

Project: - 1X660 MW SAGARDIGHI EXTN UNIT-V
GeM Bid Number: GEM/2022/B/2428311
Enquiry No.: PE/PG/SGI/E-7040/2022, Dtd: 10.08.2022
Package: - DC LEAD ACID BATTERIES

Subject: Corrigendum – 01 to NIT

DUE DATE
30-Aug-2022
BY 03:00 PM (IST)

The bid submission of subject tender is **extended up to 30.08.2022 at 03:00 PM through Government e Marketplace (GeM).**

Technical specification for subject tender has been revised. Same is enclosed with this corrigenda.

Bidders are requested to submit their offer/revised offer on or before **30.08.2022 at 03:00 P.M.**

For and on behalf of **BHEL**



श्री प्रमोद (डी.जी.)/Dy. Manager (P.G.-I)
भारत भारी इलेक्ट्रिकल्स लिमिटेड / Bharat Heavy Electricals Ltd.
पावर सेक्टर-परियोजना अभियंत्रण प्रभाग
Power Sector-Project Engineering Management
पीएलईडीपी, एच.आर.डी.आई. एम्बु इण्डस्ट्रियल कॉम्प्लेक्स
PPEI Bldg. H.R.D.I. & ESI Complex,
प्लॉट नं. 25, सेक्टर 16 ए, नोएडा - 201301
Plot No. 25, Sec. 16 A, Noida - 201301

TARUN ARYA
DY. MGR. / PG-I

1 X 660 MW Sagardighi Thermal Power Project Extn. Unit No. 5

West Bengal Power Development Corporation (WBPDC)

VOLUME – II

TECHNICAL SPECIFICATION FOR

220V DC Lead Acid Plant Battery

BHEL DOCUMENT NO. : PE-TS-445-508-E001

REVISION NO. : 0



BHARAT HEAVY ELECTRICALS LIMITED

POWER SECTOR

PROJECT ENGINEERING MANAGEMENT

NOIDA-201301, UTTAR PRADESH, INDIA

	TECHNICAL SPECIFICATION FOR 220V DC Lead Acid Plante Battery	SPECIFICATION NO. PE-TS-445-508-E001	
		VOLUME II	
		REVISION 0	DATE: 29.07.22
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COMPLIANCE CERTIFICATE

The bidder shall confirm compliance to the following by signing/ stamping this compliance certificate and furnishing same with the offer.

1. The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusion/ deviation with regard to same.
2. There are no deviation with respect to specification other than those furnished in the 'schedule of deviations'.
3. Only those technical submittals which are specifically asked for in NIT to be submitted at tender stage shall be considered as part of offer. Any other submission, even if made, shall not be considered as part of offer.
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 description/ quantities from those given in BOQ-Cum-Price schedule enclosed with NIT shall not be considered (i.e., technical description & quantities as per specification shall prevail).

BIDDER'S STAMP & SIGNATURE

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SECTION –I
SPECIFIC TECHNICAL REQUIREMENTS

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1.0 SCOPE OF ENQUIRY

- 1.1 This specification covers the design, manufacture, inspection and testing at manufacturer's works, proper packing, delivery to site and supervision of E&C of 220V DC BATTERY as mentioned in different sections of this specification.
- 1.2 Standard technical requirements of the 220V DC BATTERY are indicated in Section-II. Project specific technical/ quality requirements / changes are listed in Section-I & Data Sheet-A.
- 1.3 The stipulations of Section-I, followed by those of Data Sheet-A, followed by Section-II shall prevail in case of any conflict between the stipulations of Section-I, Section-II & Datasheet-A.

2.0 BILL OF QUANTITIES:

- 2.1 Quantity requirements shall be as per BOQ cum Unpriced Price Schedule enclosed with NIT.

3.0 SPECIFIC TECHNICAL REQUIREMENTS:

3.1 Technical /Quality/ Inspection:

S. No.	Reference clause No. of Section II (if any)	Specific Requirement/ Change
1	Section-II, Clause no. 13.0	Refer Annexure-III of Section-I.
2	Section-II, Clause no. 9.2): INSPECTIONS & TESTING	In continuation to clause no. 9.2, following shall be added: (a) Following type tests on two cells of the battery to be conducted: (i) Capacity test for voltage on battery during discharge. (ii) Endurance test. (iii) Ampere hour & watt hour efficiency test The charges of the above type tests shall be given separately in price schedule as indicated in BOQ-CUM PRICE SCHEDULE enclosed with NIT. (b) Bidder shall also submit the valid type test reports not older than 5 years (as on 01/07/20) for the type tests listed under Annexure-A of Quality plan as per relevant standards on identical equipment in type and rating. In absence of valid type tests reports, vendor shall conduct all such type tests without any commercial/delivery implication to BHEL. (c) 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 equipment, including the discharge resistor, charger, tools, tackles and instruments shall be arranged by BHEL. Above test shall be conducted by bidder during the visit for supervision of E&C as indicated in BOQ-CUM PRICE SCHEDULE enclosed with NIT.

