

RAICHUR POWER CORPORATION LTD.

2x800 MW YERAMARUS STPP

VOLUME – IIB

TECHNICAL SPECIFICATION FOR

220V DC BATTERY

BHEL DOCUMENT NO. : PE-TS-362-508-E001, REV-0



BHARAT HEAVY ELECTRICALS LIMITED

POWER SECTOR

PROJECT ENGINEERING MANAGEMENT

NOIDA – 201301



**TECHNICAL SPECIFICATION FOR
220V DC BATTERY**

SPECIFICATION NO. PE-TS-362-508-E001

VOLUME II B

SECTION -

2X800 MW YERAMARUS STPP

REVISION 0 | DATE 22.12.2011

SHEET 1 OF 29

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TOTAL NO. OF SHEETS = 29 (INCLUDING COVER/ SEPARATOR SHEETS)

(REFER INSTRUCTION NO. 1 OF 'INSTRUCTIONS TO BIDDERS')

**IT IS CONFIRMED THAT OUR TECHNICAL OFFER COMPLIES WITH THE SPECIFICATION IN TOTO, & THAT
THERE ARE NO TECHNICAL DEVIATIONS.**

BIDDER'S STAMP & SIGNATURE



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INSTRUCTIONS TO BIDDERS FOR PREPARING TECHNICAL OFFERS

1. In line with clause no. 10.1 of Section-C, Volume-II-B of the specification, two signed and stamped copies of the following shall be furnished by all bidders as technical offer:
 - a. Battery sizing calculation with respect to load duty cycle as per Annexure-II of Section-C to be provided along with supporting documents for considered factors.
 - b. Unpriced Price Schedule (Annexure-A: BOQ & price schedule, as enclosed with the specification) with bidder's signature and company stamp.
 - c. A copy of this sheet ("Instructions to Bidders for Preparing Technical Offer"), with bidder's signature and company stamp.
 - d. A copy of previous sheet ("List Of Contents"), with bidder's signature and company stamp.
 - e. A copy of next sheet ("Deviation Schedule"), with "NO DEVIATION" and bidder's signature and company stamp.
 - f. A copy of Data Sheet-A, with required information and bidder's signature and company stamp.
2. No technical submittal such as copies of type test certificates, data Sheets, write-up, drawing, technical literature, etc. is required during tender stage. Any such submission, even if made, shall not be considered as part of offer.
3. Confirmations/ comments (if any) regarding delivery schedules shall be furnished as part of the commercial offer. Any reference elsewhere/ covering letter of technical offer shall not be considered by BHEL.
4. Any comments/ clarifications on technical/ inspection requirements furnished as part of bidder's covering letter shall not be considered by BHEL, and bidder's offer shall be construed to be in conformance with the specification.
5. Any changes made by the bidder in the price schedule with respect to the battery description/ quantities, notes etc. from those given in Annexure-A to Section-C of specification [Bill Of Quantities] shall not be considered (i.e., technical description, quantities, notes etc. as per specification shall prevail).

BIDDER'S STAMP & SIGNATURE



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DEVIATION SCHEDULE

| SL. NO. | CLAUSE NO. | DEVIATION | REASONS FOR DEVIATION |
|---------|------------|-----------|-----------------------|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

It is certified that the offer is fully in conformance to the specification requirements except for the deviations, which are specifically brought out in the above prescribed Deviation Schedule.

Signature & seal of Bidder's authorized representative



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PREAMBLE

1.0 The Tender documents contains three (3) volumes. The bidder shall meet the requirements of all three volumes.

1.1 **VOLUME - I CONDITIONS OF CONTRACT**

This consists of four parts as below:-

Volume – IA This part contains Instructions to bidders for making bids to BHEL.

Volume – IB This part contains General Commercial Conditions of the Tender & includes provision that vender shall be responsible for the quality of item supplied by their sub-vendors.

Volume – IC This part contains Special Conditions of Contract.

Volume – ID This part contains Commercial conditions for Erection & Commissioning site work, as applicable.

1.2 **VOLUME – II TECHNICAL SPECIFICATION**

Technical requirements are stipulated in Volume – II, which comprises of:-

Volume – IIA General Technical Conditions.

Volume – IIB Technical Specification including Drawings, if any.

1.3 **VOLUME – IIB**

This volume is sub-divided in to following sections:-

Section – A This section outlines the Intent of Specification

Section – B This section provides “Project Information”.

Section – C This section indicates Technical Requirements specific to Contract.

Data sheet - A :- Specific data and other requirements pertaining to the equipments.

Data sheet – C :- Indicates data / documents to be furnished after the award of Contract as per agreed schedule by the vendor (as applicable)

Quality Plan



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SECTION - A

SCOPE OF ENQUIRY

- 1.0 This specification covers the design, manufacture, inspection and testing at manufacturer's works, proper packing and delivery to site of 220V DC Battery as mentioned in different sections of this specification for **2X800 MW YERAMARUS STPP**.
- 2.0 It is not the intent to specify herein all the details of design & manufacture. However, the equipment shall conform in all respects to high standards of design engineering and workmanship and shall be capable of performing in continuous commercial operation up to bidder's guarantee.
- 3.0 The general terms and conditions, instructions to bidders and other attachment referred to elsewhere are hereby made part of the Technical Specification.
- 4.0 The bidders shall be responsible for and governed by all requirements stipulated hereinafter.
- 5.0 Bidders shall confirm total compliance to the specification without any deviations from the technical/ quality assurance requirements stipulated.
- 6.0 The documents shall be in English language and MKS system of units.



