5.9 VALVE:

Safety valve vent plugs shall be provided in each cell. They shall be explosion resistant, self-resealing and pressure regulating type. They shall not allow gas (air) to enter into the cell but shall allow gas to escape from the cell above a certain internal pressure, which does not lead to deformation or other damage to the cell.

- The vent plug used shall be explosion resistant and self-re-sealing pressure regulating type. Vent plug shall be such that it cannot be opened without proper tool.
- The valve shall be so designed that it operates at a pressure between 0.14 Kg / Sq. mm to 0.63 Kg / Sq. mm to release the excess gas and reseal automatically as soon as the gas pressure within the cell drops to atmospheric value.
- All the cells shall be subjected to pressure test up to 0.7 Kg / Sq. mm.
- The self-discharge rate at room temperature shall not be more than 5 % of the capacity of

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each battery per month.

- Each valve opening shall be covered with flame barrier capable in preventing the ingress of flame into the cell interior when the valve opens and hydrogen / oxygen gas mixture is released.

5.10 FASTNERS:

Bolts, nuts and washers for connecting the cells shall be effectively lead-coated to prevent corrosion. Where it is not possible to bolt the cell terminals directly to assemble a battery, separate lead-coated copper or aluminum connectors of suitable size shall be provided to join the cells.

5.11 STAND AND BATTERY RACKS:

The cells shall be supported on insulated rack fixed with pads and with adequate clearances between the adjacent cells. The battery racks shall be made of best quality material having the features of rodent proof, rust proof, sustainable to saline/coastal environments with at least three (3) coating of anti-acid paint of approved shade. Racks shall be rigid, numbering tags for each cell shall be attached on the racks. Bidder is responsible for replacement of the battery rack if any damage/deterioration found during the warranty period.

5.12 CONNECTORS:

Bars tinned copper lead connectors shall be employed for inter-cell and inter row, inter-t connections. However, the tee-off connection from the battery unit shall be made with acid resisting cables of suitable size. A suitable terminal box along with acid-resisting cable shall be provided by the Contractor for this purpose. The connectors shall preferably be of bolted type and the bolts and nuts shall be of similar material as that of connectors and shall be provided with corrosion resisting lead coating. The connectors shall be of enough cross-section to withstand all the working conditions including one-minute discharge rate as well as short circuit conditions. Terminals post shall be designed to accommodate external bolted connection conveniently. The junction between terminal posts and cover and between cover and container shall be so sealed as to prevent any seepage of electrolyte.

Positive and negative terminals posts of cells shall be clearly and unmistakably identifiable. The positive terminals shall be marked with red color in addition to '+' marking and negative terminal shall be marked suitably. The terminals and connectors shall not be covered with grease instead anti oxidation jelly shall be used.

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- a. Lead coated connection hardware such as bolts, nuts etc. 5% extra, or any other connector suitable for VRLA type Battery.
- b. Ampere-hour Meter [10-hour discharge rate] of 100 –150 AH range-1 no.

5.13 MAXIMUM SHORT CIRCUIT CURRENT:

The Bidder shall state the maximum short circuit current of each battery along with the safe duration in seconds which it can withstand. Methods proposed to be adopted for protecting batteries from the short circuit conditions should also be stated to avoid damage to the battery and loss to the associated equipment.

5.14 CHARGING:

The bidders shall state whether an equalizing charge is recommended for the battery. If so, the equalizing charge voltage, current, duration and the interval between the equalizing charging shall be specified in the Data sheet. Bidder shall also indicate the requirements for boost charging.

6. MARKING:

Acid level line shall be permanently and indelibly marked around on all the containers.

The unit shall be provided with a name plate clearly visible and effectively secured against removal. The name plate shall be indelibly and distinctly marked with all essential particulars as per relevant standards along with the following:

- a) Manufacturer's name
- b) Month and Year of manufacturing
- c) Serial number and Type designation
- d) Lead acid battery type
- e) Nominal voltage of each cell
- f) Ah capacity at 1C rate of the battery
- g) Guarantee period
- h) TPSODL- PO and Date

Also, the danger plate should be shown in front of the enclosure / Cabinet / Racks housing the battery banks.

7. TESTS

The bidder shall be required to submit complete set of the following test reports along with the offer: -

7.1 ACCEPTANCE TESTS

- i) Visual Examination & Dimension Check

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- ii) Test for capacity for 10 hours discharge rate along with the Test for voltage during discharge.
- iii) Ampere-hour and watt-hour efficiency test.