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3.2 Construction:

1. Cell container shall be made of heat & electrolyte resistant, shock absorbing, tough translucent, polypropylene or equivalent plastic material having chemical and electrochemical compatibility. The cell shall be mechanically sturdy.
2. Sufficient sediment space shall be provided so that the cells will not have to be cleaned out during normal life.
3. The cell terminals posts shall be provided with connector bolts and nuts made of copper/ brass effectively coated with lead to prevent corrosion.
4. Lead coated copper connectors shall be furnished to connect up cells of Battery set.
5. Bent copper plates, tubular copper lugs, teakwood clamp, bolts, nuts, washers, etc. shall be furnished for connection of outgoing cables.

4.0 SINGE LINE DIAGRAM FOR 220V DC SYSTEM

(Refer Annexure-IA & IB enclosed with Section-I)

5.0 LOAD DUTY CYCLE

(Refer Annexure-IIA & IIB enclosed with Section-I)

6.0 DOCUMENTS REQUIRED ALONG WITH TECHNICAL OFFER

(Refer Annexure-III enclosed with Section-I).

7.0 Drawing/Documents required after award of contract shall be as per NIT.

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1.	Rated voltage (V)	:	220V DC
2.	Type of Battery	:	High Discharge Lead-Acid Plante
3.	Conforming to	:	IEEE/IEC/ IS standards
4.	DC system Fault level & duration	:	25KA for 1 Sec
5.	Material of Battery Rack	:	Seasoned teak wood battery rack properly treated for anti-sulphuric acid resistance coated with three (3) coats of anti-acid paint. Rack shall also be treated for anti-rodent and termite attack.
6.	Design Ambient Temperature	:	50 Deg. C
7.	Minimum Electrolyte Temperature to be considered for Battery Sizing	:	5 deg. C
8.	No. of cells	:	108
9.	End cell voltage	:	1.85V/cell
10.	Nominal Float voltage (V)	:	2.25 V/cell
11.	Boost voltage (Maximum)	:	Bidder to furnish the detail along with offer
12.	AH Capacity of battery a) MAIN PLANT Battery (as per Annexure-IIA) b) FGD & ESP Area Battery (as per Annexure-IIB)	:	Bidder to furnish quoted AH capacity and battery sizing calculation along with offer
13.	Arrangement of batteries on racks	:	Single tier for batteries having cell weight 50kg or more
14.	Cable size to be terminated at Battery end (Tentative size) <i>Final size shall be informed during detailed engineering</i>	:	1) Main plant Battery: 2 RUNS OF 1C x 400 sq.mm (Cu) FS CABLE/ pole. 2) FGD & ESP Area Battery: 1 RUN OF 1C x 150 sq.mm (Cu) FS CABLE/ pole.
15.	Tapping to be provided in battery	:	No
16.	Tapping to be provided at which cell (if Tapping is applicable)	:	NA
17.	Type of cable lugs to be supplied (Suitable number of copper lugs for cable termination at battery terminals shall be provided by bidder. Tentative cable size has been informed at Sl. No. 14 above. <i>Final cable size shall be informed during detailed engineering</i>	:	Copper tubular lugs
18.	Recommended boost charging rate (battery to be charged in 10 hrs)	:	Bidder to furnish the detail along with offer
19.	Recommended trickle charging rate	:	Bidder to furnish the detail along with offer

Notes: 1) Bidders stand guarantee that the rating offered at S. No. 12 shall meet 'Load Duty Cycle' as per Annexure - IIA & IIB of specification

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	<u>DATA SHEET-C</u>	SECTION I	
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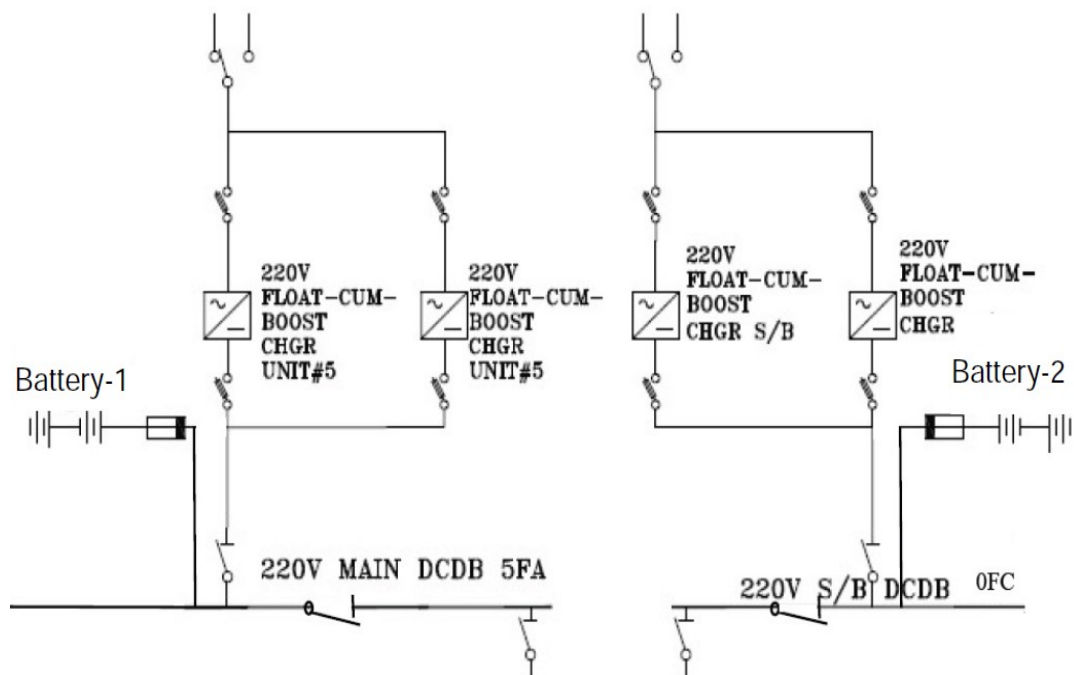
S. No.	PARAMETER	UNIT	VALUE
1.0	Make and Type		
2.0	AH capacity at 27° C and end voltage		
2.1	At 10 Hr discharge rate	AH	
2.2	At 1 Hr discharge rate	AH	
3.0	Battery Discharge current		
3.1	At one minute rate	Amp	
3.2	At 30 minutes rate	Amp	
3.3	At 30 minutes rate at end voltage	Amp	
3.4	At 60 minutes rate	Amp	
3.5	At 60 minutes rate at end voltage	Amp	
3.6	At 120 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	
15.2	Charging in 10 hours	Amp	
16.0	Allowable ripple content acceptable to battery (r.m.s)	%	