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SECTION – ‘B’

RAICHUR POWER CORPORATION LTD

TITLE

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PROJECT INFORMATION

- 1.0 Owner : Raichur Power Corporation Ltd
22/23, Sudarshan Complex,
IInd floor, Sheshadri Road,
Bangalore-560 009
Karnataka, India
- 2.0 Consultant : M/s Evonik Energy Services (I)
Pvt. Ltd.,A-29, Sector 16
Noida-201301(UP), India
- 3.0 Project Title : 2x800 MW Yermarus Thermal
Power Station
- 4.0 Location : Yermarus
Raichur Dist
Karnataka State, INDIA
It is situated at about 8 Kms from
Raichur on the Raichur-Hyderabad
State Highway-13 and 12 kms
away from Bank of river Krishna
and about 5 kms from Raichur
Thermal Power Station
- 5.0 Nearest Railway : Chicksugur Railway Station which
is about 2 kms from site.
- 6.0 Nearest Airport : Hyderabad around 200 kms
- 7.0 Nearest Port : Chennai around at about 470 kms
from site.
- 8.0 Latitude and Longitude : Latitude - 16° 16' 55.9"N
Longitude - 77° 20' 38.6"E
- 9.0 Elevation above mean sea level : 350-375 meters
- 10.0 Climatic Conditions
- (a) Ambient Temperature
- i. maximum temperature : 45° C
- ii. minimum temperature : 6° C

PROJECT INFORMATION

iii. Design Temperature : 50° C Ambient
for all Electrical/
Mechanical
Equipment

(b) Relative Humidity

i. Maximum during monsoon : 85%

ii. Minimum : 20%

iii. Average : 65%

(c) Rainfall

Annual average rain : 720 mm

Max. for one day : 115 mm

Max. intensity : 38 mm/hr

Period : June to September

(d) Wind Speed

i. Prevailing wind : West, South-East, North-West,
direction South-West

ii. Maximum mean wind : 15.9 Kms / hr
speed (4.42 m/s)

iii. Average : 9.61 Km/hr
(2.67 m/s)

11.0 Wind Load

Calculations for wind effect shall be in accordance with IS:875- (Part-3) latest revision taking into account the following :

(a) Basic wind speed of 39 m/sec as given in Fig.1 of the code.

(b) Factor K1 shall be taken as 1.06

(c) Terrain category shall be 2 and corresponding values shall be taken for K2

(d) Factor K3 shall be taken as 1.0

12.0 Wind Loading for Stack

(a) For wind pressure as per clause 11.0 above

(b) For RC stacks as per IS: 4998

PROJECT INFORMATION

13.0 Seismic data (as per IS:1893 latest issue)

- (a) Zone : Zone III (as per IS:1893- latest)
- (b) Importance factor (I) : 1.75

14.0 Auxiliary power supply : Auxiliary electrical equipment to be supplied against this specification shall be suitable for operation on the following supply system.

- (a) For motors rated above 1500 kW : 11000V, 3 phase, 3 wire, 50Hz medium earthed AC
- (b) For motors rated 175KW and above and below 1499KW. : 3300V, 3 phase, 3 wire, 50Hz medium earthed AC
- (c) For motor rated 174 kW and below : 415, 3 phase, 3 wire solidly earthed AC
- (d) For motor control centre : 415V, 3 phase, 3 wire solidly earthed AC
- (e) DC. motor starters, DC solenoids, DC alarm, control and protections : 220 V DC, 2 wire, unearthed DC
- (f) AC control & protective devices : 110 V 1 phase, 50Hz, 2 wire AC supply. The single-phase 110V AC supply shall be derived by Contractor by providing 415V/110V control transformers of adequate rating with MCCB /MCB on both the primary and secondary sides.
- (g) Uninterrupted power supply : 240 V, 1 phase, 50Hz, 2 wire AC supply from UPS system for I&C (including indicator recorders) and UCMS only

PROJECT INFORMATION

- (h) AC solenoids, indicators/recorders, space heaters (for motors rated 30KW and above) : 240V 1 phase, 2 wire, 50Hz AC system with effectively earthed neutral. The power supply shall be derived by CONTRACTOR by providing 415V/ 240V transformer of adequate rating with MCCB/MCB on primary/secondary sides.
- (i) Winding heating of motors below 30kW : 24 V 1 phase,50Hz, AC with one point earthed. This shall be derived by CONTRACTOR by providing 415V 3 phase, 3 wire, AC supply through an adequately rated step-down transformer of adequate rating with MCCB / MCB on primary/secondary sides.
- (j) Solid state controls (including solenoid valves) : 24 V DC, 2 wire, supply from Battery chargers for instrumentation system only.
- (k) Lighting fixtures : 240 V, 1 phase, 2 wire, 50Hz system.
- (l) Lighting fixtures and space heaters in panels : 240 V, 1 phase, 2 wire, 50Hz system.
- (m) Construction supply : 415 V, 3 phase, 4 wire, 50 Hz AC supply with neutral lead solidly earthed.

(n) The above voltages may vary as follows :

All devices shall be suitable for continuous operation over the entire range of voltage and frequency indicated below without any change in their performance.

- i. AC supply : Voltage variation $\pm 10\%$
Frequency variation $\pm 5\%$
Combined voltage & frequency variation $\pm 10\%$
- ii. DC supply : Voltage variation +10%
-20%



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SECTION – C

SPECIFIC TECHNICAL REQUIREMENT

1.0 SCOPE OF ENQUIRY

This specification covers the design, manufacture, assembly, testing and inspection at vendor's/sub-vendor's works, packing and despatch to site of 220V DC batteries as described in the various sections of this specification. The batteries shall generally conform to IS. In this specification, as erection and commissioning is not included in vendor's scope, Vendor shall still not be absolved of his responsibility of establishing the correctness of equipment at site.

2.0 EQUIPMENT AND SERVICES TO BE FURNISHED BY THE BIDDER

The bidder shall supply the following equipment in accordance with the various sections of this specification. The Unpriced Price Schedule is enclosed as Annexure-A.