7.2 TYPE TESTS

- i) Visual examination
- ii) Checking of dimension as per manufacturer's drawing
- iii) Test for C 10 capacity and Voltage during discharge
- iv) Test for C 1 capacity and Voltage during discharge
- v) Ampere-hour and watt-hour efficiency test
- vi) Test for retention of charge
- vii) Acid retention capability test on separators
- viii) Wicking test on separators
- ix) Test on vent seal operation
- x) Test for oxygen recombination efficiency
- xi) Endurance Test

8. TYPE TEST CERTIFICATES:


The Bidder shall furnish the type test certificates of the for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at CPRI/ERDA/Government Laboratories as per the relevant IS/IEC. Type tests should have been conducted in CPRI/ERDA/Government laboratories during the period not exceeding 7 years from the date of opening the bid. In the event of any discrepancy in the test reports, i.e. any test report not acceptable, same shall be carried out without any cost implication to TPSODL.

9. PRE-DISPATCH INSPECTION:

The material shall be subject to inspection by a duly authorized representative of the TPSODL. Inspection may be made at any stage of manufacture at the discretion of the purchaser and the equipment, if found unsatisfactory as to workmanship or material, the same is liable to rejection. Bidder shall grant free access to the places of manufacture to TPSODL's representatives at all times when the work is in progress. Inspection by the TPSODL or its authorized representatives shall not relieve the bidder of his obligation of furnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TPSODL.

Following documents shall be sent along with material.

- a) Test reports
- b) MDCC issued by TPSODL

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- c) Invoice in duplicate
- d) Packing list
- e) Drawings & catalogue
- f) Guarantee / Warrantee card
- g) Delivery Challan
- h) Other Documents (as applicable).

10. INSPECTION AFTER RECEIPT AT STORES:

The material received at TPSODL, Berhampur store will be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Engineering department.

11. GUARANTEE:

Bidder shall stand guarantee towards design, materials, workmanship & quality of process/ manufacturing of items under the contract for due and intended performance of the same, as an integrated product delivered under this contract. In the event any defect is found by the Company up to a period of 54 months from the date of commissioning or 60 months from the date of last supplies made under the contract, whichever is earlier, supplier shall be liable to undertake to replace/rectify such defects at his own costs. within mutually agreed timeframe, and to the entire satisfaction of the Company, failing which the Company will be at liberty to get it replaced/rectified at supplier's risks and costs and recover all such expenses plus the Company's own charges (@ 20% of expenses incurred), from the supplier or from the "Security cum Performance Deposit" as the case may be.

The bidder shall further be responsible for 'free replacement' for another period of THREE years from the end of guarantee period for any 'latent defects' if noticed by the company.

12. PACKING:

Supplier shall ensure that all the equipment covered under this specification shall be prepared for rail/road transport and be packed in such a manner so as to protect the equipment from damage in transit. The material used for packing shall be environmentally friendly. The bidder shall provide instructions regarding handling and storage precautions to be taken at site.

13. TENDER SAMPLE:

Bidder shall submit the sample of material during submission of Bids.

14. QUALITY CONTROL:

The bidder shall submit with the offer Quality Assurance Plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction,

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components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. The Purchaser's engineer or its nominated representative shall have free access to the manufacturer's/sub-supplier's works to carry out inspections. The bidder shall ensure that the material supplied is as per the Guaranteed Technical Particulars as specified in the specifications.

15. TESTING FACILITIES:

Bidder shall have adequate in-house testing facilities for carrying out all routine tests & acceptance tests as per relevant International / Indian standards.

16. MANUFACTURING ACTIVITIES:

The successful bidder will have to submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart should be in line with the Quality assurance plan submitted with the offer.

17. SPARES, ACCESSORIES AND TOOLS

Not applicable.

18. DRAWINGS AND DOCUMENTS

Following drawings and documents shall be submitted in line with the requirement of Tender specifications:

- a) Completely filled in Schedule "A" Guaranteed Technical Particulars & Schedule "B" Deviations
- b) Work Experience details
- c) Type test certificates.
- d) Drawing 1 set of Hard Copy & Soft copy PDF File containing complete information about manufacturing.

19. SCHEDULE- "A" GUARANTEED TECHNICAL PARTICULARS

SI. No.	Particular	To be Furnished By Bidder
1	Type of battery	
2	Container	
3	Nominal DC system voltage	
4	Number of Batteries	
5	Number of Cells	
6	Cell Voltage	
a)	Nominal	
b)	End Cell Voltage	

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Sl. No.	Particular	To be Furnished By Bidder
7	Capacity of Battery (10 Hour rate of discharge)	
8	Float Charging Voltage	
9	Boost Charging Voltage	
10	Mounting Arrangement	
11	Life	

20. SCHEDULE "B" DEVIATIONS:

(TO BE ENCLOSED WITH TECHNICAL BID)

All deviations from this specification shall be set out by the Bidders, clause by Clause in this schedule. Unless specifically mentioned in this Schedule, the tender shall be deemed to confirm the purchaser's specifications:

SL. No	Clause No.	Details of deviation with justifications

We confirm that there are no deviations apart from those detailed above.

Seal of the Company:

Signature

Designation