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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		
34.0	Cable lugs at battery terminals of suitable size		

Note: Indicates data / documents to be furnished after the award of Contract.

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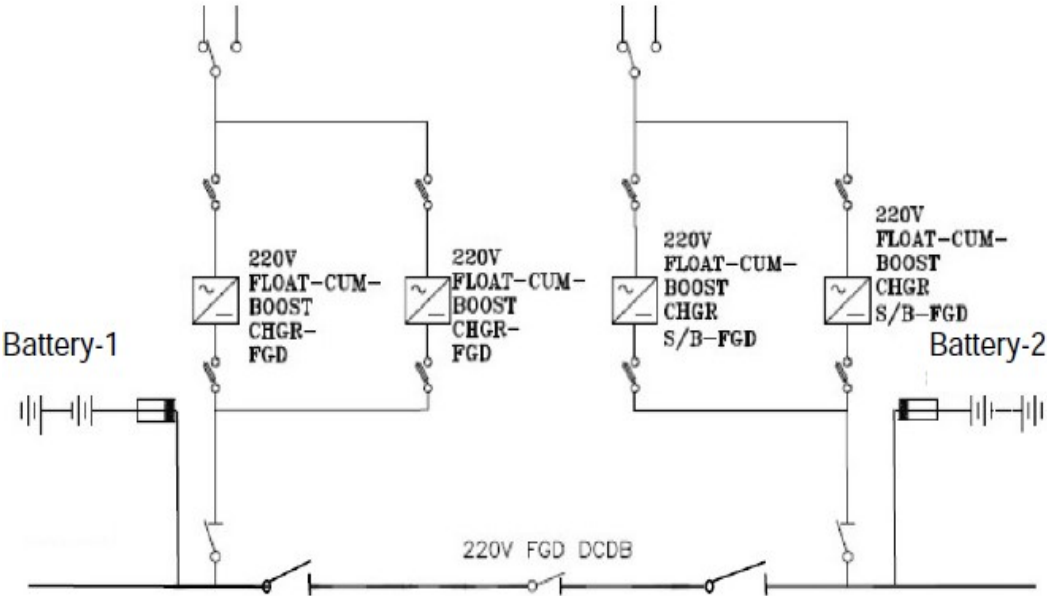
ANNEXURE-IA**SINGE LINE DIAGRAM FOR 220V DC SYSTEM****(MAIN PLANT BATTERY)**

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ANNEXURE-IB

SINGE LINE DIAGRAM FOR 220V DC SYSTEM

(FGD & ESP AREA BATTERY)

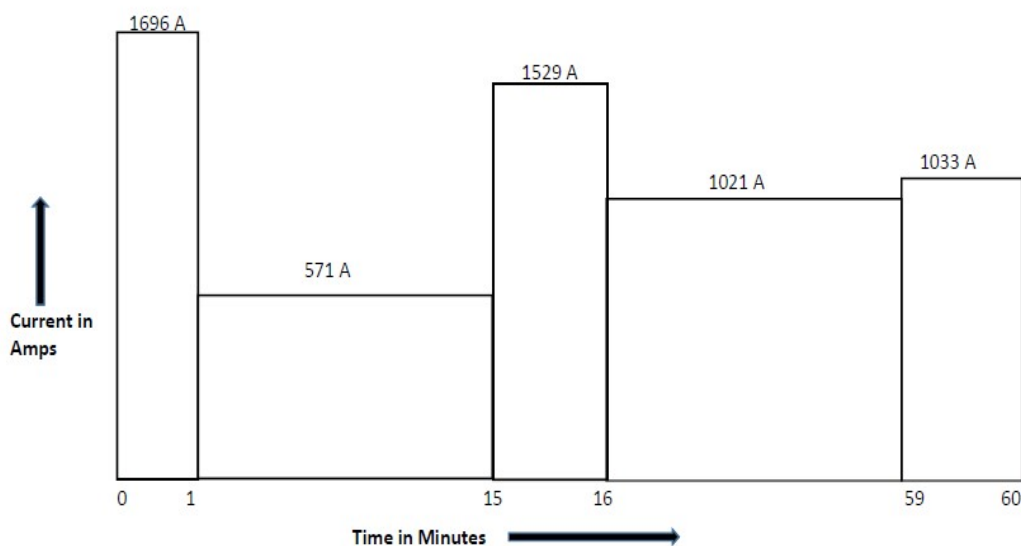


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ANNEXURE-IIA

LOAD DUTY CYCLE

(MAIN PLANT BATTERY)