3.0 SERVICES AND EQUIPMENT TO BE EXCLUDED

- A) Civil works like foundation and cable cellar, flooring of the battery room etc.
- B) Ventilation of battery and charger room.
- C) DCDB
- D) Power and control cables
- E) Erection of the equipment
- F) Battery charger, battery fuse box and discharge resistor panel

4.0 CODES AND STANDARDS

Unless otherwise specified, the latest revisions of codes/standards specified in Annexure-I enclosed are applicable and shall be referred to.

5.0 DELIVERY: Ex-works delivery of equipment shall be as per NIT.

6.0 SYSTEM CONCEPT

- 6.01 220V DC system is comprising of 2x100% batteries with individual redundant float cum boost charger (FCBC) and distribution board for control, protection, interlocking. Each side of DCDB will cater DC load duty cycle requirement as per annexure-II of section-C.



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- 6.02 DC batteries shall be suitable for standby duty. The batteries shall normally be permanently connected to the load in parallel with a charger and shall supply the load during emergency conditions when AC supplies are lost. Batteries shall be suitable for a long life under continuous float operations and occasional discharges.
- 6.03 The 220V batteries are sized considering emergency load cycle requirement of 30 minutes (as per Annexure-II) and design factors.
- 6.04 The voltage at load terminal will not exceed the limits of +10% and -15% of nominal system voltage for 220V DC system.
- 6.05 DC batteries shall be suitable for continuous operation for the design ambient temperature as defined in project information.
- 6.06 Batteries and chargers shall be connected to DC distribution board through single cores cables for each pole. Battery terminals shall be made suitable for above cable.
- 6.07 The equipment will be located indoor but in a hot, humid and tropical atmosphere.
- 6.08 Necessary accessories required for maintenance and testing of batteries shall be supplied with each battery bank as per enclosed Annexure-III.
- 6.09 Batteries with cell weight more than 50 Kg shall be arranged in single tier arrangement. The bottom tier of the stand shall not be less than 150 mm above the floor.

7.0 OTHER TECHNICAL REQUIREMENTS

7.1 Lead-Acid Batteries

- a) Batteries shall be stationery storage Lead Acid Plante high discharge type conforming to IS-1652/IEEE485. The batteries shall meet the 'Load Duty Cycle' requirements under all site-operating conditions as specified. The batteries shall be boost charged at about 2.75V per cell (maximum) and float charged at about 2.25V per cell.
- b) Containers:
Containers shall be made of transparent glass, hard rubber, suitable robust, heat resistant, leak proof, non-absorbent, acid resistant, non-bulging type and free from flaws such as wrinkles, cracks, blisters, pinholes etc. Electrolyte level lines shall be marked on containers in case of translucent containers. Float type level indicator shall be provided. The stem portion of the float shall be long enough to prevent falling of the float inside the container even if there is no electrolyte in the container. The marking for the electrolyte level shall be for upper & lower limits.



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The material for level indicator shall be acid proof and oxidation proof. Container shall be closed/sealed lid type. Lid and sealing compound shall be non-cracking type. The container made of hard rubber and plastics shall be type tested as per IS-1146. All type tests shall be carried out for sealing compound as per IS-3116. The pole sealing arrangement shall be such that no acid particle gets entrapped due to acid creep as a result of capillary action and it shall be possible to remove and refix the sealing to carry out maintenance.

c) Vent Plugs:

Vent plugs shall be provided in each cell. They shall be anti splash type, having more than one exit hole shall allow the gases to escape freely but shall prevent acid from coming out. The design shall be such that the water loss due to evaporation is kept to minimum. In addition the ventilator shall be easily removed from topping up the cells and of such dimensions that the syringe type hydrometer can be inserted into the vent to take electrolyte sample.

d) Plates:

The plates shall be designed for maximum durability during all service conditions including high rate of discharge and rapid fluctuation of load. The construction of plate shall be as per IS-1652.

The separators shall maintain the electrical insulation between the plates and shall permit free flow of electrolyte. Separators shall be suitable for continuous immersion in the electrolyte without distortion. The positive and negative terminal posts shall be clearly marked.

e) Sediment Space:

Sufficient sediment space shall be provided so that cells will not have to be cleaned during normal life and prevent shorts within the cells.

f) Cell insulators:

Each cell shall be separately supported on PVC/porcelain/hard rubber insulators fixed on the racks with adequate clearance between adjacent cells. Minimum distance between the adjacent cells shall be more than the bulge allowed for two cells as per IS-1146.

g) Electrolyte:

The electrolyte shall be prepared from battery grade Sulphuric Acid conforming to IS-266 and distilled water conforming to IS-1069. The cells shall be shipped in dry uncharged condition and electrolyte shall be supplied separately in non-returnable containers. 10% extra electrolyte shall be furnished as extra fitting to cover spillage in transit or during erection.

h) Connectors and Fasteners:

All the terminals and inter cell connectors shall be fully shrouded. Lead or lead coated copper connectors shall be used for connecting up adjacent cells and



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rows. Bolts, nuts, clamps and washers shall be lead coated with minimum thickness 0.025 mm to prevent corrosion. The thickness of lead coating shall be measured as per appendix-F of IS-6848. All the terminals and inter-cell connectors shall be fully insulated or shrouded. End take of connections from positive and negative poles of batteries shall be done through single core cable having stranded aluminium conductor and XLPE insulation. The bidder shall supply necessary supports and lugs for termination of these cables on batteries. Suitable numbers of inter rack connectors shall be supplied by the bidder to suit the battery room layout during detailed engineering.

