2X660 MW NTPC TALCHER TPP STAGE-III

TECHNICAL SPECIFICATION
FOR
DC Lead Acid/ Ni-Cd Battery

SPECIFICATION No. **PE-TS-497-508-E001**
ISSUE NO. 01
REV NO. 0

BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA, INDIA

INDEX

SL NO.	DESCRIPTION	PAGE NO.
1	Project Information	NA
2	Scope	3
3	General Technical Requirement	4-5
4	Specific Technical Requirement	
a)	Technical Data - Part - A	6-13
b)	Technical Data - Part - B (Supplier Data to be submitted after of contract)	14-16
c)	Compliance Drawings (Annexure-I, II, III & IV)	17-27
5	Performance Guarantees to be Demonstrated at Site	NA
6	Quality Plan	28-37
7	Sub Vendor List	NA
8	Painting Requirement	38
9	Packing Requirement	39
10	Unpriced Schedule	40-44
a)	Supply	-
b)	Spares	-
c)	Services	-
11	Documentation Requirement	
a)	Documents Required Along With Bid By Bidders	45
b)	Documents to be submitted by Successful Bidder after award of contract along with submission schedule	45
c)	Documents To Be Submitted As Final/As-Built	45
12	Compliance Certificate	46
13	Pre-Qualification Requirement (Technical)	47-49
14	Pre-Qualification Requirement (Financial)	-

BHEL	TECHNICAL SPECIFICATION DC Lead Acid/ Ni-Cd Battery 2X660 MW NTPC TALCHER TPP STAGE-III	PE-TS-497-508-E001 Issue No: 01 Rev. No. 00 Date : 14.03.2024

SCOPE

SCOPE OF THIS PACKAGE COVERS THE FOLLOWING:

SL.NO	PARAMETERS	REQUIREMENT
1	Supply Including Design, Engineering, Manufacturing of DC Lead Acid Battery	YES
a)	Main Supply	YES
b)	Commissioning Spares	NO
2	Painting	YES
3	Inspection & Testing	YES
4	Packing	YES
5	Transportation & Delivery To Site	YES
6	Erection & Commissioning	NO
7	Supervision of Erection & Commissioning	YES
8	Mandatory Spares	YES
9	O & M Service	NO
10	O & M Spares	NO

	TECHNICAL SPECIFICATION DC Lead Acid/ Ni-Cd Battery 2X660 MW NTPC TALCHER TPP STAGE-III	PE-TS-497-508-E001 Issue No: 01 Rev. No. 00 Date : 14.03.2024

	GENERAL TECHNICAL REQUIREMENT
1.0	It is not the intent to specify herein all the details of design and manufacturing. Bidder shall ensure that the offered equipment confirms in all respects to high standards of design, engineering and workmanship.
2.0	Bidder shall also ensure that the offered equipment shall comply with all applicable statutory and regulatory requirements.
3.0	In the event of any conflict between the requirements of two clauses of this specification, documents or requirements of different codes and standards specified, however more stringent requirement as per the interpretation of the owner shall apply.
4.0	Bidder to note that drawing/document submission shall be through web based Document Management System. Bidder would be provided access to the DMS for drg/doc approval and training for the same. Bidder to ensure proper internet connectivity at their end.
5.0	The first revision drawings/ documents submitted by vendor shall be complete in all respects.Any incomplete drawing submitted shall be treated as non- submission with delays attributable to vendor's account. For any clarification/ discussion required to complete the drawings, the bidder shall himself depute his personal to BHEL / Customer's place any number of time as per the requirement for across the table discussions/ finalizations/ submissions of drawings.
6.0	Latest codes and standards shall be complied with as on 06.06.2022 <date of techno-commercial bid opening>.
7.0	Bidder shall furnish Type Test Certificate of specified Type Test as per quality plan which has been conducted within period of 7 years as 06.06.2022 <date of techno-commercial bid opening (with customer)> , i.e. from 06.06.2015 to 06.06.2022 . These reports should be for the tests conducted on the battery identical in all respects to those proposed to be supplied under this contract and test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client. However, if the contractor is not able to submit report of the type test(s) conducted within last 7 years from the indicated date, or in the case of type test report(s) are not found to be meeting the specification requirements, the contractor shall conduct all such tests under this contract at no additional cost and time implication to the BHEL either at third party lab or in presence of client/owners representative and submit the reports for approval
8.0	Bidder shall submit stamped QP on compliance route in the event of order. In case, the bidder is supplying the item from outside India, the third party inspection shall be arranged and considered by the bidder in their offer.
9.0	As part of sl.no. 8 above; bidder shall submit QAP for DC BATTERY HEALTH MONITORING SYSTEM (BHMS) during contract stage, for BHEL's approval.

10.0	DC HEALTH MONITORING SYSTEM (HMS):
10.1	DC Battery Health Monitoring System shall include microprocessor-based hardware and software to monitor the condition of each battery cell of 220V DC systems battery banks on-line on 24x7 basis. With DC Health Monitoring System, it shall be possible to measure & analyse the individual cell and battery parameters so that any damage to battery shall be prevented by proactive maintenance. Each Battery set of main plant battery (unit#1 and unit#2) shall have its own independent DC Health Monitoring System. Separate OWS for Unit#1 & Unit#2 shall be provided. They (OWS) shall be located in Main plant control room.
10.2	DC Health Monitoring System shall measure and store the following parameters at predetermined time interval as decided by the owner during detail engineering: a) Each Cell Voltage b) Battery DC Current c) Ambient and Cell temperature
10.3	Further, DC Health Monitoring System module shall have additional provision of accepting at least 6 Nos. of Digital inputs and 2 Nos. of analog inputs (4-20mA). DC Health Monitoring System shall also be able to store these inputs status for future reference.
10.4	DC Health Monitoring System shall communicate with the Switchgear DDCMIS System and provide alarms for abnormal condition of Cell/Battery. DC Health Monitoring System modules shall have one port suitable for connecting laptop locally and one port suitable for TCP/IP protocol for communication to DDCMIS system.
10.5	Cable Requirement for DC-HMS: In addition to all the accessories required for meeting the above requirement of DC-Health monitoring system, Suitable length & type of Cables required to establish connection between cells to HMS and HMS to DDCMIS, should be considered by bidder in their scope of supply. Distance of 200 m for Unit#1, & 100 m for Unit#2; is to be considered between Battery room and DDCMIS.
11.0	LAYOUT CONSIDERATIONS:
11.1	The Battery will be located in battery rooms on wooden rack properly treated for acid resistance for Lead Acid battery; or on steel rack with alkali-resistance powder for Ni-Cd battery. Chargers / DCDB will be located in separate room. Batteries having cell weight of 50kg or more will be arranged in single tier. Refer 'Battery room layout (Annexure-IV)' in compliance drawings for batteries located in Main power house Unit # 1 & Unit # 2.
12.0	Equipment must be safe, reliable and easy to maintain at all operating condition
13.0	Mandatory Spares : Wherever the quantities have been indicated for each type, size, thickness, material, radius, range etc., these shall cover all the items supplied and installed and the breakup for these shall be furnished in the bid. In case spares indicated in the list are not applicable to the particular design offered by the bidder, the bidder should offer spares applicable to offered design with quantities generally in line with the approach followed in the mandatory spare list

BHEL	TECHNICAL SPECIFICATION DC Lead Acid/ Ni-Cd Battery 2X660 MW NTPC TALCHER TPP STAGE-III	PE-TS-497-508-E001 Issue No: 01 Rev. No. 00 Date : 14.03.2024

TECHNICAL DATA - PART - A (LEAD ACID)			
SL.NO	**DESCRIPTION**	**UOM**	**DETAIL**
1.0	**DESIGN CODES & STANDARDS**		
1.1	Battery		a) IS:1652 b) IEC-60896-11 c) BS-6290 d) IS-8320
1.2	Battery Sizing		IEEE-485
1.3	Water and Sulfuric Acid		IS-1069 and IS-266
1.4	Separators		IS-6071
1.5	Containers		IS-1146
2.0	**DESIGN /SYSTEM PARAMETERS**		
2.1	Ambient air temperature	Deg. C	50
2.2	Min Electrolyte temperature	Deg. C	15
2.3	Rated Voltage	Volts	220V DC
2.4	No. of Cells	Nos.	107
2.5	Type of Battery		Lead Acid Plante high discharge
2.6	Nominal Voltage per Cell	Volts	2
2.7	End Cell Voltage	Volts	1.85
2.8	Tapping to be provided in battery		NO
3.0	**CONSTRUCTION FEATURES**		
3.1	MATERIAL AND TYPES OF PLATES		
3.1.1	Positive Plates		
	a) Material		99.99% Pure Lead
3.1.2	Negative Plates		
	a) Material		Lead - Antimony alloy grid
3.2	ELECTROLYTE		
3.2.1	Material		Battery Grade Sulfuric Acid
3.2.2	Recommended Specific Gravity at 27 Deg.C		
	a) At Full Charger		1.215 +/- 0.005
3.2.3	Permissible max. temperature of Electrolyte		
	a) During Initial Charging	Deg. C	50
3.3	CONTAINER		
3.3.1	Material		Transparent Styrene Acrylonitrile (SAN)

3.3.2	Type		Heat resistant, leak proof, non-absorbent, acid resistant, non-bulging type and free from flaws such as wrinkles, cracks, blisters, pinholes etc
3.3.3	Marking for Electrolyte		Upper & lower limits of Electrolyte to be marked
3.3.4	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
3.4	COVER/CELL LIDS		
3.4.1	Type of Cover		Adhesive Sealed
3.4.2	Material of Cover		Opaque Styrene Acrylonitrile (SAN) or ABS Plastic
3.4.3	Type of Sealing compound		Non-Cracking Type
3.5	VENTING DEVICE		
3.5.1	Type of Vent		Anti-Splash type with More than one exit hole to allow the gases to escape freely but prevent the acid spray from the battery
3.5.2	Material		Explosion Proof Microporous Ceramic Made
3.5.3	Other Feature		Design shall be such that the water loss due to evaporation is kept to minimum and dimensions shall be such that the syringe type hydrometer can be inserted into the vent to take electrolyte sample.
3.6	SEPARATORS		
3.6.1	Type		Sitable for continuous immersion in the electrolyte without distortion and shall maintain the electrical insulation between the plates and shall permit free flow of electrolyte
3.7	INTER CELL, INTER ROW & INTER TIER/BANK CONNECTORS		
3.7.1	Material of inter cell Connectors		Lead Plated/Coated Copper connectors
3.7.2	Material of inter row/ Bank Connectors		Flexible PVC insulated Copper cable/Connector

3.7.3	Material of Both, Nuts and Washer		Brass (Lead Coated) / Stainless Steel
3.8	BATTERY RACKS		
3.8.1	Material of Rack		Wooden rack properly treated for acid resistance
3.8.2	Arrangement of batteries on racks		Single tier for batteries having cell weight 50kg or more.
3.8.3	Antirodent and Termite properties for Wooden racks ?		YES
3.8.4	Rack Insulators Material		Porcelain/Hard rubber/ PVC Pad
3.9	CABLE CONNECTION & LUGS		
3.9.1	Cable size from terminal take-off board to Fuse/MCCB Box		1) Main plant: 2 runs of 1Cx630 sq.mm cable/ pole. 2) Offsite areas: 1 run of 1Cx630 sq.mm cable/ pole
3.9.2	Cable supply Scope		
	Cables from terminal take-off/Board to Fuse/MCCB Box		BHEL
	Internal copper cables/ Connector between battery and up to terminal take-off/Board		Bidder
3.9.3	Cable Lugs supply scope as per Cable Size		Bidder
3.9.4	Supply scope of Support Equipment/Material for termination of cable at bettery end		Bidder
3.10	MARKING/DESIGNATION ON CELL		As per IS-1652/IEC-60896-11
3.11	INSTRUCTION CARDS		
3.11.1	Information on Instruction Card		As per IS-1652/IEC-60896-11
4.0	**PERFORMANCE PARAMETERS**		
4.1			Not Applicable
5.0	**INSPECTION/TESTING**		
5.1	Type Test		Refer sl. no. 7 of 'General Technical requirements'

5.2	Routine and Acceptance Test		All acceptance and routine tests as per Quality Assurance plan (QP no. PE-QP-999-508-E002) shall be carried out. Charges for these shall be deemed to be included in the equipment price.
6.0	**TECHNICAL PARAMETERS OF DC HEALTH MONITORING SYSTEM**		
6.1	Input Power Supply		220V DC
6.2	Voltage Measurement Accuracy		0.5% or better
6.3	Current Measurement Accuracy		0.5% or better
6.4	Operating Temperature Range		$0\text{-}50^{0}$ C
6.5	Mounting		Panel mounting
6.6	IP Protection		IP42

578664/2024/PS-PEM-EL

BHEL	TECHNICAL SPECIFICATION DC Lead Acid/ Ni-Cd Battery 2X660 MW NTPC TALCHER TPP STAGE-III	PE-TS-497-508-E001 Issue No: 01 Rev. No. 00 Date : 14.03.2024

TECHNICAL DATA - PART - A (NI-CD)

SL.NO	DESCRIPTION	UOM	DETAIL
1.0	**DESIGN CODES & STANDARDS**		
1.1	Battery		a) IS:10918 b) IEC-60623 c) IS-8320
1.2	Battery Sizing		IEEE-1115
1.3	Electrolyte		IS-6831/IEC-60993
1.4	Separators		IS:10918
1.5	Containers		IS-10918
1.6	Connectors		IS-1897/IS-191
2.0	**DESIGN /SYSTEM PARAMETERS**		
2.1	Ambient air temperature	Deg. C	50
2.2	Min Electrolyte temperature	Deg. C	15
2.3	Rated Voltage	Volts	220V DC
2.4	No. of Cells	Nos.	169
2.5	Type of Battery		Ni-Cd high discharge
2.6	Nominal Voltage per Cell	Volts	1.2
2.7	End Cell Voltage	Volts	1.14
2.8	Tapping to be provided in battery		NO
3.0	**CONSTRUCTION FEATURES**		
3.1	TYPES OF PLATES		
3.1.1	Positive Plates		Pocket Plate
3.1.2	Negative Plates		Pocket Plate
3.2	ELECTROLYTE		
3.2.1	Material		Solution of LIOH/KOH in distilled water
3.2.2	Recommended Specific Gravity at 27 Deg.C		
	a) At Full Charger		1.2 +/- 0.01
3.2.3	Permissible max. temperature of Electrolyte		
	a) During Initial Charging	Deg. C	50
3.3	CONTAINER		
3.3.1	Material		Translucent Plastic-Polyproplene