Duration	0-1 min	1-15 min	15-16 min	16-59 min	59-60 min
Current	1696 A	571A	1529A	1021A	1033A

FACTORS TO BE CONSIDERED FOR BATTERY SIZING:

1. MIN.ELECTROLYTIC TEMP. : 5 °C
2. END CELL VOLTAGE : 1.85V/cell
3. DESIGN MARGIN : 20%
4. AGEING FACTOR : 1.0
5. TEMPERATURE CORRECTION FACTOR : IEEE 485 for Lead Acid shall be the principle for sizing the battery including temperature correction factor.

Note:

1. Supporting Calculation for temp correction factor as per IEEE-485 shall be furnished for batteries which are not designed at 25 °C.

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ANNEXURE-IIIB**LOAD DUTY CYCLE****(FGD & ESP AREA BATTERY)**

Duration	0-1 min	1-59 min	59-60 min
Current	70 A	44A	57A

FACTORS TO BE CONSIDERED FOR BATTERY SIZING:

1. MIN.ELECTROLYTIC TEMP. : 5 °C
2. END CELL VOLTAGE : 1.85V/cell
3. DESIGN MARGIN : 20%
4. AGEING FACTOR : 1.0
5. TEMPERATURE CORRECTION FACTOR : IEEE 485 for Lead Acid shall be the principle for sizing the battery including temperature correction factor.

Note:

1. Supporting Calculation for temp correction factor as per IEEE-485 shall be furnished for batteries which are not designed at 25 °C.

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ANNEXURE-III

DOCUMENTS REQUIRED ALONG WITH THE TECHNICAL OFFER

1. Battery sizing calculation with respect to load duty cycle (Annexure-IIA & IIB) enclosed with Section-I to be provided along with supporting documents (capability / discharge curve, temperature correction factor, float charging factor & published technical catalogue) for considered factors.
2. Unpriced Price Schedule as enclosed with NIT with "Quoted" word against items with bidder's signature and company stamp.
3. A copy of the sheet "Compliance certificate" with bidder's signature and company stamp.
4. A copy of sheet "Data Sheet-A" with required information and bidder's signature and company stamp.

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SECTION - II STANDARD TECHNICAL REQUIREMENTS		

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1.0 TECHNICAL REQUIREMENTS

This specification covers the design, materials, constructional features, manufacture assembly, testing, packing and dispatch of 220V DC Lead-Acid Battery complete with all accessories.

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.

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. This enquiry covers the supply of 220V DC LEAD ACID BATTERY conforming to this specification.

2.0 CODES AND STANDARDS

Unless otherwise specified, the latest revisions of codes/standards as specified under Table-1 enclosed are applicable and shall referred to.

3.0 EQUIPMENT AND SERVICES TO BE PROVIDED BY THE BIDDER

The bidder shall supply the equipment and provide the services in accordance with the various sections of this specification and as per BOQ cum unpriced Price Schedule (Annexure-A) enclosed with NIT.

4.0 SERVICES AND EQUIPMENT TO BE EXCLUDED

- Civil works like foundation and cable cellar, flooring of the battery room etc.
- Ventilation of battery and charger room.
- 220V DCDB
- Power and control cables
- Erection of the equipment
- Battery charger, battery fuse box and discharge resistor

5.0 DESCRIPTION OF EQUIPMENT

5.1 BATTERY

All batteries shall be stationary storage Lead-Acid *high discharge* type conforming to IS-1652/IEC60896-11. The batteries shall meet the duty cycle requirements under all site and operating conditions as specified in data sheet 'A'. IEEE 485 shall be the principle for sizing the battery including temperature correction factor.

5.2 CONTAINER

Containers shall be made of transparent polymeric material, robust, heat resistant, leak proof, non-absorbent, acid/alkali resistant, non-bulging type and free from flaws such as wrinkles, cracks, blisters, pinholes etc. The marking for the electrolyte level shall be for upper & lower limits. Container shall be closed/sealed lid type. Open type cells are not

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acceptable. Lid and sealing compound shall be non-cracking type.

5.3 PLATES

The plates shall be designed for maximum durability during all service conditions including high rate of discharge and rapid fluctuation of load.

The separators shall maintain the electrical insulation between the plates and shall permit free flow of electrolyte. Proper arrangement to keep end plates in position shall be provided. Separators shall be suitable for continuous immersion in the electrolyte without distortion.