All connectors and lugs shall be capable of continuously carrying the 10 hours discharge current of respective batteries and through fault short circuit current, which the battery can produce and withstand for the period of one minute. The successful bidder shall furnish necessary sizing calculations to prove the compliance for the same at contract stage.

i) **Battery Racks:**

The batteries shall be supported on wooden/ metal racks properly treated for anti sulphuric acid resistance. The racks shall be free standing type mounted on porcelain/hard rubber/PVC pads insulators. The batteries racks and supports for cable termination shall be coated with three coats of anti-acid paint of approved shade. The nameplates, resistant to acid, for each cell shall be attached on the necessary racks.

Wherever racks are transported in dismantled conditions, match makings shall be provided to facilitate easy assembly.

j) **Following information shall be indelibly marked on outside of each cell:**

- Manufacturer's name and trade marks
- Country and year of manufacturer
- Manufacturer type designation
- AH capacity at 10 hour discharge rate
- Serial number

k) **Positive and negative terminal posts shall be clearly and indelibly marked for easy identification.**

l) **Following minimum information shall be given on the instruction cards:**

- Manufacturer's instructions for filling and initial charging of the battery together with starting and finishing charging rate
- Maintenance instructions
- Designation of cell in accordance with IS-1652
- Storing conditions of electrolyte



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8.0 PERFORMANCE GUARANTEE

8.1 Bidders shall guarantee that battery offered shall meet the 'Load Duty Cycle' requirements as stipulated in this specification and as confirmed by them in technical data sheets. In case the performance of battery at site is not as per the performance guarantee, the bidder will have to replace the battery at site free of cost.

9.0 INSPECTIONS & TESTING

9.1 The bidder shall confirm compliance to quality plan enclosed with the specification, which is subject to RPCL approval and the inspection shall be carried out based on this approved Quality Plan.

9.2 All acceptance and routine tests as per relevant standards shall be carried out by the manufacturer. Charges for all these routine and acceptance tests for all the materials shall be deemed to be included in the bid price.

9.3 Following type tests as per IS-1652 to be conducted on battery

- Capacity test and test for battery voltage during discharge.
- Ampere hour and watt hour efficiency test
- Endurance test
- Test for retention of charge

9.4 The Capacity test and test for voltage on battery during discharge shall be carried out at site on completion of E&C and immediately prior to putting battery in service. Necessary testing equipment required for testing at site (including site visit) shall be arranged by bidder.

9.5 For all components / materials, for which type test reports have been asked for in the specification, such Type tests should have been carried out on identical components / materials. In absence of such type tests reports or in case such reports are not found to be meeting the specification/standards requirements, vendor shall conduct all such type tests without any commercial/delivery implication to BHEL according to the relevant standards and reports shall be submitted to the owner for approval. (Type test charges as per clause 9.6 shall not be applicable in such cases).

9.6 The bidder shall indicate cost of carrying out all the Type tests as specified in the specification. The charges for each of the Type tests shall be given separately in price schedule. These prices will be applicable in case a type test is required to be conducted by purchaser despite availability of satisfactory type test report as per clause 9.5 above.

9.7 All material used for the construction of the equipment / items shall be new and shall be in accordance with the requirements of this specification. Materials



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utilised shall be those, which have established themselves for use in such applications.

10.0 DOCUMENTATION

10.1 By all Bidders as technical offer:

- (i) Battery sizing calculation with respect to load duty cycle as per Annexure-II of Section-C to be provided along with supporting documents for considered factors.
- (ii) Unpriced Price Schedule (Annexure-A as enclosed with the specification) with bidder's signature and company stamp.
- (iii) A copy of the sheet "Instructions to Bidders for Preparing Technical Offer" with bidder's signature and company stamp.
- (iv) A copy of sheet "List Of Contents" with bidder's signature and company stamp.
- (v) A copy of sheet "Deviation schedule" with NO DEVIATION and bidder's signature and company stamp.
- (vi) A copy of sheet "Data Sheet-A" with required information and bidder's signature and company stamp.

10.2 Final documents to be submitted after award of contract shall be as given below:

| SL. No. | DOCUMENT TITLE | DWG. / DOCUMENT No. |
|----------------|--|----------------------------|
| 1 | Data Sheet for Battery | PE-V0-362-508-E201 |
| 2 | General Arrangement drawing for Battery | PE-V0-362-508-E202 |
| 3 | Fault calculation and connector sizing calculation | PE-V0-362-508-E203 |
| 4 | Quality Plan for Battery | PE-QP-999-508-E002 |
| 5 | Type test reports for the Battery | PE-V0-362-508-E104 |
| 6 | Type test procedure for the Battery | PE-V0-362-508-E105 |

10.3 No. of prints to be submitted by vendor after award of contract shall be as specified under Annexure-IV.



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10.4 Instruction Manuals

Instruction manuals for the installation, operation and maintenance of battery to be supplied shall be furnished at least two months before the date of despatch of equipment.

The installation and maintenance manual of battery shall contain the following:

- A) General description giving type and rating of various batteries.
- B) Technical data.
- C) Salient constructional details.
- D) Instruction to be followed on receipt at site.
- E) Instructions for foundations, if any.
- F) Erection procedures and checks (handling at site, erection, pre-commissioning).
- G) Procedure for filling of electrolyte.
- H) Commissioning procedures and site tests.
- I) Routine, periodic and preventive inspection and maintenance procedures.
- J) Safety rules.
- K) Possible faults, their causes and remedies.
- L) Copies of the type, acceptance and routine test certificates in bound volume.
- M) Catalogues, literature and drawings.
- N) Outline dimension drawings showing constructional features, relevant cross sectional views and earthing details, operator oriented description of equipment and accessories.
- P) Operating procedures, maintenance procedures & precautions to be taken during operation and maintenance work.