3.3.2	Type		Heat resistant, leak proof, non-absorbent, alkali resistant, non-bulging type and free from flaws such as wrinkles, cracks, blisters, pinholes etc
3.3.3	Marking for Electrolyte		Upper & lower limits of Electrolyte to be marked
3.3.4	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
3.4	COVER/CELL LIDS		
3.4.1	Type of Cover		Closed/Sealed
3.4.2	Material of Cover		Polyproplene
3.4.3	Type of Sealing compound		Non-Cracking Type
3.5	VENTING DEVICE		
3.5.1	Type of Vent		Anti-Splash type with More than one exit hole to allow the gases to escape freely but prevent the alkali spray from the battery
3.5.2	Other Feature		Design shall be such that the water loss due to evaporation is kept to minimum and dimensions shall be such that the syringe type hydrometer can be inserted into the vent to take electrolyte sample.
3.6	SEPARATORS		
3.6.1	Type		Sitable for maintaining the electrical insulation between the plates and shall permit free flow of electrolyte. Separator between plates of the cells shall be porous alkali resistant and have insulating capacity to avoid shorting or leakage of current between the plates of opposite polarity
3.7	INTER CELL, INTER ROW & INTER TIER/BANK CONNECTORS		

3.7.1	Material of inter cell/ Block Connectors		Nickel Plated/Coated Copper connector
3.7.2	Material of inter row/ Bank Connectors		Flexible PVC insulated Copper cable/Connector
3.7.3	Material of Both, Nuts and Washer		Stainless Steel/Mild Steel
3.8	BATTERY RACKS		
3.8.1	Material of Rack		Mild Steel with alkali resitance.
3.8.2	Arrangement of batteries on racks		Single tier for batteries having cell weight 50kg or more.
3.8.4	Rack Insulators Material		Porcelain/Hard rubber/ PVC Pad
3.9	CABLE CONNECTION & LUGS		
3.9.1	Cable size from terminal take-off board to Fuse/MCCB Box		1) Main plant: 2 runs of 1Cx630 sq.mm cable/ pole. 2) Offsite areas: 1 run of 1Cx630 sq.mm cable/ pole
3.9.2	Cable supply Scope		
	Cables from terminal take-off/Board to Fuse/MCCB Box		BHEL
	Internal copper cables/ Connector between battery and up to terminal take-off/Board		Bidder
3.9.3	Cable Lugs supply scope as per Cable Size		Bidder
3.9.4	Supply scope of Support Equipment/Material for termination of cable at bettery end		Bidder
3.10	MARKING/DESIGNATION ON CELL		As per IS-10918/IEC-60623
3.11	INSTRUCTION CARDS		
3.11.1	Information on Instruction Card		As per IS-10918/IEC-60623
4.0	**PERFORMANCE PARAMETERS**		
4.1			Not Applicable
5.0	**INSPECTION/TESTING**		
5.1	Type Test		Refer sl. no. 7 of 'General Technical requirements'

5.2	Routine and Acceptance Test		All acceptance and routine tests as per Quality Assurance plan (QP no. PE-QP-999-508-E004) shall be carried out. Charges for these shall be deemed to be included in the equipment price.
6.0	**TECHNICAL PARAMETERS OF DC HEALTH MONITORING SYSTEM**		
6.1	Input Power Supply		220V DC
6.2	Voltage Measurement Accuracy		0.5% or better
6.3	Current Measurement Accuracy		0.5% or better
6.4	Operating Temperature Range		$0\text{-}50^{0}$ C
6.5	Mounting		Panel mounting
6.6	IP Protection		IP42

	TECHNICAL SPECIFICATION DC Lead Acid/ Ni-Cd Battery 2X660 MW NTPC TALCHER TPP STAGE-III	PE-TS-497-508-E001 Issue No: 01 Rev. No. 00 Date : 14.03.2024

TECHNICAL DATA - PART - B (SUPPLIER DATA TO BE FURNISHED AFTER AWARD OF CONTRACT)

SL.NO	DESCRIPTION	UOM	DETAIL
1.0	**GENERAL PARTICULARS**		
1.1	Make of Battery		
1.2	Type of Cell		
1.3	IS Nomenclature		
1.4	Nominal Float Voltage per Cell	Volts	
1.5	Capacity of Battery(As per Load Duty cycle, Temp correction factor & Design Margin)	AH	
1.6	No. of Battery Bank in Parallel	Nos.	
1.7	Expected life of battery under normal operation & maintenance conditions	Years	
1.8	Efficiency		
1.8.1	Ah efficiency	%	
1.8.2	Watt Hr efficiency	%	
1.9	Storage		
1.9.1	Recommended Max. period of cell storage before the first Charge (After Installation and filling of Electrolyte)	Hrs.	
1.9.2	Recommended Storage life of Battery (Dry shelf life)	Years	
1.10	Ventilation Requirements		
1.10.1	Gas generation per single cell per hour	Litre	
1.10.2	Gas generation for 1 set battery	Litre	
1.10.3	No. of air exchanges required per hour	cubic mt./hour	
1.11	Resistance of Battery		
1.11.1	Internal resistance of Each Cell at fully charged condition	m-ohms	
1.11.2	Internal resistance of Each Cell at fully discharged condition	m-ohms	
1.11.3	Internal resistance of Each Battery at fully charged condition	m-ohms	
1.11.4	Internal resistance of Each Battery at fully discharged condition	m-ohms	
1.12	Short Circuit Current		
1.12.1	At Battery terminal during float charging	kA	
1.12.2	At Battery terminal during boost charging	kA	
1.12.3	Time for which battery can withstand short circuit at terminals	Sec	

2.0	**BATTERY CAPACITY AND DISCHARGE CURRENT**		
2.1	Declared Capacity at 27 deg. C upto ECV		
	Initial	AH	
	Rated	AH	
	End of Life	AH	
2.2	Battery Discharge Current at various duration at ECV		
	5 Minute	Amps	
	30 Minute	Amps	
	1 Hr.	Amps	
	10 Hr.	Amps	
2.3	Loss in capacity in 28 days due to self-discharge	%	
3.0	**RECOMMENDED CHARGING RATE FOR**		
3.1	Float Charging		
	Limit Current	Amps	
	Voltage per cell	Volts	
3.2	Boost Charging		
	Starting Current	Amps	
	Finishing current	Amps	
	Voltage	Volts	
3.3	Trickle Charging		
	Minimum	mA	
	Maximum	mA	
3.4	Equalising Charge		
	Voltage	Volts	
	Current	Amps	
	Duration	Hrs	
	Interval between successive equalising charge	Months	
4.0	**CONSTRUCTION FEATURES**		
4.1	MATERIAL AND TYPES OF PLATES		
4.1.1	Positive Plates		
	a) Height of Positive Plate	mm	
	b) Thickness of Positive Plate	mm	
	c) No. of Positive Plates	Nos.	
4.1.2	Negative Plates		
	a) Height of Negative Plate	mm	
	b) Thickness of Negative Plate	mm	

	c) No. of Negative Plates	Nos.	
4.1.3	Clearance between bottom of the plate and the bottom of the container	mm	
4.1.4	Clearance between top of the plate and top of the container	mm	
4.2	ELECTROLYTE		
4.2.1	Recommended Specific Gravity at 27 Deg.C		
	a) For First Filling		
	b) At Full Charger		
	c) When Battery is discharged at 10 hours rate		
4.2.2	Permissible max. temperature of Electrolyte		
	a) Permissible max. temperature of Electrolyte	Deg. C	
4.2.3	Quantity of Electrolyte per cell	Litre	
4.2.4	Quantity of Electrolyte for battery (Including 10% extra)	Litre	
4.3	CONTAINER		
4.3.1	Thickness	mm	
4.3	SEPARATORS		
4.3.1	Material		
4.3.2	Thickness	mm	
4.4	INTER CELL, INTER ROW & INTER TIER/BANK CONNECTORS		
4.4.1	Thickness of Inter-Cell Connectors	mm	
4.4.2	Thickness of Inter-Row Connectors	mm	
4.4.3	Thickness of Inter-Tier/Bank Connectors	mm	
4.5	BATTERY RACKS		
4.5.1	No. of racks per battery	Nos.	
4.5.2	No. pf cells on each rack	Nos.	
4.5.3	Dimensions of the racks	LXWXH (mm)	
4.6	OVERALL DIMENSION		
4.6.1	Each Cell	LXWXH (mm)	
4.6.2	Battery Set	LXWXH (mm)	
4.6.3	Distance Between Cell centres	mm	
4.7	WEIGHTS		
4.7.1	Each Cell		
	a) Without Acid/ Electrolyte	Kgs.	
	b) With Acid/ Electrolyte	Kgs.	
4.7.2	Complete 1 Set of Battery		
	a) Without Acid/ Electrolyte	Kgs.	
	b) With Acid/ Electrolyte	Kgs.	

बी एच ई एल BHEL	TECHNICAL SPECIFICATION DC Lead Acid/ Ni-Cd Battery 2X660 MW NTPC TALCHER TPP STAGE-III	PE-TS-497-508-E001 Issue No: 01 Rev. No. 00 Date : 14.03.2024

COMPLIANCE DRAWINGS

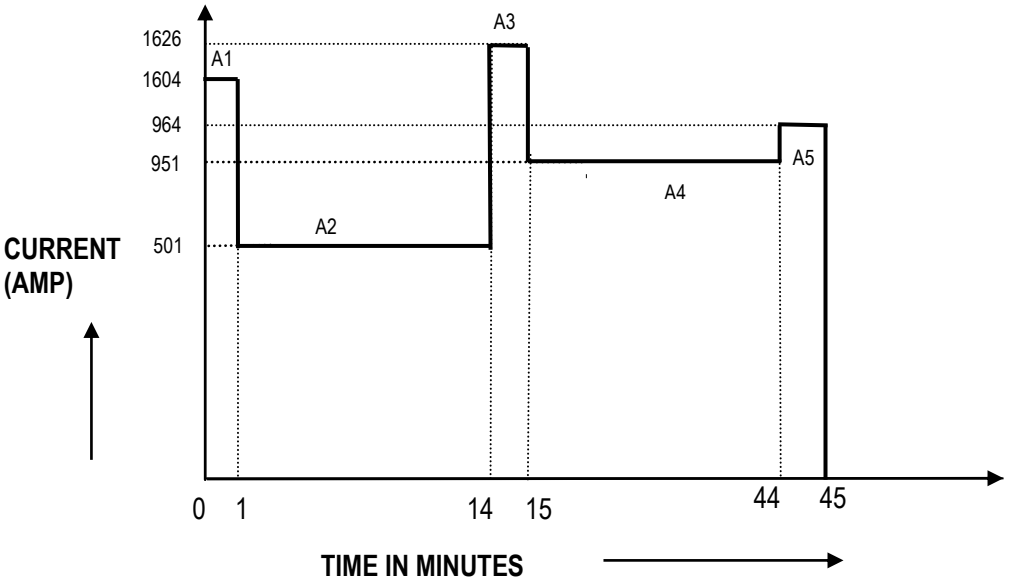
	TECHNICAL SPECIFICATION DC Lead Acid/ Ni-Cd Battery 2X660 MW NTPC TALCHER TPP STAGE-III	PE-TS-497-508-E001 Issue No: 01 Rev. No. 00 Date : 14.03.2024

LOAD DUTY CYCLE

TECHNICAL SPECIFICATION DC Lead Acid/ Ni-Cd Battery 2X660 MW NTPC TALCHER TPP STAGE-III	PE-TS-497-508-E001
	Issue No: 01
	Rev. No. 00
	Date: 01.03.2024

ANNEXURE-I

1. LOAD DUTY CYCLE OF MAIN PLANT (Battery 1, Area 1)



FACTORS TO BE CONSIDERED FOR BATTERY SIZING:

1. AGEING FACTOR : 1.25
2. MIN.ELECTROLYTIC TEMP. : 15 ˚C
3. END CELL VOLTAGE : 1.85V (for Lead-Acid Plante) & 1.14V (for Ni-Cd) PER CELL.
4. TEMPERATURE CORRECTION FACTOR : As per manufacturer's data for Ni-cd; for lead acid refer note (ii)

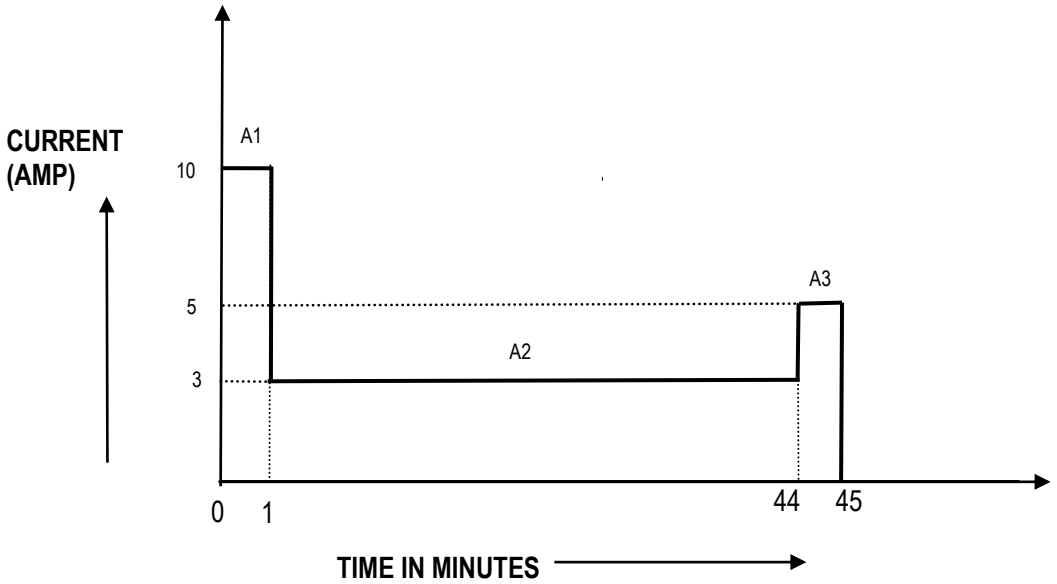
Note:

i) Bidder has to take ageing factor (margin) in their battery sizing calculation for Ni-CD battery/ LEAD Acid Battery. No deviation is acceptable on ageing factor.

ii) Supporting calculation for temp correction factor as per IEEE 485 shall be furnished for batteries which are not designed at 25˚ C.