The positive and negative terminal posts shall be clearly marked

5.4 CONNECTIONS

Lead coated copper connectors (or a better product) shall be used for connecting up adjacent cells and rows. Bolts, nuts, clamps, washers etc as applicable in shall be provided. 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 cables. Necessary support equipments and copper lugs for termination of these cables on batteries shall also be supplied by the contractor. 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 discharge current of the respective Batteries and through fault short circuit current which the battery can produce and withstand for the period declared. Successful bidder shall furnish necessary sizing calculations to prove compliance to the same.

5.5 VENT PLUG

Vent plug shall be provided in each cell. It shall be anti-splash type and having more than one exit hole to allow the gases to escape freely but prevent the acid spray from the battery. 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.

5.6 SEDIMENT SPACE

Sufficient sediment space shall be provided beneath the plates to accommodate any plate deposit, which accumulates at the bottom of the cell over a reasonable life of battery without short-circuiting the plates.

5.7 The following information shall be marked on out side of each cell.

- Name, type and trade mark of manufacturer
- Country and year of manufacture
- Capacity at 10 hr discharge rate .
- Upper and lower electrolyte level
- Serial Number

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5.8 ELECTROLYTE

The electrolyte comprise of battery grade sulphuric acid conforming to IS: 266 and water conforming to IS: 1069. The cells shall be shipped dry, uncharged with electrolyte supplied in non-returnable good quality polyethylene or other suitable containers. Ten percent extra electrolyte shall be supplied to account for any spillage during transit.

5.9 BATTERY RACKS

- Wooden/FRP/Steel battery racks to be supplied as specified in datasheet-A. Wooden rack shall be made of best quality treated wood
- Racks shall be painted with at least two (2) coats of acid resistant/ anti corrosive paint.
- Racks shall be free standing type mounted on porcelain/hard rubber/ PVC Pad insulators as applicable.
- Numbering tags for each cell shall be attached on to the battery racks.
- Battery racks and other supporting/interconnecting accessories shall be as per layout arrangement to be approved by purchaser during contract engineering stage.
- The bottom tier of the stand shall not be less than 150 mm above the floor.
- Wherever racks are transported in dismantled conditions, match markings shall be provided to facilitate easy assembly.

6.0 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 relevant standard.
- Storing conditions of electrolyte

7.0 LIFE

The guaranteed life of battery when operating under the specified conditions shall be furnished.

8.0 ACCESSORIES

Battery accessories shall be provided as specified in BOQ cum unpriced Price Schedule (Annexure-A) enclosed with NIT.

9.0 INSPECTION AND TESTING

Offered equipment shall be of type tested design. The bidder shall confirm compliance to quality plan enclosed with the specification, which is subject to customer/ BHEL approval and the inspection shall be carried out based on this approved Quality Plan (QP no. PE-QP-999-508-E002).

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9.1 Quality Assurance

All materials components and equipment's covered under this specification shall be procured, manufactured, inspected and tested as per the BHEL standards, quality plan number PE-QP-999-S08-E002 enclosed with this specification and which shall be complied with.

All acceptance and routine tests as per IS-1652 shall be carried out by the manufacturer. Charges for all routine and acceptance tests for all the materials shall be deemed to be included in the bid price.

9.2 Type, Routine and Acceptance Tests

Type, Routine and Acceptance tests to be performed as per Quality Plan(QP no. PE-QP-999-508-E002) enclosed with this specification.

10.0 PERFORMANCE GUARANTEE

Bidders shall guarantee that battery offered shall meet the 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.

11.0 INSTRUCTION MANUALS

11.1 Instruction manuals for the installation, operation and maintenance of battery to be supplied shall be furnished. The installation and maintenance manual shall contain the following.

- General description giving type and rating of various batteries.
- Technical data
- Salient constructional details.
- Instruction to be followed on receipt at site.
- Instructions for foundations, if any
- Erection procedures and checks.
- Procedure for filling of electrolyte.
- Commissioning procedures and site tests.
- Routine, periodic and preventive inspection and maintenance procedures.
- Safety rules.
- Possible faults, their causes and remedies.
- Type and routine test certificates.
- Catalogues, literatures and drawings.

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		REV NO. : 01 DATE : 30/05/2016
		SHEET : 6 of 7
12.0 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. 13.0 By all Bidders as technical offer: - Battery sizing calculation with respect to load duty cycle enclosed with Section-I to be provided along with supporting documents (capability / discharge curve, temperature correction factor, float charging factor & published technical catalogue) for considered factors. - Unpriced Price Schedule (Annexure-A) as enclosed with NIT with “Quoted” word against items with bidder’s signature and company stamp. - A copy of the sheet “Compliance certificate” with bidder’s signature and company stamp. - A copy of sheet “Data Sheet-A” with required information and bidder’s signature and company stamp.		

	TITLE :	SPECIFICATION NO.
	TECHNICAL SPECIFICATION FOR	PE-SS-999-508-E001
	220V DC LEAD ACID BATTERY	VOLUME NO. : II
		SECTION : II
		REV NO. : 01 DATE : 30/05/2016
		SHEET : 7 of 7

Table-1

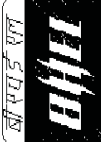
LIST OF CODES AND STANDARDS FOR LEAD ACID BATTERY

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.	STATIONARY LEAD-ACID BATTERIES – VENTED TYPES – GENERAL REQUIREMENTS & METHODS OF TESTS	IEC60896-11
12.	INDIAN ELECTRICITY RULES & INDIAN ELECTRICITY ACTS	

Note:

Vendor to note that wherever IS is mentioned equivalent IEC is also acceptable. In case of any technical requirement not covered by IEC, technical requirement as per IS shall prevail.