10.5 Bidder shall furnish field quality plan detailing out the specific quality control procedure covering receipt of material/equipment and handling at site, storage, erection, commissioning, post commissioning etc.

11.0 TOOLS AND TACKLE

Tools & tackle which are essential to facilitate assembly, adjustments, maintenance & dismantling of equipment shall be provided as part of equipment supplied. The above tools shall be supplied along with the initial consignment of equipment so as to be available prior to erection but may not be used for erection purposes.



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12.0 BASIC DESIGN DOCUMENTS

'Basic Design Documents' cover: Battery data sheet, connector sizing calculation, Quality Plan, OGA for 220V battery, type test reports & type test procedure (if applicable) for battery.

13.0 AS-BUILT DRAWINGS

Though only supply of equipment is under bidder's scope, bidder may note that all as-built correction (as given by purchaser to vendor) shall have to be incorporated in the originals by the vendor and copies of the as-built corrected drawings / documents as per requirement shall be submitted by the vendor.

14.0 Statutory and regulatory requirements as per IE rule 1956 with amendment - 3 rule 1986, rules Nos. 35, 42, 50 & 51 shall be adhered to.



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ANNEXURE-I

LIST OF APPLICABLE STANDARDS

- | | | |
|-----|--|----------|
| 1. | STATIONERY LEAD ACID PLANTE BATTERY | IS 1652 |
| 2. | RECOMMENDED PRACTICE FOR SIZING LEAD ACID BATTERIES | IEEE 485 |
| 3. | SPECIFICATION FOR WATER FOR STORAGE BATTERIES | IS 1069 |
| 4. | SPECIFICATION FOR SULPHURIC ACID FOR LEAD ACID BATTERIES | IS 266 |
| 5. | RUBBER & PLASTIC CONTAINERS FOR LEAD ACID BATTERIES | IS 1146 |
| 6. | SYNTHETIC SEPARATORS FOR LEAD ACID BATTERIES | IS 6071 |
| 7. | SEALING COMPOUND FOR LEAD ACID BATTERIES | IS 3116 |
| 8. | METHODS OF TESTS FOR LEAD ACID BATTERIES | IS 8320 |
| 9. | SPECIFICATION FOR HIGH PERFORMANCE PLANTE'S CELLS | BS-6290 |
| 10. | ELECTRICAL VOCABULAR, PRIMARY CELLS AND BATTERIES. | IS:1885 |
| 11. | INDIAN ELECTRICITY RULES & INDIAN ELECTRICITY ACTS | |