TECHNICAL SPECIFICATION DC Lead Acid/ Ni-Cd Battery 2X660 MW NTPC TALCHER TPP STAGE-III	PE-TS-497-508-E001
	Issue No: 01
	Rev. No. 00
	Date: 01.03.2024

2. LOAD DUTY CYCLE OF RAW WATER INTAKE PLANT (Battery 2, Area 2)



FACTORS TO BE CONSIDERED FOR BATTERY SIZING:

1. AGEING FACTOR : 1.25
2. MIN.ELECTROLYTIC TEMP. : 15 ˚C
3. END CELL VOLTAGE : 1.85V (for Lead-Acid Plante) & 1.14V (for Ni-Cd) PER CELL.
4. TEMPERATURE CORRECTION FACTOR : As per manufacturer's data for Ni-cd; for lead acid refer note (ii)

Note:

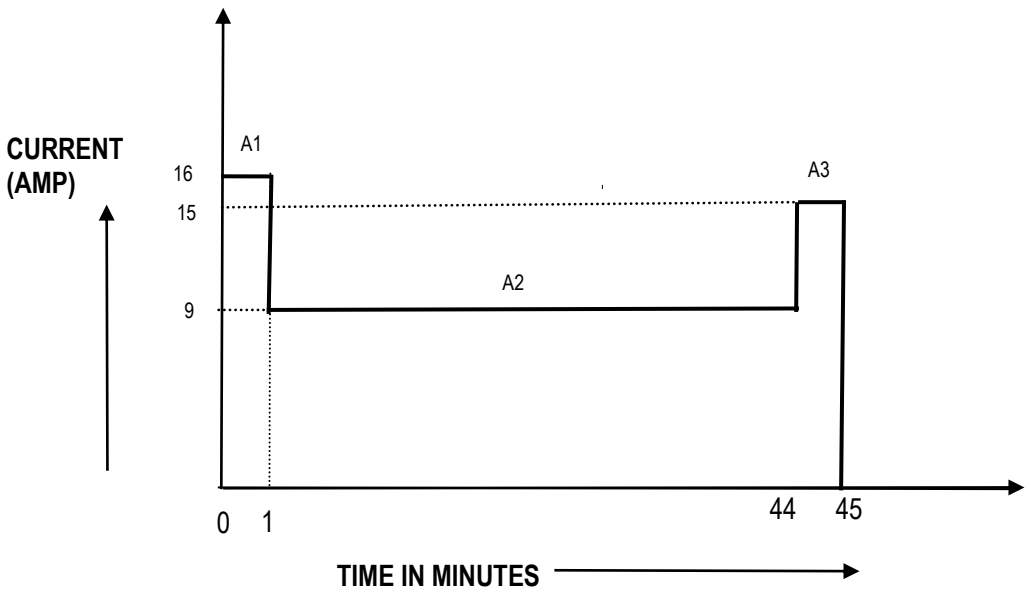
i) Bidder has to take ageing factor (margin) in their battery sizing calculation for Ni-CD battery/ LEAD Acid Battery. No deviation is acceptable on ageing factor.

ii) Supporting calculation for temp correction factor as per IEEE 485 shall be furnished for batteries which are not designed at 25˚ C.

iii) Minimum AH rating of Battery: 150AH for Lead acid plante type / 90 AH for Ni-Cd high discharge pocket plate type battery.

TECHNICAL SPECIFICATION DC Lead Acid/ Ni-Cd Battery 2X660 MW NTPC TALCHER TPP STAGE-III	PE-TS-497-508-E001
	Issue No: 01
	Rev. No. 00
	Date: 01.03.2024

3. LOAD DUTY CYCLE OF WATER SYSTEM (Battery 2, Area 3)



FACTORS TO BE CONSIDERED FOR BATTERY SIZING:

1. AGEING FACTOR : 1.25
2. MIN.ELECTROLYTIC TEMP. : 15 ˚C
3. END CELL VOLTAGE : 1.85V (for Lead-Acid Plante) & 1.14V (for Ni-Cd) PER CELL.
4. TEMPERATURE CORRECTION FACTOR : As per manufacturer's data for Ni-cd; for lead acid refer note (ii)

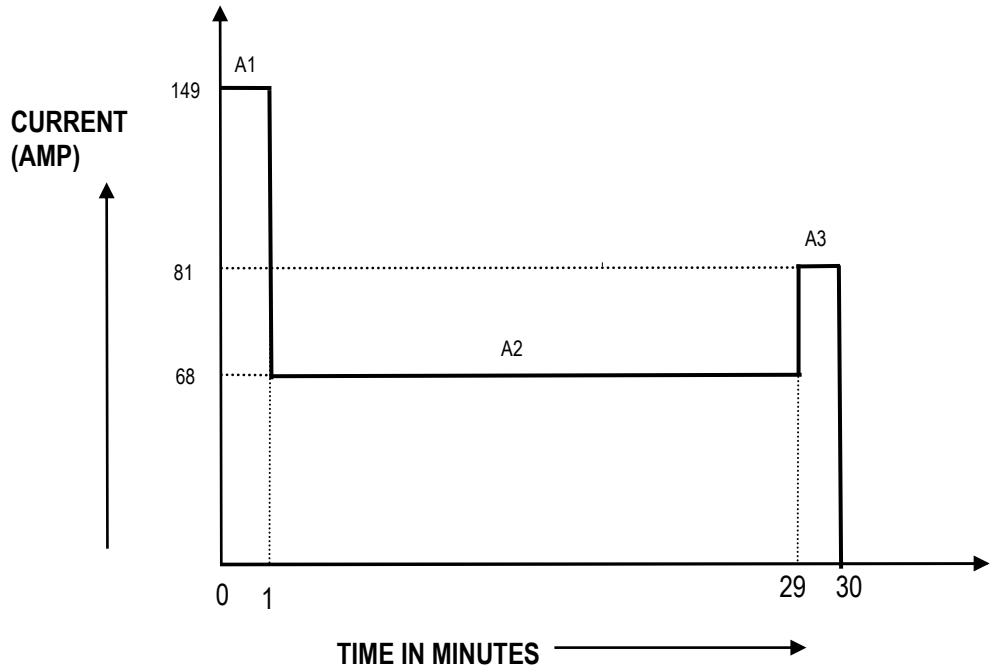
Note:

i) Bidder has to take ageing factor (margin) in their battery sizing calculation for Ni-CD battery/ LEAD Acid Battery. No deviation is acceptable on ageing factor.

ii) Supporting calculation for temp correction factor as per IEEE 485 shall be furnished for batteries which are not designed at 25˚ C.

iii) Minimum AH rating of Battery: 150AH for Lead acid plante type / 90 AH for Ni-Cd high discharge pocket plate type battery.

4. LOAD DUTY CYCLE OF AHP MCC ROOM CATERING AHP & COMMON FGD LOADS (Battery 3, Area 4)



FACTORS TO BE CONSIDERED FOR BATTERY SIZING:

1. AGEING FACTOR : 1.25
2. MIN.ELECTROLYTIC TEMP. : 15 ˚C
3. END CELL VOLTAGE : 1.85V (for Lead-Acid Plante) & 1.14V (for Ni-Cd) PER CELL.
4. TEMPERATURE CORRECTION FACTOR : As per manufacturer's data for Ni-cd; for lead acid refer note (ii)

Note:

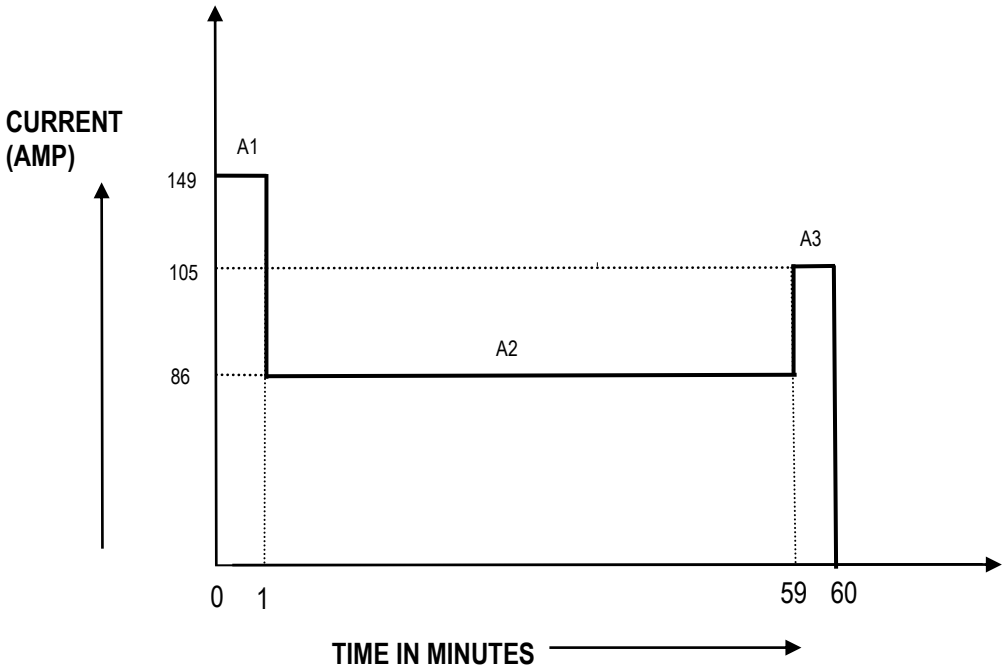
i) Bidder has to take ageing factor (margin) in their battery sizing calculation for Ni-CD battery/ LEAD Acid Battery. No deviation is acceptable on ageing factor.

ii) Supporting calculation for temp correction factor as per IEEE 485 shall be furnished for batteries which are not designed at 25˚ C.

iii) Minimum AH rating of Battery: 150AH for Lead acid plante type / 90 AH for Ni-Cd high discharge pocket plate type battery.

TECHNICAL SPECIFICATION DC Lead Acid/ Ni-Cd Battery 2X660 MW NTPC TALCHER TPP STAGE-III	PE-TS-497-508-E001
	Issue No: 01
	Rev. No. 00
	Date: 01.03.2024

5.0 LOAD DUTY CYCLE OF CHP MCC ROOM CATERING CHP, LHP, GHP/CSSP LOADS (Battery 3, Area 5)



FACTORS TO BE CONSIDERED FOR BATTERY SIZING:

1. AGEING FACTOR : 1.25
2. MIN.ELECTROLYTIC TEMP. : 15 ˚C
3. END CELL VOLTAGE : 1.85V (for Lead-Acid Plante) & 1.14V (for Ni-Cd) PER CELL.
4. TEMPERATURE CORRECTION FACTOR : As per manufacturer's data for Ni-cd; for lead acid refer note (ii)

Note:

i) Bidder has to take ageing factor (margin) in their battery sizing calculation for Ni-CD battery/ LEAD Acid Battery. No deviation is acceptable on ageing factor.

ii) Supporting calculation for temp correction factor as per IEEE 485 shall be furnished for batteries which are not designed at 25˚ C.

iii) Minimum AH rating of Battery: 150AH for Lead acid plante type / 90 AH for Ni-Cd high discharge pocket plate type battery.