Receipt No : 975513/2022/PS-PEM-EL

		MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS		STANDARD QUALITY PLAN				SPEC NO.:PE-TS-XXX-508-E001		DATE:-	
		CUSTOMER WBPDCL						QP NO.:PE-QP-999-508-E002, REV.01		DATE:- 30/06/2020	
		PROJECT 1 X 660 MW Sagardighi Thermal Power Project Extn. Unit No. 5						P.O NO.:-		DATE:-	
		ITEM:- DC LEAD ACID BATTERY		SYSTEM:- DC SYSTEM				SECTION:-		SHEET 1 OF 3	
SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTIC CHECK	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY	REMARKS	
1		3	4	5	6	7	8	9	10	11	
					M	C/N			M	C	N
1.0 RAW MATERIALS & BOUGHT OUT ITEMS											
1.1	(Pure Lead for Pos. plate, Lead Alloy for Neg. plate & Sulphuric acid)	Chemical	MA	Chemical Analysis	Random Sample	IS:1652, IS:266, IS:1069 & MFR's Std.	IS:1652, IS:266, IS:1069 & MFR's Std.	Test Cert.	✓	P	V
1.2 SEPARATOR											
a)	Visual	Visual	MA	Visual	Random Sample	IS:1652 & MFR's Std.	IS:1652 & MFR's Std.	Test Cert.	✓	P	V
b)	Physical	Physical	MA	Physical	Random Sample	-do-	-do-	-do-	✓	P	V
c)	Chemical	Chemical	MA	Chemical	Random Sample	(For Synthetic IS : 6071)	(For Synthetic IS : 6071)	-do-	✓	P	V
d)	Electrical Resistance Test	Electrical	MA	Electrical	Random Sample	-do-	-do-	-do-	✓	P/V	V
e)	Acceptance test Dimension, Volume Porosity, Wettability of separator	Test	MA	Test	Random Sample	-do-	-do-	-do-	✓	P	V
1.3 TERMINAL POST											
a)	Dimensional Conformance	Dimension	MA	Measurement	Random Sample	IS:1652, IS:8320 & MFR's Std.	IS:1652, IS:8320 & MFR's Std.	Test Cert.	✓	P	V
b)	Material Conformance	Chemical	CR	Chemical	Random Sample	-do-	-do-	-do-	✓	P	V
c)	Thread size depth & chamfer	Physical	MA	Measurement	Random Sample	-do-	-do-	-do-	✓	P	V
d)	Surface finish & defects	Visual	MA	Visual	100%	-do-	-do-	-do-	✓	P	V
e)	Plating Quality	Thickness	CR	Measurement	Random Sample	-do-	-do-	-do-	✓	P	V
1.4 CONNECTOR											
a)	Dimension	Dimension	MA	Measurement	Random Sample	IS:1652, IS:8848 & Appd. Drg./Doc.	IS:1652, IS:8848 & Appd. Drg./Doc.	Test Cert.	✓	P/V	V
b)	Thickness of lead coating	Thickness	CR	Measurement	Random Sample	-do-	-do-	-do-	✓	P/V	V
1.5 VENT CAP											
a)	Dimensional Conformance	Dimension	MA	Measurement	Random Sample	IS:1652 & Appd. Drg./Doc.	IS:1652 & Appd. Drg./Doc.	Test Cert.	✓	P	V
# Vent cap shall be easily removed from topping up the cells and of such dimensions that the syringe type hydrometer can be inserted into vent to take electrolyte sample.											

BHEL				BIDDER/SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL					
ENGINEERING		QUALITY		Sign & Date		Doc No.		Sign & Date		Seal	
Prepared By	Signature	Name	Signature	Name	Signature	Reviewed By	Signature	Signature	Signature	Signature	Signature
Checked By	Signature	Name	Signature	Name	Signature	Checked By	Signature	Signature	Signature	Signature	Signature

KANHAIY A KUMAR

Digitally signed by KANHAIY A KUMAR
DN: cn=KANHAIY A KUMAR, o=BHEL, ou=PEM, email=kanhaiy.kumar@bhel.in, c=IN
Date: 2020.08.28 13:59:05 +05'30'

MANISH

Digitally signed by MANISH
DN: cn=MANISH, o=BHEL, ou=PEM, email=manish.hukla@bhel.in, c=IN
Date: 2020.08.28 14:48:02 +05'30'

RITESH KUMAR JAISWAL

Digitally signed by RITESH KUMAR JAISWAL
DN: cn=RITESH KUMAR JAISWAL, o=BHEL, ou=PEM, email=ritesh.jaiswal@bhel.in, c=IN
Date: 2020.08.28 16:10:07 +05'30'