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220V DC BATTERY**

SPECIFICATION NO. PE-TS-362-508-E001

VOLUME II B

SECTION -

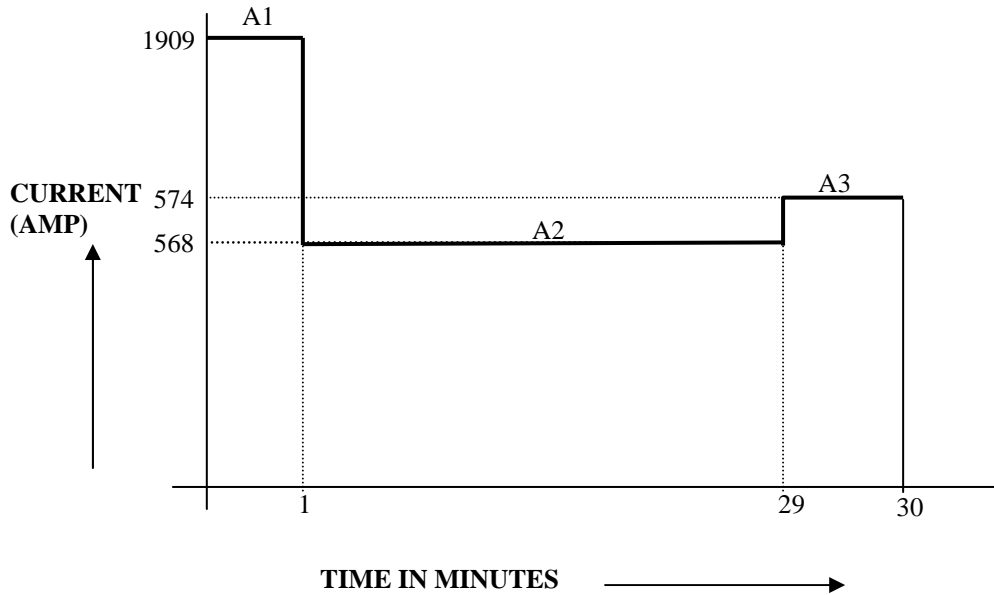
2X800 MW YERAMARUS STPP

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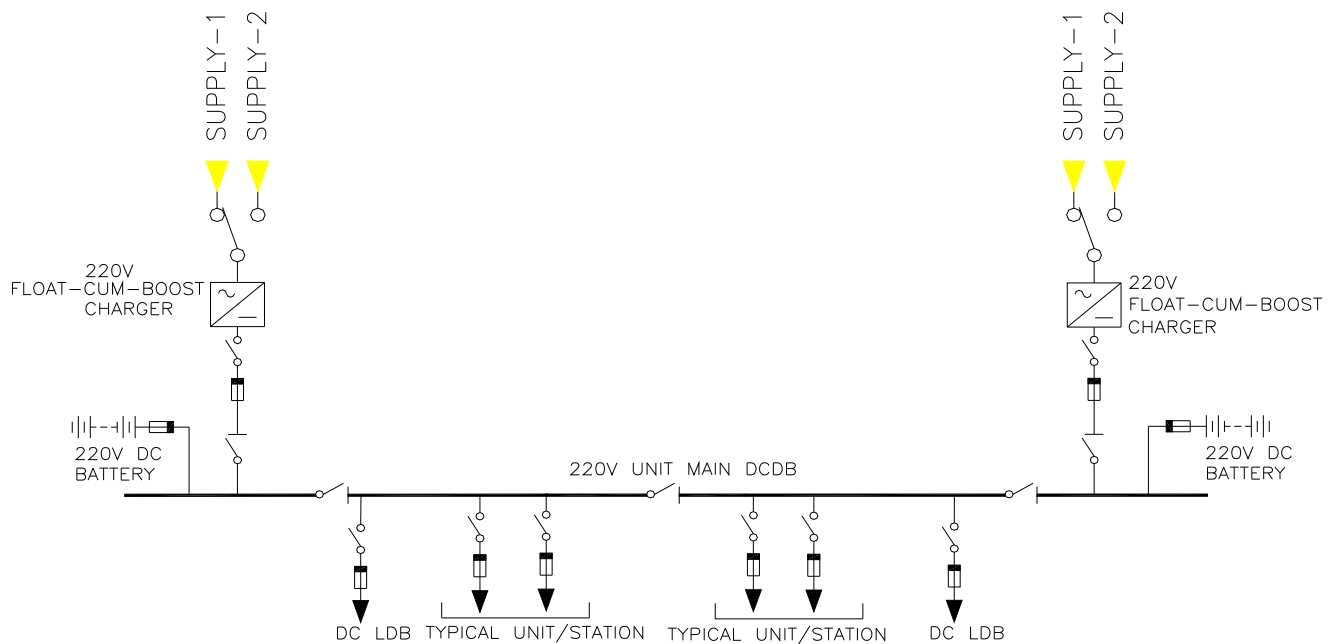
ANNEXURE-II

LOAD DUTY CYCLE & ONE LINE DIAGRAM - 220V DC SYSTEM



FACTORS TO BE CONSIDERED FOR BATTERY SIZING:

- | | |
|---------------------------|------------------|
| 1. AGEING FACTOR | : 1.0 |
| 2. DESIGN MARGIN | : 1.1 |
| 3. MIN.ELECTROLYTIC TEMP. | : 15° C |
| 4. END CELL VOLTAGE | : 1.85V PER CELL |
| 5. NUMBER OF CELLS | : 108 |





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ANNEXURE-III

ACCESSORIES

Following accessories shall be provided for each battery bank:

| S no | Name of accessory | QTY (in Nos.) |
|-------------|--|----------------------|
| 1 | Hydrometer (in step of 0.005) | 2 |
| 2 | Set of hydrometer syringes (suitable for the vent holes in different cells) | 2 |
| 3 | Thermometer for measuring electrolyte temperature | 2 |
| 4 | Wall mounting type holder made of teak wood for hydrometer and thermometer | 2 |
| 5 | Digital Cell testing voltmeter (3-0-3V) | 2 |
| 6 | Alkali mixing jar | 1 |
| 7 | Rubber apron | 2 |
| 8 | Pair of rubber gloves | 2 |
| 9 | Set of spanners | 2 |
| 10 | No smoking' notice | 2 |
| 11 | Goggles (industrial) | 2 |
| 12 | Instruction card | 10 |
| 13 | Minimum and maximum room temperature indicator for each Battery Room | 1 |
| 14 | Cell Lifter | 1 |

ANNEXURE - IV

| | |
|---|-----------------|
| CONTRACT COORDINATION PROCEDURE | Rev 03 |
| PROJECT: 2 X 800 MW YERMARUS THERMAL POWER STATION | 30/07/10 |

Annexure II

| S no | Description | KPCL | | | Contractor (BHEL) | | | | |
|--------------|--|----------------------------------|----------------------------|------------------------------------|-------------------|---------------|------|-----|------|
| | | Bangalore (Thermal Design) | YTPS (site) | Consulting Engineer M/s EESI | PS- Marketing | Units/ PEM | Site | PMG | PSSR |
| A | Correspondence - soft copy (email) & Hard copy as per requirement | | | | | | | | |
| 1 | Post Contract | 1 | Nil | Nil | S | 1* | 1* | 1 | 1* |
| | | 1 | Nil | S | Nil | Nil | Nil | Nil | Nil |
| | | 1 | S | Nil | Nil | 1* | 1 | 1 | 1 |
| | | S | 1 | 1 | Nil | 1 | 1* | 1 | 1* |
| | | 1* | 1* | Nil | Nil | 1* | 1* | 1 | S |
| 1 | | 1 | 1 | Nil | 1* | 1* | S | 1* | |
| B (a) | Contractor Drawings | | | | | | | | |
| 1 | Preliminary/ resubmission | PDF + 1 hard copy | Nil | PDF | Nil | S | Nil | P | Nil |
| 2 | Return preliminary with comments | PDF | Nil | S | Nil | PDF | Nil | P | Nil |
| 3 | Final approved drawings for stamping (Hard copy) | Nil | Nil | 4 | Nil | S | Nil | P | Nil |
| 4 | Return of stamped copies by EESI (Hard copy) | 1 | Nil | S | Nil | 2 | Nil | P | Nil |
| 5 | Distribution by contractor (Hard Copy) | 4 | 4 | Nil | Nil | S | 4 | P | Nil |
| 6 | As-Built drawings/ Erection Drawings | 1CD + 1hard copy | 1 CD + 4 hard copies | Nil | Nil | S | 1 | P | Nil |
| B (b) | All design calculations/ design memorandum/ data sheet/ MQP | | | | | | | | |
| 1 | Preliminary/ resubmission | 1 | Nil | 1 | Nil | S | Nil | P | Nil |
| 2 | Return preliminary with comments | 1 | Nil | S | Nil | 1 | Nil | P | Nil |
| 3 | Final approved documents for stamping (Hard Copy) | Nil | Nil | 4 | Nil | S | Nil | P | Nil |
| 4 | Stamped copies | 1 | Nil | S | Nil | 2 | Nil | P | Nil |
| 5 | Distribution | 2CD | Nil | Nil | Nil | S | 1* | P | 1* |
| C | Progress Reports (Monthly) | | | | | | | | |
| 1 | Contractor | 3 | Nil | Nil | Nil | Nil | Nil | S | Nil |
| 2 | Consultant | 3 | Nil | S | Nil | Nil | Nil | 1 | Nil |
| D | Manuals | | | | | | | | |
| 1 | Erection & Commissioning | 3 | 5 | Nil | Nil | Nil | 3 | P | S |
| 2 | Operation & Maintenance | 3 | 5 | Nil | Nil | S | 3 | P | P |