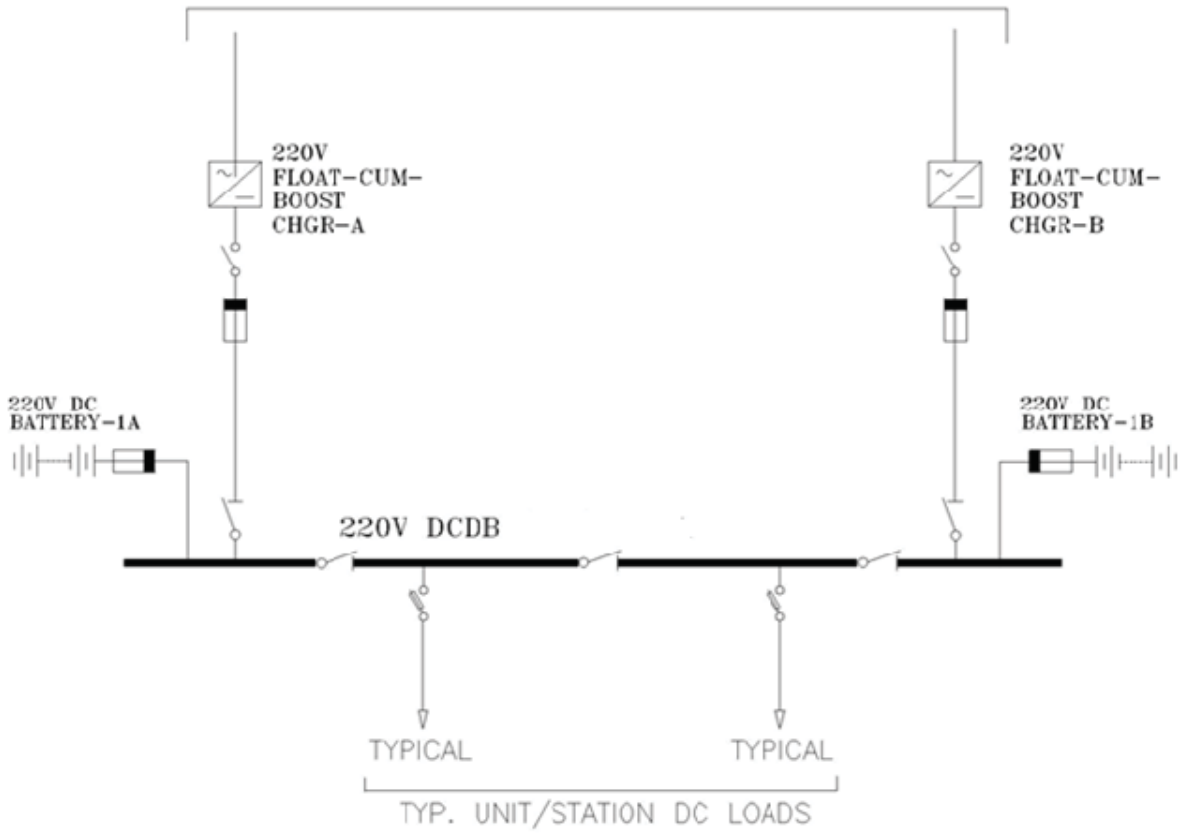
	TECHNICAL SPECIFICATION DC Lead Acid/ Ni-Cd Battery 2X660 MW NTPC TALCHER TPP STAGE-III	PE-TS-497-508-E001 Issue No: 01 Rev. No. 00 Date : 14.03.2024

CONNECTION DIAGRAM OF BATTERY, DCDB, CHARGER

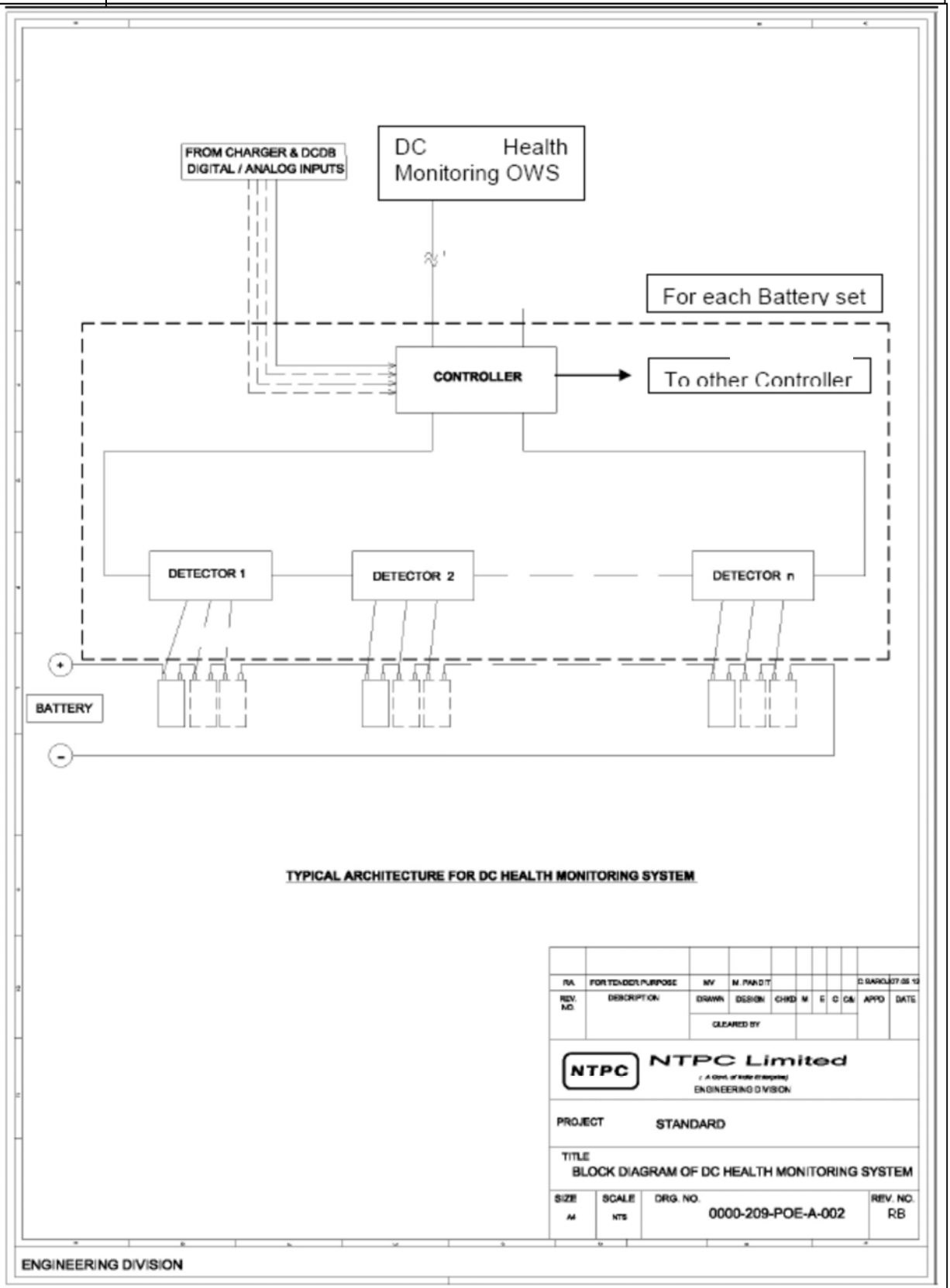
	TECHNICAL SPECIFICATION DC Lead Acid/ Ni-Cd Battery 2X660 MW NTPC TALCHER TPP STAGE-III	PE-TS-497-508-E001
		Issue No: 01
		Rev. No. 00
		Date: 01.03.2024