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS			STANDARD QUALITY PLAN				SPEC NO.:-PE-TS-XXX-508-E001		DATE:-	
			CUSTOMER		WBPDCL		QP NO.:-PE-QP-999-508-E002, REV.01		DATE:- 30/06/2020	
			PROJECT		1 X 660 MW Sagardighi Thermal Power Project Extn. Unit No. 5		P.O NO.:-		DATE:-	
			ITEM:- LEAD ACID BATTERY		SYSTEM:- DC SYSTEM		SECTION:-		SHEET 2 OF 3	
SL NO.	COMPONENT & OPERATIONS	CHARACTERISTIC CHECK	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY	REMARKS
1		3	4	5	6	7	8	9	D *	11
					M				C	N
1.6 CONTAINER										
a)	Verification Constructional requirement	Visual	MA	Visual	Sample Plan as per IS:1146	IS:1652, IS:1146, IS:8320		Test Cert.	✓	P
b)	Verification of Markings	Visual	MA	Visual	-do-	-do-	-do-	-do-	✓	P
c)	High Voltage Test	Electrical	MA	Electrical	-do-	-do-	-do-	-do-	✓	P
d)	Drops Ball Test	Mechanical	MA	Mechanical	-do-	-do-	-do-	-do-	✓	P
e)	Plastic Yield Test	Mechanical	MA	Mechanical	-do-	-do-	-do-	-do-	✓	P
f)	Acid Resistance Test	Chemical	MA	Chemical	-do-	-do-	-do-	-do-	✓	P
g)	Hydraulic thrust endurance test	Physical	MA	Physical	-do-	-do-	-do-	-do-	✓	P
2.0 FINISHED BATTERY		Routine Test	CR	Electrical & Measurement	100%	IS:1652 & IS:8320		Inspection Report	✓	P
Note: Before Start of Inspection, Manufacturer Internal Inspection Record(QC) of the offered Batteries to be Verified										
3.0 FINAL INSPECTION										
3.1 Type Test #										
a)	Verification Constructional requirement	Visual	MA	Visual	Sample as per IS: 8320/IS:1652	IS:1652		Inspection Report	✓	P
b)	Verification of Markings	Visual	MA	Visual	-do-	-do-	-do-	-do-	✓	P
c)	Verification of Dimensions	Dimension	MA	Measurement	-do-	-do-	-do-	-do-	✓	P
d)	Test for Capacity & Voltage during discharge	Test	CR	Electrical & Measurement	-do-	-do-	-do-	Type Test report	✓	P
e)	AH & WH efficiency Test	-do-	CR	Electrical & Measurement	-do-	-do-	-do-	-do-	✓	P
f)	Test for loss of capacity on storage	-do-	CR	Electrical & Measurement	-do-	-do-	-do-	-do-	✓	P
g)	Endurance Test	-do-	CR	Electrical & Measurement	-do-	-do-	-do-	-do-	✓	P
h)	Loss of water test	-do-	CR	Electrical & Measurement	-do-	-do-	-do-	-do-	✓	P
i)	Test for suitability for Floating Battery Operation	-do-	CR	Electrical & Measurement	-do-	-do-	-do-	-do-	✓	P
j)	Internal Resistance and Short Circuit Test	-do-	CR	Electrical & Measurement	-do-	-do-	-do-	-do-	✓	P
# # Conduction of Type Tests from S.No. (d) to (j) shall be as per Annexure-A enclosed. If Conduction of Type test is required as per Ann-A, then Same shall be Witnessed (W) by BHEL/Customer in place of Verification(V) under column 'C' and 'N' of AGENCY(10) Above.										

BHEL				BIDDER/SUPPLIER				FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING		QUALITY		Sign & Date		Sign & Date		Doc No.		Sign & Date	
Prepared By	Kanhaiya Kumar	Prepared By	Kunal Gandhi					Reviewed By			
Checked By	Manish Shukla	Checked By	Ritesh K Jaiswal					Checked By			

Digitally signed by KANHAIYA KUMAR
DN: cn=KANHAIYA KUMAR, o=BHEL, ou=PEM, email=manishshukla@bhel.in, c=IN
Date: 2020.08.28 12:39:29 +05'30'

MANISH A KUMAR

Digitally signed by MANISH DN: cn=MANISH, o=BHEL, ou=PEM, email=manishshukla@bhel.in, c=IN
Date: 2020.08.28 14:48:29 +05'30'

Digitally signed by RITESH KUMAR JAISWAL
DN: cn=Ritesh K Jaiswal, o=BHEL, ou=PEM, email=riteshjaiswal@bhel.in, c=IN
Date: 2020.08.28 16:12:05 '30'

RITESH KUMAR JAISWAL

Digitally signed by Ritesh K Jaiswal
DN: cn=Ritesh K Jaiswal, o=BHEL, ou=PEM, email=riteshjaiswal@bhel.in, c=IN
Date: 2020.08.28 16:12:05 '30'

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Receipt No : 975513/2022/PS-PEM-EL

		MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS		STANDARD QUALITY PLAN				SPEC NO.:PE-TS-XXX-508-E001		DATE:-	
CUSTOMER		WBPDCL		PROJECT 1 X 660 MW Sagardighi Thermal Power Project Extn. Unit No. 5				QP NO.:PE-QP-999-508-E002, REV.01		DATE:- 30/06/2020	
ITEM:- LEAD ACID BATTERY		SYSTEM:- DC SYSTEM		REFERENCE DOCUMENT				P.O NO.:-		DATE:-	
CLASS		TYPE OF CHECK		QUANTUM OF CHECK		REFERENCE DOCUMENT		ACCEPTANCE NORMS		FORMAT OF RECORD	
3		5		6		7		8		9	
3.2 Acceptance Test		Visual		Sample Plan as per IS: 8320		IS:1652		IS:1652		Inspection Report	
a) Verification of Markings		Dimension		Capacity		Voltage during discharge		Visual & Dimension		Visual & Dimension	
b) Verification of Dimensions		Capacity		Voltage during discharge		Visual & Dimension		Visual & Dimension		Visual & Dimension	
c) Test for Capacity		Dimension		Capacity		Voltage during discharge		Visual & Dimension		Visual & Dimension	
d) Test for Voltage during discharge		Capacity		Voltage during discharge		Visual & Dimension		Visual & Dimension		Visual & Dimension	
4.0 Battery Racks		Visual		Sample Plan as per IS: 8320		IS:1652		IS:1652		Inspection Report	
5.0 Accessories		Dimension		Capacity		Voltage during discharge		Visual & Dimension		Visual & Dimension	
6.0 Cable Lugs and Terminal Plate		Visual		Sample Plan as per IS: 8320		IS:1652		IS:1652		Inspection Report	
7.0 Packing		Visual		Sample Plan as per IS: 8320		IS:1652		IS:1652		Inspection Report	

NOTES:-

1. Wherever IS standard is mentioned, equivalent IEC/International standard is also acceptable as per applicability of test. In case of any technical requirement not covered by IEC, technical requirement as per IS shall prevail.
2. BHEL Reserves the right for conducting repeat test, if required.
3. Photographs of complete Battery Package items after packaging to be sent to BHEL-Purchase Group for review before issuing MDCC.
4. In case, any changes in QAP commented by customer at contract stage shall be carried out by bidder without any implication to BHEL/Customer.
5. Project Specific QAP to be developed based on customer requirement.
6. For Export Job, BHEL technical specification for sea worthy packing to be followed.
7. Packing shall be suitable for storage at site in tropical climate conditions.

LEGEND :-

- * RECORDS, IDENTIFIED WITH "TICK(✓)" SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.
- ** M: SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, C: MAIN SUPPLIER/ BHEL/ THIRD PARTY INSPECTION AGENCY, N: CUSTOMER
- P: PERFORM, W: WITNESS, V: VERIFICATION, AS APPROPRIATE
- MA: MAJOR, MI: MINOR, CR: CRITICAL, D: DOCUMENTATION

ENGINEERING		QUALITY		BIDDER/SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL	
Sign & Date	Name	Sign & Date	Name	Doc No.	Sign & Date	Name	Seal
Prepared By	Kanhaiya Kumar	Prepared By	Kunal Gandhi	Reviewed By			
Checked By	Manish Shukla	Checked By	Ritesh K Jaiswal	Checked By			

KANHAIYA A KUMAR

Digitally signed by KANHAIYA KUMAR
DN: cn=KANHAIA KUMAR, o=BHEL, ou=PEM, email=kanhaiya.kumar@bhel.in, c=IN
Date: 2020.08.28 12:46:17 +05'30'

MANISH

Digitally signed by MANISH
DN: cn=MANISH, o=BHEL, ou=PEM, email=manishshukla@bhel.in, c=IN
Date: 2020.08.28 14:48:54 +05'30'

RITESH KUMAR JAISWAL

Digitally signed by RITESH KUMAR JAISWAL
DN: cn=RITESH KUMAR JAISWAL, o=BHEL, ou=PEM, email=riteshkumar@bhel.in, c=IN
Date: 2020.08.28 15:13:04 +05'30'

LIST OF TYPE TEST FOR LEAD ACID BATTERY

S No	Test	Type test description	Referred standard	Type Test to be specifically conducted (Yes/No)	BHEL/Customer's approval/Review Req. on test certificate (Yes/No)
1	Type Test	• Test for Capacity & Voltage during discharge	IS:1652	Yes	Yes
		• AH & WH efficiency Test	IS:1652	Yes	Yes
		• Test for loss of capacity on storage (Retension of Charge)	IS:1652	No	Yes
		• Endurance Test	IS:1652	Yes	Yes
		• Loss of water test	IS:1652	No	Yes
		• Test for suitability for floating batteryoperation	IS:1652	No	Yes
		• Internal resistance and short circuit test	IS:1652	No	Yes

**KANHAIYA
A KUMAR**

Digitally signed by KANHAIYA KUMAR
DN: cn=KANHAIYA KUMAR, o=BHEL,
ou=P&M,
email=kanhaiya.kumar@bhel.in,
c=IN
Date: 2020.08.28 12:40:42 +05'30'

MANISH

Digitally signed by Kunal
DN: cn=Kunal, o=ou,
email=kunalgandhi@bbh
elin, c=IN
Date: 2020.08.28
15:13:19 +05'30'

RITESH
 KUMAR
 JAISWAL