Abbreviations:

RPCL: Raichur Power Corporation Limited

Consultant: M/s Evonik Energy Services (India) Pvt. Ltd. (EESI)

S: Source, T: Transparency, CD: Compact Disc, 1*: One copy case to case basis,

P: Only transmittal / covering letter, PDF: Soft copy in pdf format





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DATASHEET -A

LEAD ACID PLANTE BATTERY

- | | | | |
|-----|--|---|--|
| 1. | Rated voltage (V) | : | 220V DC |
| 2. | Type of Battery | : | Lead Acid Plante high discharge |
| 3. | Conforming to | : | IEEE/ IS standards |
| 4. | No. of cells & End cell voltage | : | 108 Nos.; 1.85V |
| 5. | Nominal Float voltage (V) | : | 2.25 V/cell |
| 6. | Boost voltage (Maximum) (V) | : | Bidder to furnish the detail along with offer |
| 7. | Capacity at 10 hour rate at 27°C offered by the bidder | : | Bidder to furnish quoted AH capacity and battery sizing calculation along with offer |
| 8. | Minimum temp for which battery capacity to be selected | : | 15°C as minimum electrolyte temp. |
| 9. | Arrangement of batteries on racks | : | Single tier |
| 10. | Connection from battery to DCDB | : | Cables |

Notes:

- Bidders to furnish battery sizing calculation along with the offer and indicate rating offered at SI No 6 & 7.
- Bidders stand guarantee that the rating offered at SI No 7 shall meet 'Load Duty Cycle' as per Annexure-II of specification.



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DATA SHEET -C

| Sr. No. | PARAMETER | UNIT | VALUE |
|----------------|---|-------------|--------------|
| 1.0 | Make and Type | | |
| 2.0 | AH capacity at 27° C and end voltage | | |
| 2.1 | At 10 Hr discharge rate | AH | |
| 2.2 | At 1 Hr discharge rate | AH | |
| 3.0 | Battery Discharge current | | |
| 3.1 | At one minute rate | Amp | |
| 3.2 | At 30 minutes rate | Amp | |
| 3.3 | At 30 minutes rate at end voltage | Amp | |
| 3.4 | At 60 minutes rate | Amp | |
| 3.5 | At 60 minutes rate at end voltage | Amp | |
| 4.0 | Types of plates | | |
| 4.1 | Negative plates | | |
| 4.2 | Positive plates | | |
| 5.0 | Method of connection between cells | | |
| 6.0 | Voltage per cell at the end of charge at the finishing rate | V | |
| 7.0 | Recommended Trickle charge current | Amp | |
| 8.0 | Type and material of separators | | |
| 9.0 | Material of container | | |
| 10.0 | Type of container | | |
| 11.0 | Internal resistance of cells | Ohms | |
| 12.0 | Total resistance of connectors | Ohms | |
| 13.0 | Insulator Material for | | |
| 13.1 | Cells | | |
| 13.2 | Racks | | |
| 14.0 | Average life | Years | |
| 15.0 | Recommended boost charger rating for | | |
| 15.1 | Charging in 8 hours | Amp | |



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| Sr. No. | PARAMETER | UNIT | VALUE |
|---------|---|----------------|-------|
| 15.2 | Charging in 10 hours | Amp | |
| 16.0 | Allowable ripple content acceptable to battery (r.m.s) | % | |
| 17.0 | Hydrogen evaluation | | |
| 18.0 | Cell designation in accordance with IS: 1651/1652 | | |
| 19.0 | Applicable standard | | |
| 20.0 | Whether battery performance curve and calculation for capacities enclosed | | |
| 21.0 | Recommended Maximum period of storage of Electrolyte before first charge | | |
| 22.0 | Amount and specific gravity of electrolyte per cell required for first filling at 27° C | | |
| 23.0 | Recommended specific gravity of electrolyte at 27° C | | |
| 23.1 | When fully charged | | |
| 23.2 | When fully discharged | | |
| 24.0 | Container dimensions | (L X B X H)mm | |
| 25.0 | Distance between centres of cells when erected | Mm | |
| 26.0 | Terminal connectors | | |
| 26.1 | Type | | |
| 26.2 | Material | | |
| 27.0 | Battery Racks | | |
| 27.1 | Type & Material | | |
| 27.2 | Outline dimensions | (L X B X H) mm | |
| 27.3 | Net weight | Kg | |
| 28.0 | Weight per cell | Kg | |
| 28.1 | Net dry weight | Kg | |
| 28.2 | Net weight with electrolyte | Kg | |
| 29.0 | Total shipping weight of one battery unit (without electrolyte) | Kg | |
| 30.0 | Taps provided at cell no. | | |
| 31.0 | Connection from battery to charger (busbar/ cable) | | |
| 32.0 | Recommended size of (busbar/ cable) | | |
| 33.0 | Whether backup calculation furnished | | |