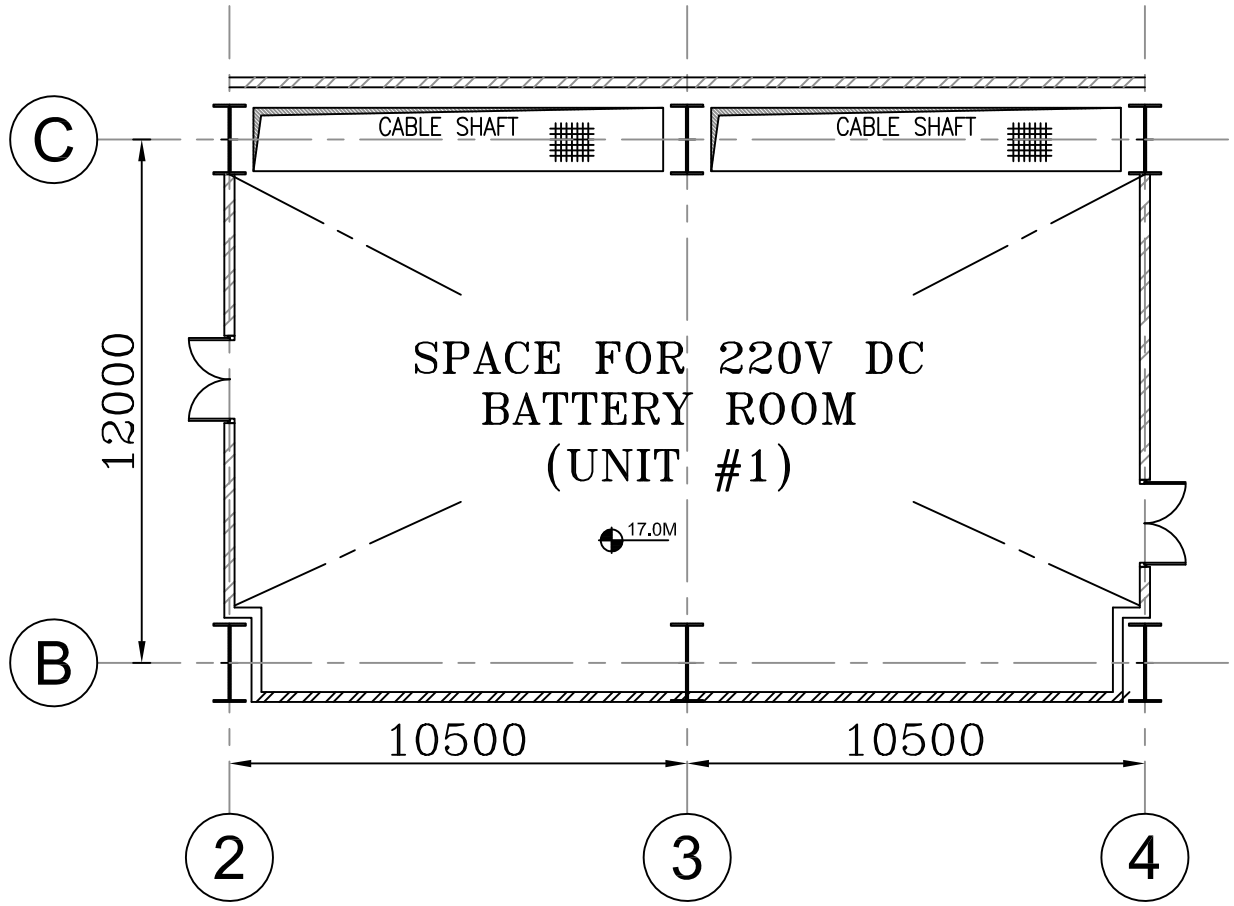
ANNEXURE-II

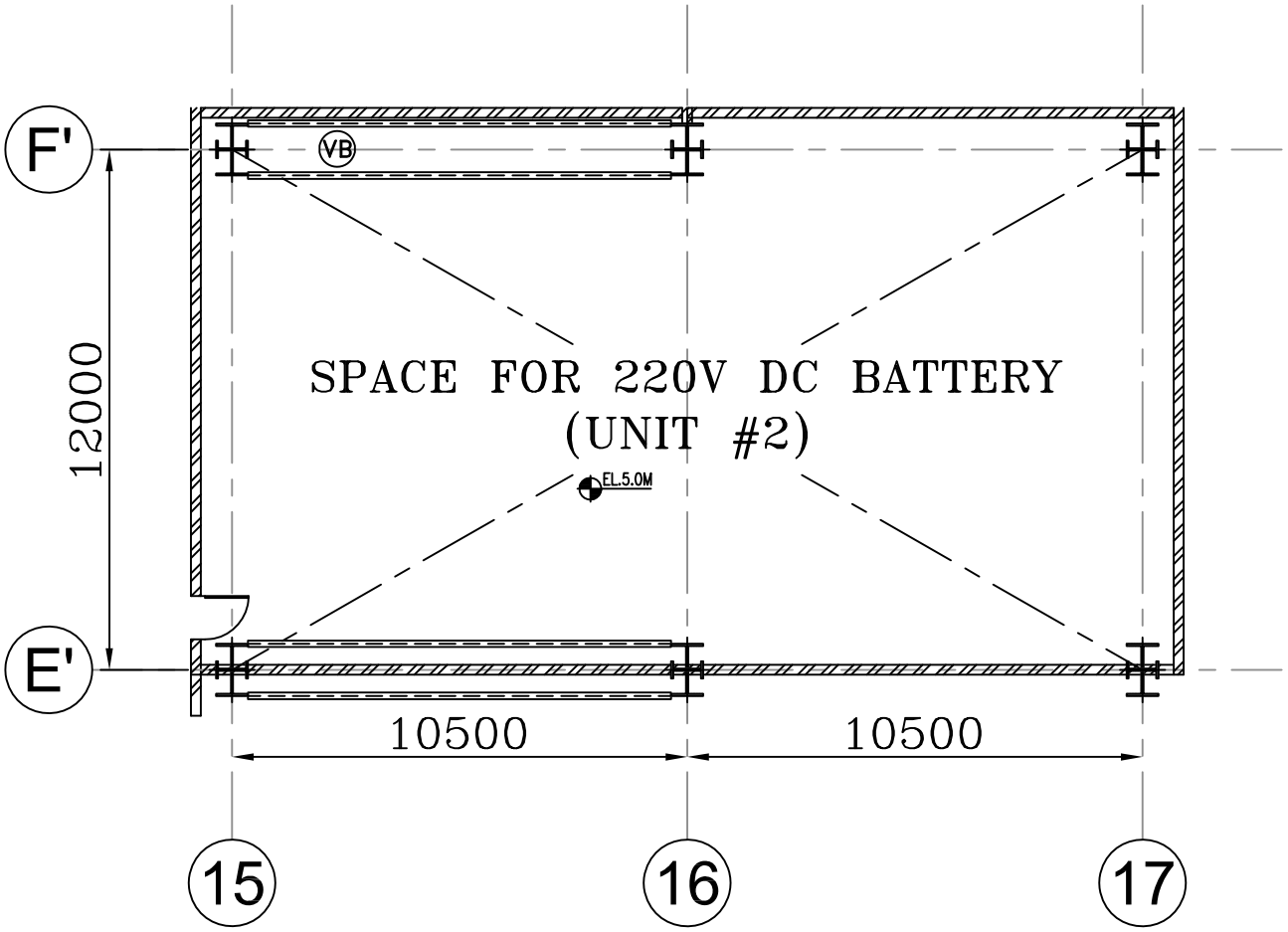
SINGE LINE DIAGRAM FOR 220V DC SYSTEM



CLAUSE NO.	TECHNICAL REQUIREMENTS




C
B
CABLE SHAFT
CABLE SHAFT
SPACE FOR 220V DC
BATTERY ROOM
(UNIT #1)
17.0M
12000
10500
10500
2
3
4


F'
E'
VB
SPACE FOR 220V DC BATTERY
(UNIT #2)
EL.5.0M
12000
10500
10500
15
16
17

QUALITY PLAN

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	QUALITY PLAN			SPEC NO.:-PE-TS-XXX-508-E001	DATE:-
	CUSTOMER			QP NO.:-PE-QP-999-508-E002, REV.02	DATE:- 27/02/2024
	PROJECT			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	2	3	4	5	6		7	8	9	D *	10			11
					M	B/C					**			
											M	B	C	
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	V	
1.2	**SEPARATOR**													
a)	Chemical	Chemical	MA	Chemical	Random Sample	-	(For Synthetic IS : 6071)	(For Synthetic IS : 6071)	-do-	√	P	V	-	
b)	Electrical Resistance Test	Electrical	MA	Electrical	Random Sample	-	-do-	-do-	-do-	√	P	V	-	
c)	Acceptance test Dimension, Volume Porosity, Wettability of separator	Test	MA	Test	Random Sample	-	-do-	-do-	-do-	√	P	V	-	
1.3	**CONNECTOR**													
a)	Dimension	Dimension	MA	Measurement	Random Sample	-	IS:1652 & Appd. Drg./Doc.	IS:1652 & Appd. Drg./Doc.	Test Cert.	√	P	V	V	
b)	Thickness of lead coating	Thickness	CR	Measurement	Random Sample	-	-do-	-do-	-do-	√	P	V	V	
1.4	**VENT CAP**													
a)	Dimensional Conformance	Dimension	MA	Measurement	Random Sample	-	IS:1652 & Appd. Drg./Doc. Also Refer Remarks#	IS:1652 & Appd. Drg./Doc. Also Refer Remarks#	Test Cert.	√	P	V	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.*
1.5	**CONTAINER**													
a)	Verification Constructional requirement	Visual	MA	Visual	Sample Plan as per IS:1146	-	IS:1652, IS:1146, IS:8320	IS:1652, IS:1146, IS:8320	Test Cert.	√	P	V	-	

BHEL						BIDDER/SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGGINEERING			QUALITY			Sign & Date		Doc No.			
	Sign & Date	Name		Sign & Date	Name				Sign & Date	Name	Seal
Prepared By	KANHAIYA KUMAR	Kanhaiya Kumar	Prepared By	Kundan Prasad	Kundan Prasad	Seal		Reviewed By			
Checked By	Ayan Saha	Ayan Saha	Checked By	Harish Kumar	Harish Kumar			Checked By			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	QUALITY PLAN			SPEC NO.:-PE-TS-XXX-508-E001	DATE:-
	CUSTOMER			QP NO.:-PE-QP-999-508-E002, REV.02	DATE:- 27/02/2024
	PROJECT			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	2	3	4	5	6		7	8	9	D *	10			11
					M	B/C					**			
											M	B	C	
b)	Verification of Markings	Visual	MA	Visual	-do-	-	-do-	-do-	-do-	√	P	V	-	
c)	High Voltage Test	Electrical	MA	Electrical	-do-	-	-do-	-do-	-do-	√	P	V	-	
d)	Drops Ball Test	Mechanical	MA	Mechanical	-do-	-	-do-	-do-	-do-	√	P	V	-	
e)	Plastic Yield Test	Mechanical	MA	Mechanical	-do-	-	-do-	-do-	-do-	√	P	V	-	
f)	Acid Resistance Test	Chemical	MA	Chemical	-do-	-	-do-	-do-	-do-	√	P	V	-	
g)	Hydraulic thrust enduarnce test	Physical	MA	Physical	-do-	-	-do-	-do-	-do-	√	P	V	-	
2.0	**FINISHED BATTERY**	Routine Test	CR	Electrical & Measurement	100%	100%	IS:1652 & IS:8320	IS:1652 & IS:8320	Inspection Report	√	P	V	V	
	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	Sample as per IS: 8320/IS:1652	IS:1652	IS:1652	Inspection Report	√	P	W	W	
b)	Verification of Markings	Visual	MA	Visual	-do-	-do-	-do-	-do-	-do-	√	P	W	W	
c)	Verification of Dimensions	Dimension	MA	Measurement	-do-	-do-	-do-	-do-	-do-	√	P	W	W	
d)	Test for Capacity & Voltage during discharge	Test	CR	Electrical & Measurement	-do-	-do-	-do-	-do-	Type Test report	√	P	V	V	
e)	AH & WH efficiency Test	-do-	CR	Electrical & Measurement	-do-	-do-	-do-	-do-	-do-	√	P	V	V	*# # 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 'B' and 'C' of AGENCY(10) Above.*
f)	Test for loss of capacity on storage	-do-	CR	Electrical & Measurement	-do-	-do-	-do-	-do-	-do-	√	P	V	V	
g)	Endurance Test	-do-	CR	Electrical & Measurement	-do-	-do-	-do-	-do-	-do-	√	P	V	V	
h)	Loss of water test	-do-	CR	Electrical & Measurement	-do-	-do-	-do-	-do-	-do-	√	P	V	V	
i)	Test for suitability for Floating Battery Operation	-do-	CR	Electrical & Measurement	-do-	-do-	-do-	-do-	-do-	√	P	V	V	
j)	Internal Resistance and Short Circuit Test	-do-	CR	Electrical & Measurement	-do-	-do-	-do-	-do-	-do-	√	P	V	V	

BHEL						BIDDER/SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGGINEERING			QUALITY			Sign & Date		Doc No.			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared By	KANHAIYA KUMAR	Kanhaiya Kumar	Prepared By	Kundan Prasad	Kundan Prasad			Reviewed By			
Checked By	Ayan Saha	Ayan Saha	Checked By	Harish Kumar	Harish Kumar			Checked By			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	QUALITY PLAN			SPEC NO.:-PE-TS-XXX-508-E001	DATE:-
	CUSTOMER			QP NO.:-PE-QP-999-508-E002, REV.02	DATE:- 27/02/2024
	PROJECT			P.O NO.:-	DATE:-
	ITEM:- LEAD ACID BATTERY		SYSTEM:- DC SYSTEM	SECTION:-	SHEET 3 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	2	3	4	5	6		7	8	9	D *	10			11
					M	B/C					**			
											M	B	C	
3.2	**Acceptance Test**													
a)	Verification of Markings	Visual	MA	Visual	Sample Plan as per IS: 8320	Sample Plan as per IS: 8320	IS:1652	IS:1652	Inspection Report	√	P	W	W	
b)	Verification of Dimensions	Dimension	MA	Measurement	-do-	-do-	-do-	-do-	-do-	√	P	W	W	
c)	Test for Capacity	Capacity	CR	Electrical & Measurement	-do-	-do-	-do-	-do-	-do-	√	P	W	W	
d)	Test for Voltage during discharge	Voltage during discharge	CR	Electrical & Measurement	-do-	-do-	-do-	-do-	-do-	√	P	W	W	
4.0	**Battery Racks**	Visual & Dimension	MA	Visual & Dimension	1 Sample	1 Sample	Approved drg/ doc	Approved drg/ doc	-do-	√	P	W	V	
5.0	**Accessories**	Visual & Dimension	MA	Visual & Dimension	100%	100%	Approved drg/ doc	Approved drg/ doc	-do-	√	P	W	-	
6.0	**Cable Lugs and Terminal Plate**	Visual	MA	Visual	100%	100%	Approved drg/ doc	Approved drg/ doc	-do-	√	P	W	-	
7.0	**Packing**	Verification of Packing Methods, Finish & Completeness	MA	Visual	100%	100%	Approved drg/ doc/ As Per Manufacturer Std./ Approved Packing drg/ doc($$)	Approved drg/ doc/ As Per Manufacturer Std./ Approved Packing drg/ doc($$)	-do-	√	P	W	-	($$)- Approved Packing Drg./ Doc Applicable for Export Job/Projects

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. Latest revision/year of issue of all the IS/IEC standard indicated in QAP shall be reffered.

LEGEND :-

* RECORDS, INDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION,

** **M**: SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, **B**: MAIN SUPPLIER/ BHEL/ THIRD PARTY INSPECTION AGENCY, **C**: CUSTOMER

P: PERFORM, **W**: WITNESS, **V**: VERIFICATION, AS APPROPRIATE

MA: MAJOR, **MI**: MINOR, **CR**: CRITICAL, **D**: DOCUMENTATION

BHEL						BIDDER/SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGGINEERING			QUALITY			Sign & Date		Doc No.			
	Sign & Date	Name		Sign & Date	Name				Sign & Date	Name	Seal
Prepared By	KANHAIYA KUMAR	Kanhaiya Kumar	Prepared By	Kundan Prasad	Kundan Prasad	Seal		Reviewed By			
Checked By	Ayan Saha	Ayan Saha	Checked By	Harish Kumar	Harish Kumar			Checked By			

ANNEXURE-A

QUALITY PLAN
STANDARD QP NO. : PE-QP-999-508-E002, REV.02

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	NO	*YES
		• AH & WH efficiency Test	IS:1652	NO	*YES
		• Test for loss of capacity on storage (Retension of Charge)	IS:1652	NO	*YES
		• Endurance Test	IS:1652	NO	*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

06.06.2022

NOTES: (*)
1) Type test reports to be submitted which should be carried out within last **7** years from the date of techno commercial bid opening

2) All equipment to be supplied shall be of type tested design. During detail engineering, the contractor shall submit for Owner's approval the reports of all the type tests as listed in this specification and carried out within last **7** years from the indicated date. These reports should be for the test conducted on the equipment similar to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client.
3) However, if the contractor is not able to submit report of the type test(s) conducted within last **7** years from the indicated date, or in the case of type test report(s) are not found to be meeting the specification requirements, the contractor shall conduct all such tests under this contract at no additional cost to the owner either at third party lab or in presence of client/owners representative and submit the reports for approval.

and time implication

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN			SPEC NO.:-PE-TS-XXX-508-E001	DATE:-
	CUSTOMER			QP NO.:-PE-QP-999-508-E004, REV.03	DATE:-27/02/2024
	PROJECT			P.O NO.:-	DATE:-
	ITEM:- DC NI-CD BATTERY		SYSTEM:- DC SYSTEM	SECTION:-	SHEET 1 OF 4

SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTIC CHECK	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	D *	AGENCY			REMARKS
1	2	3	4	5	6		7	8	9		10			11
					M	B/C					**			
											M	B	C	
1.0	RAW MATERIALS & BOUGHT OUT ITEMS													
1.1	CELL CONTAINER													
a)	Dimensional & Constructional Conformance	Visual	MA	Measurement	Sampling as per IS-2500(1)-2000, S-3 Level	-	IS-10918/ Manufacturer's Drg./ Std.	IS-10918/ Manufacturer's Drg./ Std.	Inspection Report	√	P	V	-	
b)	Ball Drop Test	Mechanical	MA	Mechanical	1 Sample/Batch	-	IS-1146/ Manufacturer's Drg./ Std.	IS-1146/ Manufacturer's Drg./ Std.	Manufacturer's TC	√	P	V	-	
c)	Hydraulic Thrust Endurance Test	Physical	MA	Physical	1 Sample/Batch	-	-do-	-do-	-do-	√	P	V	-	
d)	Resistance to Alkali	Chemical	MA	Chemical	1 Sample/Batch	-	-do-	-do-	-do-	√	P	V	-	
e)	HV Test	Electrical	MA	Electrical	3 Sample/Batch	-	-do-	-do-	-do-	√	P	V	-	
f)	Shade Difference, Straightness of Side Walls, Free from Burrs, Flash lines etc.	Visual	MA	Visual	100%	-	-	Free From Visual Defects	Inspection Report		P	-	-	
1.2	CONNECTOR													
a)	Material Conformance	Chemical	CR	Chemical	1 Sample/Batch	-	As per IS-1897/ IS-191	As per IS-1897/ IS-191	Manufacturer's TC	√	V	V	V	External Report
b)	Dimensional Conformance	Visual	MA	Measurement	Sampling as per IS-2500(1)-2000, 2.5%AQL	-	Approved drg/ doc & Manufacturer's Std.	Approved drg/ doc & Manufacturer's Std.	Inspection Report	√	P	V	V	
c)	Visual Defects	Visual	MA	Visual	100%	-	-	Free From Visual Defects & Burrs	-do-	√	P	V	V	
d)	Plating Quality (Duplex)	Physical/ Visual	CR	Visual & Thickness	Sampling as per IS-2500(1)-2000, S-3 Level	-	Manufacturer's Drg./ Std.	Manufacturer's Drg./ Std.	Manufacturer's TC	√	P	V	V	External Report
1.3	SEPARATOR													
a)	Dimensional Conformance	Visual	MA	Measurement	Sampling as per IS-2500(1)-2000, S-3 Level	-	IS-10918/ Manufacturer's Drg./ Std.	IS-10918/ Manufacturer's Drg./ Std.	Inspection Report	√	P	V	-	

BHEL						BIDDER/SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGGINEERING			QUALITY			Sign & Date		Doc No.			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared By	KANHAIYA KUMAR	Kanhaiya Kumar	Prepared By	Kundan Prasad	Kundan Prasad			Reviewed By			
Checked By	Ayan Saha	Ayan Saha	Checked By	Harish Kumar	Harish Kumar			Checked By			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN			SPEC NO.:-PE-TS-XXX-508-E001	DATE:-
	CUSTOMER			QP NO.:-PE-QP-999-508-E004, REV.03	DATE:-27/02/2024
	PROJECT			P.O NO.:-	DATE:-
	ITEM:- DC NI-CD BATTERY		SYSTEM:- DC SYSTEM	SECTION:-	SHEET 2 OF 4

SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTIC CHECK	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	D *	AGENCY **			REMARKS
					M	B/C					M	B	C	
1	2	3	4	5	6		7	8	9		10			11
b)	Colour shade difference, burrs, flash at the edge	Visual	MA	Visual	Sampling as per IS-2500(1)-2000, S-3 Level	-	-	Free From Visual Defects	-do-		P	-	-	
1.4	**VENT CAPS**													
a)	Dimensional Conformance	Visual	MA	Visual & Measurement	Sampling as per IS-2500(1)-2000, S-3 Level	-	-	Refer Remarks#	Inspection Report	√	P	V	V	*# Vent cap shall be easily removed for topping up the cells and of such dimensions that the syringe type hydrometer can be inserted into vent to take electrolyte sample.*
1.5	**RUBBER COMPONENTS (GASKETS & SEALING RING ETC)**													
a)	Material Quality	Physical	CR	Shore Hardness	1 Sample/Lot	-	Manufacturer's Drg./ Std.	Manufacturer's Drg./ Std.	Inspection Report	√	P	V	-	
b)	Resistance to alkali & oil	Chemical	MA	Chemical	3 Sample/Lot	-	-do-	-do-	Manufacturer's TC	√	P	V	-	External Report
c)	Dimensional Conformance	Visual	MA	Measurement	Sampling as per IS-2500(1)-2000, S-3 Level	-	-do-	-do-	Inspection Report	√	P	V	-	
d)	Flash or burrs	Visual	MA	Visual	100%	-	-	Free from Defects	-do-		P	-	-	
2.0	**FINISHED BATTERY**													
	Note: Before Start of Inspection, Manufacturer Internal Inspection Record(QC) of the offered Batteries to be Verified													
2.1	**ROUTINE TEST**													
a)	Physical Examination	Visual	MA	Visual	Sampling as per IS-8320	Sampling as per IS-8320	IS:10918 & IS:8320	IS:10918 & Approved drg/ doc	Inspection Report	√	P	V	V	
b)	Dimension, Mass and Layout	Dimension & Visual	MA	Measurement & Visual	-do-	-do-	Approved drg/ doc	-do-	-do-	√	P	V	V	

BHEL						BIDDER/SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGGINEERING			QUALITY			Sign & Date		Doc No.			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared By	KANHAIYA KUMAR	Kanhaiya Kumar	Prepared By	Kundan Prasad	Kundan Prasad			Reviewed By			
Checked By	Ayan Saha	Ayan Saha	Checked By	Harish Kumar	Harish Kumar			Checked By			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC NO.:-PE-TS-XXX-508-E001	DATE:-
	CUSTOMER		QP NO.:-PE-QP-999-508-E004, REV.03	DATE:-27/02/2024
	PROJECT		P.O NO.:-	DATE:-
	ITEM:- DC NI-CD BATTERY	SYSTEM:- DC SYSTEM	SECTION:-	SHEET 3 OF 4

SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTIC CHECK	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	D *	10			11
					M	B/C					**			
											M	B	C	
c)	Cell Marking	Visual	MA	Visual	100%	100%	-do-	-do-	-do-	√	P	V	V	
d)	Polarity & Absence of Short Circuit	Electrical	MA	Electrical	100%	100%	IS:10918	-do-	-do-	√	P	V	V	By Voltage Meas. accordingly to Polarity
2.2	**TYPE TEST ##**													
a)	Physical Examination	Visual	MA	Visual	Sampling as per IS-8320/IS-10918	Sampling as per IS-8320/IS-10918	IS:10918 & Approved drg/ doc	IS:10918 & Approved drg/ doc	Type Test Report	√	P	W	W	
b)	Dimensions, Mass & Layout	Dimension & Visual	MA	Measurement & Visual	-do-	-do-	-do-	-do-	-do-	√	P	W	W	
c)	Cell Marking	Visual	MA	Visual	-do-	-do-	-do-	-do-	-do-	√	P	W	W	
d)	Polarity & absence of short circuit	Electrical	MA	Electrical	-do-	-do-	-do-	-do-	-do-	√	P	W	W	By Voltage Meas. accordingly to Polarity
e)	Air pressure test	Visual	MA	Meas. of Pr. Drop in 15 Sec	-do-	-	-do-	-do-	-do-	√	P	V	V	*# # Conduction of Type Tests from S.No. (e) to (l) 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 'B' and 'C' of AGENCY(10) Above*
f)	Insulation Resistance	Electrical	MA	Electrical & Measurement	-do-	-	-do-	-do-	-do-	√	P	V	V	
g)	Ampere-hour capacity	Electrical	CR	Electrical & Measurement	-do-	-	-do-	-do-	-do-	√	P	V	V	
h)	Retention of Charge	Electrical	CR	Electrical & Measurement	-do-	-	-do-	-do-	-do-	√	P	V	V	
i)	Test for discharge performance at low temp.	Electrical	CR	Electrical & Measurement	-do-	-	-do-	-do-	-do-	√	P	V	V	
j)	Life Cycle Test	Electrical	CR	Electrical & Measurement	-do-	-	-do-	-do-	-do-	√	P	V	V	
k)	Dielectric Test	Electrical	CR	Electrical & Measurement	-do-	-	-do-	-do-	-do-	√	P	V	V	
l)	Storage Test	Electrical	CR	Electrical & Measurement	-do-	-	-do-	-do-	-do-	√	P	V	V	

BHEL						BIDDER/SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGGINEERING			QUALITY			Sign & Date		Doc No.			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared By	KANHAIYA KUMAR	Kanhaiya Kumar	Prepared By	Kundan Prasad	Kundan Prasad			Reviewed By			
Checked By	Ayan Saha	Ayan Saha	Checked By	Harish Kumar	Harish Kumar			Checked By			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN			SPEC NO.:-PE-TS-XXX-508-E001	DATE:-
	CUSTOMER			QP NO.:-PE-QP-999-508-E004, REV.03	DATE:-27/02/2024
	PROJECT			P.O NO.:-	DATE:-
	ITEM:- DC NI-CD BATTERY		SYSTEM:- DC SYSTEM	SECTION:-	SHEET 4 OF 4

SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTIC CHECK	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	D *	AGENCY **			REMARKS
					M	B/C					M	B	C	
1	2	3	4	5	6		7	8	9		10			11
2.3	**ACCEPTANCE TEST**													
a)	Physical Examination	Visual	MA	Visual	Sampling as per IS-8320	Sampling as per IS-8320	IS:10918 & Approved drg/ doc	IS:10918 & Approved drg/ doc	Inspection Test Report	√	P	W	W	
b)	Dimensions, Mass & Layout	Dimension & Visual	MA	Measurement & Visual	-do-	-do-	-do-	-do-	-do-	√	P	W	W	
c)	Cell marking	Visual	MA	Visual	-do-	-do-	-do-	-do-	-do-	√	P	W	W	
d)	Polarity and absence of short circuit	Electrical	MA	Electrical	-do-	-do-	-do-	-do-	-do-	√	P	W	W	By Voltage Meas. accordingly to Polarity
e)	Air pressure test	Visual	MA	Meas. of Pr. Drop in 15 Sec	-do-	-do-	-do-	-do-	-do-	√	P	W	W	
f)	Insulation Resistance	Electrical	MA	Electrical & Measurement	Sampling as per IS-8320	Sampling as per IS-8320	IS:10918 & Approved drg/ doc	IS:10918 & Approved drg/ doc	Inspection Report	√	P	W	W	
g)	Ampere-hour capacity	Electrical	CR	Electrical & Measurement	-do-	-do-	-do-	-do-	-do-	√	P	W	W	
3.0	**BATTERY RACKS**	Visual & Dimension	MA	Visual & Dimension	1 Sample	1 Sample	Approved drg/ doc	Approved drg/ doc	-do-	√	P	W	V	
4.0	**ACCESSORIES**	Visual & Dimension	MA	Visual & Dimension	100%	100%	Approved drg/ doc	Approved drg/ doc	-do-	√	P	W	-	
5.0	**CABLE LUGS AND TERMINAL PLATE**	Visual	MA	Visual	100%	100%	Approved drg/ doc	Approved drg/ doc	-do-	√	P	W	-	
6.0	**PACKING**	Verification of Packing Methods, Finish & Completeness	MA	Visual	100%	100%	Approved drg/ doc/ As Per Manufacturer Std./ Approved Packing drg/ doc($$)	Approved drg/ doc/ As Per Manufacturer Std./ Approved Packing drg/ doc($$)	-do-	√	P	W	-	($$)- Approved Packing Drg./ Doc Applicable for Export Job/Projects

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. Latest revision/year of issue of all the IS/IEC standard indicated in QAP shall be reffered.

LEGEND :

* RECORDS, INDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION,

** **M:** SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, **B**: MAIN SUPPLIER/ BHEL/ THIRD PARTY INSPECTION AGENCY, **C:** CUSTOMER

P: PERFORM, **W:** WITNESS, **V:** VERIFICATION, AS APPROPRIATE

MA: MAJOR, **MI:** MINOR, **CR:** CRITICAL, **D:** DOCUMENTATION

BHEL						BIDDER/SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGGINEERING			QUALITY			Sign & Date		Doc No.			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared By	KANHAIYA KUMAR	Kanhaiya Kumar	Prepared By	Kundan Prasad	Kundan Prasad			Reviewed By			
Checked By	Ayan Saha	Ayan Saha	Checked By	Harish Kumar	Harish Kumar			Checked By			

ANNEXURE-A

STANDARD QUALITY PLAN
STANDARD QP NO. : PE-QP-999-508-E004, REV. 03

LIST OF TYPE TEST FOR NI-CD 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	• Air pressure test	IS:10918	NO	*YES
		• Insulation Resistance	IS:10918	NO	*YES
		• Ampere-hour capacity	IS:10918	NO	*YES
		• Retention of Charge	IS:10918	NO	*YES
		• Test for discharge performance at low temp.	IS:10918	NO	*YES
		• Life Cycle Test	IS:10918	NO	*YES
		• Dielectric Test	IS:10918	NO 06.06.2022	*YES
		• Storage Test	IS:10918	NO	*YES

NOTES: (*)

and time implication

1) Type test reports to be submitted which should be carried out within last **7** years from the date of techno commercial bid opening

2) All equipment to be supplied shall be of type tested design. During detail engineering, the contractor shall submit for Owner's approval the reports of all the type tests as listed in this specification and carried out within last **7** years from the indicated date. These reports should be for the test conducted on the equipment similar to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client.

3) However, if the contractor is not able to submit report of the type test(s) conducted within last **7** years from the indicated date, or in the case of type test report(s) are not found to be meeting the specification requirements, the contractor shall conduct all such tests under this contract at no additional cost to the owner either at third party lab or in presence of client/owners representative and submit the reports for approval.

BHEL	TECHNICAL SPECIFICATION DC Lead Acid/ Ni-Cd Battery 2X660 MW NTPC TALCHER TPP STAGE-III	PE-TS-497-508-E001 Issue No: 01 Rev. No. 00 Date : 14.03.2024

PAINTING REQUIREMENT

1) Wooden battery rack properly treated for anti-sulphuric acid resistance, coated with three (3) coats of anti-acid paint and shall also be treated for anti-rodent and termite attack : **For Lead acid battery**.

2) MS rack shall be Powder coated with alkali resistance paint : **For Ni-Cd battey**

बी एच ई एल BHEL	TECHNICAL SPECIFICATION DC Lead Acid/ Ni-Cd Battery 2X660 MW NTPC TALCHER TPP STAGE-III	PE-TS-497-508-E001 Issue No: 01 Rev. No. 00 Date : 14.03.2024

PACKING REQUIREMENT

Sl.no	DESCRIPTION
1	**Type of Packing:**
1.1	The Battery 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.
1.2	Battery cell shall be packed inside wooden box or crate or fixed on wooden pallet depending upon the size.
1.3	Loose items/accessories shall be separately packed inside wooden box or crate or fixed
2	**Quality of wood:**
2.1	**Quality of wood:** Wood used for packing box shall be Pinewood/Rubber wood/ Mango wood/Fir wood/Silver Oak wood/Junglewood/Plywood or other as per availability with moisture content not exceeding 30%.
3	**Cushioning material and moisture absorber:**
3.1	Suitable cushioning shall be provided by rubberized coir/ thermocol / expanded soft polyethylene foam/honeycomb.
3.2	Adequate quantity of packed desiccant shall be suitably placed inside the packing box.