| | | QUALITY PLAN | | CUSTOMER : Raichur Power Co. Ltd. | | PROJECT:2X800 MW YERMARARUS STPP # 1 & 2 | | SPECIFICATION : PE-TS-362-508-E001 | | | | |
|---------|-------------------------|-------------------------|-------------|-----------------------------------|--|--|--|------------------------------------|-------------------------------|-----|-----|---|
| | | | | BIDDER/ : APPROVED VENDOR | | TITLE | | NUMBER : | | | | |
| | | | | VENDOR | | QUALITY PLAN | | SPEC: TECHNICAL SPECIFICATION | | | | |
| | | SHEET 1 OF 1 | | SYSTEM : 220V DC SYSTEM | | NUMBER : PE-QP-999-508-E002 REV.00 | | TITLE FOR BATTERY | | | | |
| | | | | SYSTEM : 220V DC SYSTEM | | ITEM : LEAD ACID BATTERY | | SECTION VOLUME III | | | | |
| SL. NO. | COMPONENT/OPERATION | CHARACTERISTICS CHECK | CAT. | TYPE/METHOD OF CHECK | EXTENT OF CHECK | REFERENCE DOCUMENT | ACCEPTANCE NORM | FORMAT OF RECORD | AGENCY | | | REMARKS |
| | | | | | | | | | P | W | V | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | | 11 |
| 1.0 | FINISHED BATTERY / CELL | 1.TYPE TEST | MA | TEST | IS:1651 & 1652/BHEL SPEC BSI:6290 Pt-4 | IS:1651 & 1652/BHEL SPEC BSI:6290 Pt-4 | IS:1651 & 1652/BHEL SPEC BSI:6290 Pt-4 | INSPN REPORT | 3,2 | - | 2,1 | <div style="border: 1px solid black; padding: 5px; width: fit-content;"> 1: BHEL and / or NTPL 2: Vendor 3: Sub-vendor of vendor </div> |
| | | 2.ACCEPTANCE TEST | MA | TEST | -DO- | -DO- | -DO- | | 2 | 2,1 | - | |
| 2.0 | ACCESSORIES | 1.VISUAL AND DIMENSIONS | MA | TEST | 100% | BHEL DRG | BHEL DRG | INSPECTION | 3,2 | 2,1 | - | |
| BHEL | | | PARTICULARS | | BIDDER/VENDOR | | | | | | | |
| | | | NAME | | | | | | | | | |
| | | | SIGNATURE | | | | | | | | | |
| | | | DATE | | | | | | | | | |
| | | | | | | | | | BIDDER'S/VENDORS COMPANY SEAL | | | |

2X800 MW YERAMARUS STPP
BOQ cum PRICE SCHEDULE for 220V DC BATTERY

| Sr. No. | Item code | Item Description | Unit | Quantity | Remarks |
|---------|-------------------|---|------|----------|--|
| (A) | MAIN ITEMS | | | | |
| 1.0 | 508-11013-A | LEAD ACID PLANTE 220V BATTERY1 | Nos. | 4 | 220V DC, AH capacity to be decided by bidder as per Annexure-II of Section-C, 1.85 ECV, 108 cells, Lead-Acid Plante high discharge battery with 100% electrolyte +10% extra electrolyte, all accessories listed, suitable termination arrangement and metal/teakwood racks |
| 1.1 | | LIST OF ACCESSORIES WITH EACH BATTERY SET | | | |
| 1.1.1 | | Hydrometer (in step of 0.005) | Nos. | 2 | Part of item 1.0 |
| 1.1.2 | | Set of hydrometer syringes (suitable for the vent holes in different cells) | Nos. | 2 | |
| 1.1.3 | | Thermometer for measuring electrolyte temperature | Nos. | 2 | |
| 1.1.4 | | Wall mounting type holder made of teak wood for hydrometer and thermometer | Nos. | 2 | |
| 1.1.5 | | Digital Cell testing voltmeter (3-0-3V) | Nos. | 2 | |
| 1.1.6 | | Alkali mixing jar | No. | 1 | |
| 1.1.7 | | Rubber apron | Nos. | 2 | |
| 1.1.8 | | Pair of rubber gloves | Nos. | 2 | |
| 1.1.9 | | Set of spanners | Nos. | 2 | |
| 1.1.10 | | No smoking' notice | Set | 2 | |
| 1.1.11 | | Goggles (industrial) | Set | 2 | |
| 1.1.12 | | Instruction card | Nos. | 10 | |
| 1.1.13 | | Minimum and maximum room temperature indicator for each Battery Room | Set | 1 | |
| 1.1.14 | | Cell Lifter | Set | 1 | |
| 2.0 | 508-11007-A | E & C SPARES | Set | 1 | |
| 2.1 | | Intercell connector | Nos. | 5 | |
| 2.2 | | Vent plug | Nos. | 5 | |
| 2.3 | | Gloves | Set | 2 | |
| 3.0 | 508-11029-A | TYPE TEST | LOT | 1 | |
| 3.1 | | Ampere hour and watt-hour efficiency test | LOT | | |
| 3.2 | | Endurance tests | LOT | | |
| 3.3 | | Test for capacity & test for voltage during discharge | LOT | | To be carried out at site on completion of E&C and immediately prior to putting battery in service. |
| 3.4 | | Test for retention of charge | LOT | | |

*2X800 MW YERAMARUS STPP
BOQ cum PRICE SCHEDULE for 220V DC BATTERY*

| (B) | OPTIONAL ITEMS | | | | |
|------------|-----------------------|--|-----|---|-----------------------|
| 1.0 | 508-11024-A | SUPERVISION OF COMMISSIONING | No. | 1 | |
| 2.0 | 508-11025-A | SUPV.OF E&C | SET | 1 | |
| 3.0 | 508-11009-A | INCREMENTAL INCREASE IN BATTERY RATING | SET | 1 | With a rating of 20AH |