	TECHNICAL SPECIFICATION DC Lead Acid/ Ni-Cd Battery 2X660 MW NTPC TALCHER TPP STAGE-III	PE-TS-497-508-E001 Issue No: 01 Rev. No. 00 Date : 14.03.2024

UNPRICED SCHEDULE

578664/2024/PS-PEM-EL

BHEL	TECHNICAL SPECIFICATION DC Lead Acid/ Ni-Cd Battery 2X660 MW NTPC TALCHER TPP STAGE-III	PE-TS-497-508-E001 Issue No: 01 Rev. No. 00 Date : 14.03.2024

ANNEXURE - A
BOQ-CUM-PRICE SCHEDULE (LEAD ACID BATTERY/ NI CD BATTERY) - PEM SCOPE

SL. NO	ITEM CODE	ITEM DESCRIPTION/ SERVICE	UOM	TOTAL QTY	UNIT PRICE	TOTAL PRICE
A		**220V BATTERY**				
A.1	**508-13030-A**	**BREAK UP DETAIL for 220V BATTERY 1 (Area 1)**				
A.1.1		220V, Lead acid/ Ni-Cd battery suitable for MAIN PLANT as per 'Compliance drawings- Annexure-I (Load duty cycle)' One Set => One Battery String comprising of 107/ 169 Cells. If one string is not meeting the required AH capacity, multiple (n nos.) strings of 107/ 169 cells each shall be provided. The complete connectors (including inter cell, inter-row, inter-bank connectors), required to connect the "n" nos. strings shall be in bidder's scope.	Sets	4		
A.1.2		Electrolyte (for first filling plus 10% extra in non-returnable container)	Sets	4		
A.1.3		Wooden racks for lead acid with 3 coats of anti acid paint/ MS racks properly treated with alkali resistance powder	Sets	4		
A.1.4		Stand insulators plus 5% extra	Lot	4		
A.1.5		Intercell, inter row, inter bank connectors with connection hardware as required for complete installation plus 5% extra and end take-off with one no.	Lot	4		
A.1.6		Cell numbering tags with fixing arrangement (1set)	lot	4		
A.1.7		Anti-splash type vent plug	Sets	4		
A.1.8		Nickle coated connection hardware plus 5% extra	lot	4		
A.1.9		Cable clamps with fixing hardware	lot	4		
A.1.10		PVC/ CFRP spill trays under battery set (battery to have spill tray covering every cell)	Set	4		
A.2		**LIST OF ACCESSORIES (Quantity mentioned is to be supplied for each battery bank seperately)**				
A.2.1		Hydrometer	Nos	2		
A.2.2		Cell testing digital voltmeter (3-0-3V) with testing leads	Nos	2		
A.2.3		Wall mounting type holder for hydrometer and thermometer	Nos	2		
A.2.4		Set of Hydrometer syringes suitable for vent holes in different cells	Nos	2		
A.2.5		Thermometer for measuring electrolyte temperature	Nos	5		
A.2.6		Specific gravity correction chart	Nos	2		
A.2.7		Rubber apron	Nos	2		
A.2.8		Pair of rubber hand gloves	Pair	2		
A.2.9		Set of Spanners	Nos	2		
A.2.10		" No Smoking" notice	Nos	2		
A.2.11		Goggles (Industrial)	Nos	2		
A.2.12		Instruction card	Nos	10		
A.2.13		Minimum & maximum temperature indicator for each battery room	Nos	1		
A.2.14		Acid / Alkali mixing jar	Nos	1		
A.3		**Battery Health Monitoring System (for each battey cell of battery sets as per Sl.no. A.1.1 above)**	**Nos**	**4**		
A.4	**508-13031-A**	**BREAK UP DETAIL for 220V BATTERY 2 (Area 2)**				
A.4.1		220V, Lead acid/ Ni-Cd battery suitable for RAW WATER INTAKE AREA as per 'Compliance drawings- Annexure-I (Load duty cycle)' (1 set comprises of 107/ 169 Cells)	Sets	2		
A.4.2		Electrolyte (for first filling plus 10% extra)	Sets	2		
A.4.3		MS racks properly treated with alkali resistance powder	Sets	2		
A.4.4		Stand insulators plus 5% extra	Lot	2		
A.4.5		Intercell, inter row , inter bank connectors with connection hardware as required for complete installation plus 5% extra and end take-off with one no extra take off.	Lot	2		
A.4.6		Cell numbering tags with fixing arrangement (1set)	lot	2		
A.4.7		Anti-splash type vent plug	Sets	2		
A.4.8		Nickle coated connection hardware plus 5% extra	lot	2		
A.4.9		Cable clamps with fixing hardware	lot	2		
A.4.10		PVC/ CFRP spill trays under battery set (battery to have spill tray covering every cell)	Set	2		
A.5		**LIST OF ACCESSORIES (Quantity mentioned is to be supplied for each battery bank seperately)**				
A.5.1		Hydrometer	Nos	2		
A.5.2		Cell testing digital voltmeter (3-0-3V) with testing leads	Nos	2		
A.5.3		Wall mounting type holder for hydrometer and thermometer	Nos	2		
A.5.4		Set of Hydrometer syringes suitable for vent holes in different cells	Nos	2		

A.5.5		Thermometer for measuring electrolyte temperature	Nos	5		
A.5.6		Specific gravity correction chart	Nos	2		
A.5.7		Rubber apron	Nos	2		
A.5.8		Pair of rubber hand gloves	Pair	2		
A.5.9		Set of Spanners	Nos	2		
A.5.10		" No Smoking" notice	Nos	2		
A.5.11		Goggles (Industrial)	Nos	2		
A.5.12		Instruction card	Nos	10		
A.5.13		Minimum & maximum temperature indicator for each battery room	Nos	1		
A.5.14		Acid / Alkali mixing jar	Nos	1		
A.6	**508-13031-A**	**BREAK UP DETAIL for 220V BATTERY 2 (Area 3)**				
A.6.1		220V, Lead acid/ Ni-Cd battery suitable for WATER SYSTEM as per 'Compliance drawings- Annexure-I (Load duty cycle)' (1 set comprises of 107/ 169 Cells)	Sets	2		
A.6.2		Electrolyte (for first filling plus 10% extra)	Sets	2		
A.6.3		MS racks properly treated with alkali resistance powder	Sets	2		
A.6.4		Stand insulators plus 5% extra	Lot	2		
A.6.5		Intercell, inter row , inter bank connectors with connection hardware as required for complete installation plus 5% extra and end take-off with one no extra take off.	Lot	2		
A.6.6		Cell numbering tags with fixing arrangement (1set)	lot	2		
A.6.7		Anti-splash type vent plug	Sets	2		
A.6.8		Nickle coated connection hardware plus 5% extra	lot	2		
A.6.9		Cable clamps with fixing hardware	lot	2		
A.6.10		PVC/ CFRP spill trays under battery set (battery to have spill tray covering every cell)	Set	2		
A.7		**LIST OF ACCESSORIES (Quantity mentioned is to be supplied for each battery bank seperately)**				
A.7.1		Hydrometer	Nos	2		
A.7.2		Cell testing digital voltmeter (3-0-3V) with testing leads	Nos	2		
A.7.3		Wall mounting type holder for hydrometer and thermometer	Nos	2		
A.7.4		Set of Hydrometer syringes suitable for vent holes in different cells	Nos	2		
A.7.5		Thermometer for measuring electrolyte temperature	Nos	5		
A.7.6		Specific gravity correction chart	Nos	2		
A.7.7		Rubber apron	Nos	2		
A.7.8		Pair of rubber hand gloves	Pair	2		
A.7.9		Set of Spanners	Nos	2		
A.7.10		" No Smoking" notice	Nos	2		
A.7.11		Goggles (Industrial)	Nos	2		
A.7.12		Instruction card	Nos	10		
A.7.13		Minimum & maximum temperature indicator for each battery room	Nos	1		
A.7.14		Acid / Alkali mixing jar	Nos	1		
B	**508-13007-A**	**E & C SPARES**				
		For Battery 1 & 2				
B.1		Gloves	Set	12		
B.2		Vent Plugs	Nos	18		
B.3		Intercell connectors	Nos	18		
C	**508-13024-A**	**SUPERVISION OF E&C**				
		For Battery 1 & 2				
C.1		LUMP SUM CHARGES PER VISIT FOR ENGINEER (EXCEPT DAILY CHARGES)-BATTERY	VISIT	4		
C.2		LUMP SUM DAILY CHARGES FOR ENGINEER-BATTERY	DAYS	60		
C.3		LUMP SUM CHARGES PER VISIT FOR ENGINEER (EXCEPT DAILY CHARGES)-BHMS	VISIT	2		
C.4		LUMP SUM DAILY CHARGES FOR ENGINEER-BHMS	DAYS	20		
D	**508-13000-B**	**MANDATORY SPARES**				
D.1		Complete dry cell (for Battery-1, Area-1)	No	68		
D.2		Complete dry cell (for Battery-2, Area-2)	No	17		
D.3		Complete dry cell (for Battery-2, Area-3)	No	17		

Notes :

1.0	AMOUNT PAYABLE FOR ENGINEER PER VISIT TO SITE = VISIT CHARGES AS PER SL. NO (C.1, C.3) ABOVE + (DAILY CHARGES AS PER SL. NO (C.2, C.4) ABOVE X NO. OF DAYS AT SITE) (TO BE CERTIFIED BY BHEL SITE).
2.0	THE VISIT CHAGRES SHALL BE INCLUSIVE OF CHARGES OF AIR FARE/TRAIN FARE , BOARDING/LODGING, LOCAL CONVEYANCE, MEDICAL , INSURANCE ETC.
3.0	SITE VISIT CHARGES SHALL BE APPLICABLE FOR ANY VISIT MADE BY VENDOR AT SITE AFTER RECEIVING THE INSTRUCTION FROM BHEL FOR DEPUTATION OF VENDOR REPRESENTATIVE. THE VISIT CAN BE CALLED FOR SUPERVISION OF COMMISSIONING & TESTING ETC.
4.0	COPPER LUGS FOR CABLE TERMINATION AT BATTERY TERMINALS SHALL BE IN BIDDER'S SCOPE & CABLE SIZES SHALL BE INFORMED DURING DETAILED ENGINEERING.
5.0	BIDDERS TO QUOTE EITHER FOR LEAD ACID OR NI-CD BATTERY

BHEL	TECHNICAL SPECIFICATION DC Lead Acid/ Ni-Cd Battery 2X660 MW NTPC TALCHER TPP STAGE-III	PE-TS-497-508-E001 Issue No: 01 Rev. No. 00 Date : 14.03.2024

ANNEXURE - A

BOQ-CUM-PRICE SCHEDULE (LEAD ACID BATTERY/ NI CD BATTERY) - ISG SCOPE

SL. NO	ITEM CODE	ITEM DESCRIPTION/ SERVICE	UOM	TOTAL QTY	UNIT PRICE	TOTAL PRICE
A		**220V BATTERY**				
A.1	**508-13031-A**	**BREAK UP DETAIL for 220V BATTERY 3 (Area 4)**				
A.1.1		220V, Lead acid/ Ni-Cd battery suitable for ISG AHP BLDG as per 'Compliance drawings- Annexure-I (Load duty cycle)' (1 set comprises of 107/ 169 Cells)	Sets	2		
A.1.2		Electrolyte (for first filling plus 10% extra)	Sets	2		
A.1.3		MS racks properly treated with alkali resistance powder	Sets	2		
A.1.4		Stand insulators plus 5% extra	Lot	2		
A.1.5		Intercell, inter row , inter bank connectors with connection hardware as required for complete installation plus 5% extra and end take-off with one no extra take off.	Lot	2		
A.1.6		Cell numbering tags with fixing arrangement (1set)	lot	2		
A.1.7		Anti-splash type vent plug	Sets	2		
A.1.8		Nickle coated connection hardware plus 5% extra	lot	2		
A.1.9		Cable clamps with fixing hardware	lot	2		
A.1.10		PVC/ CFRP spill trays under battery set (battery to have spill tray covering every cell)	Set	2		
A.2		**LIST OF ACCESSORIES (Quantity mentioned is to be supplied for each battery bank seperately)**				
A.2.1		Hydrometer	Nos	2		
A.2.2		Cell testing digital voltmeter (3-0-3V) with testing leads	Nos	2		
A.2.3		Wall mounting type holder for hydrometer and thermometer	Nos	2		
A.2.4		Set of Hydrometer syringes suitable for vent holes in different cells	Nos	2		
A.2.5		Thermometer for measuring electrolyte temperature	Nos	5		
A.2.6		Specific gravity correction chart	Nos	2		
A.2.7		Rubber apron	Nos	2		
A.2.8		Pair of rubber hand gloves	Pair	2		
A.2.9		Set of Spanners	Nos	2		
A.2.10		" No Smoking" notice	Nos	2		
A.2.11		Goggles (Industrial)	Nos	2		
A.2.12		Instruction card	Nos	10		
A.2.13		Minimum & maximum temperature indicator for each battery room	Nos	1		
A.2.14		Acid / Alkali mixing jar	Nos	1		
A.3	**508-13031-A**	**BREAK UP DETAIL for 220V BATTERY 3 (Area 5)**				
A.3.1		220V, Lead acid/ Ni-Cd battery suitable for ISG CHP BLDG as per 'Compliance drawings- Annexure-I (Load duty cycle)' (1 set comprises of 107/ 169 Cells)	Sets	2		
A.3.2		Electrolyte (for first filling plus 10% extra)	Sets	2		
A.3.3		MS racks properly treated with alkali resistance powder	Sets	2		
A.3.4		Stand insulators plus 5% extra	Lot	2		
A.3.5		Intercell, inter row , inter bank connectors with connection hardware as required for complete installation plus 5% extra and end take-off with one no extra take off.	Lot	2		
A.3.6		Cell numbering tags with fixing arrangement (1set)	lot	2		
A.3.7		Anti-splash type vent plug	Sets	2		
A.3.8		Nickle coated connection hardware plus 5% extra	lot	2		
A.3.9		Cable clamps with fixing hardware	lot	2		
A.3.10		PVC/ CFRP spill trays under battery set (battery to have spill tray covering every cell)	Set	2		
A.4		**LIST OF ACCESSORIES (Quantity mentioned is to be supplied for each battery bank seperately)**				
A.4.1		Hydrometer	Nos	2		
A.4.2		Cell testing digital voltmeter (3-0-3V) with testing leads	Nos	2		
A.4.3		Wall mounting type holder for hydrometer and thermometer	Nos	2		
A.4.4		Set of Hydrometer syringes suitable for vent holes in different cells	Nos	2		
A.4.5		Thermometer for measuring electrolyte temperature	Nos	5		
A.4.6		Specific gravity correction chart	Nos	2		
A.4.7		Rubber apron	Nos	2		
A.4.8		Pair of rubber hand gloves	Pair	2		
A.4.9		Set of Spanners	Nos	2		
A.4.10		" No Smoking" notice	Nos	2		
A.4.11		Goggles (Industrial)	Nos	2		
A.4.12		Instruction card	Nos	10		

A.4.13		Minimum & maximum temperature indicator for each battery room	Nos	1		
A.4.14		Acid / Alkali mixing jar	Nos	1		
B	**508-13007-A**	**E & C SPARES**				
		For Battery 3				
B.1		Gloves	Set	8		
B.2		Vent Plugs	Nos	12		
B.3		Intercell connectors	Nos	12		
C	**508-13024-A**	**SUPERVISION OF E&C**				
		For Battery 3				
C.1		LUMP SUM CHARGES PER VISIT FOR ENGINEER (EXCEPT DAILY CHARGES)-BATTERY	VISIT	2		
C.2		LUMP SUM DAILY CHARGES FOR ENGINEER-BATTERY	DAYS	20		
D	**508-13000-B**	**MANDATORY SPARES**				
D.1		Complete dry cell (for Battery-3, Area-4)	No	17		
D.2		Complete dry cell (for Battery-3, Area-5)	No	17		

Notes :

1.0	AMOUNT PAYABLE FOR ENGINEER PER VISIT TO SITE = VISIT CHARGES AS PER SL. NO (C.1) ABOVE + (DAILY CHARGES AS PER SL. NO (C.2) ABOVE X NO. OF DAYS AT SITE) (TO BE CERTIFIED BY BHEL SITE).
2.0	THE VISIT CHAGRES SHALL BE INCLUSIVE OF CHARGES OF AIR FARE/TRAIN FARE , BOARDING/LODGING, LOCAL CONVEYANCE, MEDICAL , INSURANCE ETC.
3.0	SITE VISIT CHARGES SHALL BE APPLICABLE FOR ANY VISIT MADE BY VENDOR AT SITE AFTER RECEIVING THE INSTRUCTION FROM BHEL FOR DEPUTATION OF VENDOR REPRESENTATIVE. THE VISIT CAN BE CALLED FOR SUPERVISION OF COMMISSIONING & TESTING ETC.
4.0	COPPER LUGS FOR CABLE TERMINATION AT BATTERY TERMINALS SHALL BE IN BIDDER'S SCOPE & CABLE SIZES SHALL BE INFORMED DURING DETAILED ENGINEERING.
5.0	BIDDERS TO QUOTE EITHER FOR LEAD ACID OR NI-CD BATTERY

DOCUMENTATION REQUIREMENT

DRAWINGS & DOCUMENTS TO BE SUBMITTED BY ALL THE BIDDERS ALONG WITH THE BID	
Sl. No.	**DOCUMENT TITLE**
1	PQR CREDENTIALS
2	COMPLIANCE SHEET
3	BATTERY SIZING CALCULATION WITH RESPECT TO LOAD DUTY CYCLE ENCLOSED WITH SPEC TO BE PROVIDED ALONG WITH SUPPORTING DOCUMENTS (CAPABILITY / DISCHARGE CURVE, TEMPERATURE CORRECTION FACTOR(AS PER IEEE-485/ IEEE-1115), FLOAT CHARGING FACTOR & PUBLISHED TECHNICAL CATALOGUE) FOR CONSIDERED FACTORS.

DRAWINGS & DOCUMENTS TO BE SUBMITTED BY SUCCESSFUL BIDDER AFTER AWARD OF CONTRACT ALONG WITH SUBMISSION SCHEDULE

Sl. No.	*BHEL Drawing No.*	*NTPC Drawing No.*	*Drawing Title*	*Vendor Sub (Days)**	*BHEL comment (Days)*	*Vendor Sub (Days)#*	*BHEL and Customer comment/approval (Days)*	*Total Engg Time (Days)*
Primary Documents								
1	PE-V0-497-508-E101	4540-001-215-PVE-Y-105	TDS FOR BATTERY	21	9	7	18	55
2	PE-V0-497-508-E306	4540-001-215-PVE-B-107	GA AND BATTERY ROOM LAYOUT OF BATTERY BANK; & CABLE TERMINATION ARRANGEMENT FOR BATTERY TERMINAL	21	9	7	18	55
3	PE-V0-497-508-E102	4540-001-215-PVE-N-109	BATTERY SIZING, CATALOGUES, PERFORMANCE CURVES, CAPACITY CURVES, DERATING FACTOR FOR AMBIENT TEMPERATURE	21	9	7	18	55
4	PE-V0-497-508-E103	4540-001-215-PVE-H-110	BILL OF MATERIAL FOR BATTERY	21	9	7	18	55
5	PE-V0-497-508-E108	4540-001-215-PVE-H-001	LIST OF MANDATORY SPARES FOR BATTERY **($$)**	21	9	7	18	55
6	PE-V0-497-508-E902	4540-001-215-QVE-Q-005	QUALITY PLAN FOR BATTERY	21	9	7	18	55
7	PE-V0-497-508-E104		TDS, GA & CIRCUIT DIAGRAM FOR BHMS	21	9	7	18	55
Secondary Documents								
1	PE-V0-497-508-E105	4540-001-215-PVE-G-003	FIELD QUALITY PLAN FOR BATTERY	21	9	7	18	55
2	PE-V0-497-508-E111		QUALITY PLAN PLAN FOR BHMS	21	9	7	18	55
3	PE-V0-497-508-E106	4540-001-215-PVE-W-112	LIST OF E & C SPARES FOR BATTERY	21	9	7	18	55
4	PE-V0-497-508-E110		TYPE TEST REPORT FOR BATTERY **(%%)**	21	9	7	18	55
5	PE-V0-497-508-E107		FAT (FACTORY ACCEPTANCE TEST) PROCEDURE FOR BHMS	21	9	7	18	55
6	PE-V0-497-508-E109		O & M MANUAL FOR BATTERY	within 30 days of issuance of MDCC				

NOTES:

a) * 1st submission within indicated days from date of purchase order

b) # Submission (within indicated days) after incorporating all BHEL comments

c) $$ Primary document for delivery of Mandatory Spares only and not to be linked with Battery supply.

d) %% Endurance tests(If Applicable) report shall be submitted after conduction of the test.

e) Primary documents shall be considered for Delay analysis and secondary documents shall be for engineering completion purpose

f) For BHMS: Primary document (PE-V0-497-508-E104) shall be considered for Delay analysis separatly from Battery package docs/ drwgs. Secondary document (PE-V0-497-508-E111) shall be for engineering completion purpose only.

DRAWINGS & DOCUMENTS TO BE SUBMITTED AS FINAL/AS-BUILT DOCUMENT	
Sl. No.	**DOCUMENT TITLE**
1	APPROVED DOCUMENTS
2	O&M MANUAL
3	ALL TEST CERTIFICATES

578664/2024/PS-PEM-EL

COMPLIANCE CERTIFICATE	
1	It is hereby confirm that the technical specification (sheet 1 to) has been read, understood. We confirm compliance to the tender specification including any clarification and amendments without any deviation.
2	It is hereby declared that any technical submittals which was not specifically asked for in NIT shall stand withdrawn.

Signature of authorised Representative

Name and Designation :

Name & Address of the Bidder

Date

PRE QUALIFICATION REQUIREMENT (TECHNICAL)

578664/2024/PS-PEM-EL

	PRE-QUALIFICATION REQUIRMENTS FOR DC LEAD ACID / Ni-Cd BATTERIES 2X660MW TALCHER TPP STAGE-III EPC PACKAGE	PE-PQ-497-508-E001 REVISION NO. 00 DATE 16.03.2024 SHEET NO. 1 OF 1

ITEM AND TYPE OF BATTERY: DC Lead Acid / Ni-Cd Battery.

SCOPE: Supply: YES; Erection & Commissioning: NO; Supervision of Erection & Commissioning : YES;

1	Vendor should have manufactured and supplied at least two (2) numbers of highest offered rating or above of high discharge type plante positive plate type battery (in case bidder offers Lead Acid plante type battery) or high discharge type Nickel Cadmium battery (in case bidder offers Nickel Cadmium battery), at least one (1) each at two (2) different industrial installations, which should have been in successful operation for at least two (2) years prior to the date of 06.06.2022. NOTE: Two different installations mean two different project sites or two different contracts.
2	Minimum two (2) nos. purchase orders for the applicable type of batteries shall be submitted which should not be more than five (5) years old from the date of techno-commercial bid opening for establishing continuity in business.

Notes:

1. Consideration of offer shall be subject to customer's approval of bidders, if applicable.
2. Bidder to submit all supporting documents in English. If documents submitted by bidder are in language other than English, a self-attested English translated document should also be submitted.
3. Notwithstanding anything stated above, BHEL reserves the right to assess the capabilities and capacity of the bidder to perform the contract, should the circumstances warrant such assessment in the overall interest of BHEL.
4. After satisfactory fulfillment of all the above criteria/ requirement, offer shall be considered for further evaluation as per NIT and all the other terms of the tender.
5. PQR clause no. 1 is in line with customer's provenness criteria. In addition to the same, bidder to furnish details as per attached Annexure-1.

PREPARED BY	CHECKED BY	REVIEWED BY	APPROVED BY
16.03.24 NAME: VIKAS KUMAR SINGH DESIGNATION: MANAGER (E)	16/03/24 16.3.24 NAME: ANKUR ARORA/ AYAN SAHA DESIGNATION: SR. MANAGER (E)/ DGM (E)	16/3/2024 NAME: SANDEEP LODH DESIGNATION: AGM (E)	16/3/2024 NAME: DEBASISA RATH DESIGNATION: GM (E)

ANNEXURE-1

Sub QR Data to be filled in to meet the provenness requirements for Battery

S.No.	Item Description
1.1	Numbers, Rating and type of the Battery manufactured and supplied and installed at two (2) different industrial installations and which are in successful operation for at least two (2) years
1.01.00	Name & address of Manufacturer
1.02.00	Name of the plant(s) and its location(s)
1.03.00	Client(s) name and its address, Fax and Tel. No.
1.04.00	Name and designation of the responsible person in client's organisation
1.05.00	Contract No. & Date
1.06.00	Date of commissioning
1.07.00	No. of years in successful operation for above batteries
1.08.00	Certificate from client(s) in support of the above stated experience has been enclosed at Annexure.....

Note : 1) Certificates from the client for the successful operation for each of the above shall be Submitted.

2) Supporting documents/ reference data as applicable shall be submitted.

Date :

Place :

(Signature).....

(Printed Name).....

(Designation).....

(Common seal).....

Signature of authorized signatory.....

578664/2024/PS-PEM-EL

	PRE-QUALIFICATION REQUIRMENTS FOR DC LEAD ACID / Ni-Cd BATTERIES 2X660MW TALCHER TPP STAGE-III EPC PACKAGE	PE-PQ-497-508-E001 REVISION NO. 00 DATE 16.03.2024 SHEET NO. 1 OF 1

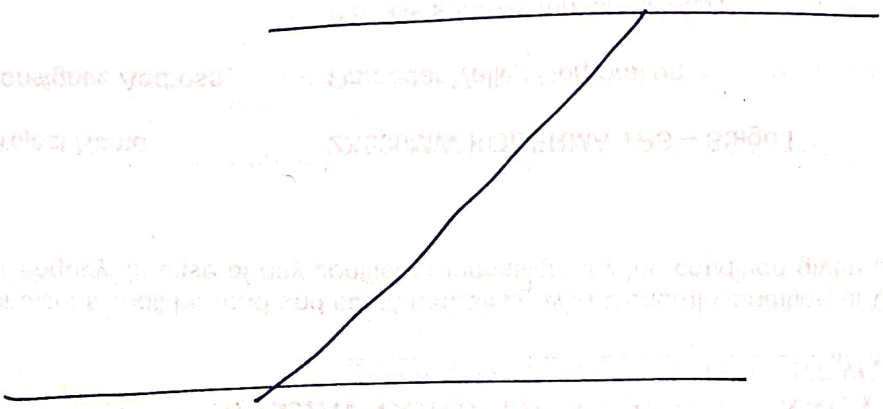
ITEM AND TYPE OF BATTERY: DC Lead Acid / Ni-Cd Battery.

SCOPE: Supply: YES; Erection & Commissioning: NO; Supervision of Erection & Commissioning : YES;

1	Vendor should have manufactured and supplied at least two (2) numbers of highest offered rating or above of high discharge type plante positive plate type battery (in case bidder offers Lead Acid plante type battery) or high discharge type Nickel Cadmium battery (in case bidder offers Nickel Cadmium battery), at least one (1) each at two (2) different industrial installations, which should have been in successful operation for at least two (2) years prior to the date of 06.06.2022. NOTE: Two different installations mean two different project sites or two different contracts.
2	Minimum two (2) nos. purchase orders for the applicable type of batteries shall be submitted which should not be more than five (5) years old from the date of techno-commercial bid opening for establishing continuity in business.

Notes:

1. Consideration of offer shall be subject to customer's approval of bidders, if applicable.
2. Bidder to submit all supporting documents in English. If documents submitted by bidder are in language other than English, a self-attested English translated document should also be submitted.
3. Notwithstanding anything stated above, BHEL reserves the right to assess the capabilities and capacity of the bidder to perform the contract, should the circumstances warrant such assessment in the overall interest of BHEL.
4. After satisfactory fulfillment of all the above criteria/ requirement, offer shall be considered for further evaluation as per NIT and all the other terms of the tender.
5. PQR clause no. 1 is in line with customer's provenness criteria. In addition to the same, bidder to furnish details as per attached Annexure-1.



PREPARED BY	CHECKED BY	REVIEWED BY	APPROVED BY
16.03.24 NAME: VIKAS KUMAR SINGH DESIGNATION: MANAGER (E)	16/03/24 16.3.24 NAME: ANKUR ARORA/ AYAN SAHA DESIGNATION: SR. MANAGER (E)/ DGM (E)	16/3/2024 NAME: SANDEEP LODH DESIGNATION: AGM (E)	16/3/2024 NAME: DEBASISA RATH DESIGNATION: GM (E)

ANNEXURE-1

Sub QR Data to be filled in to meet the provenness requirements for Battery

S.No.	Item Description
1.1	Numbers, Rating and type of the Battery manufactured and supplied and installed at two (2) different industrial installations and which are in successful operation for at least two (2) years
1.01.00	Name & address of Manufacturer
1.02.00	Name of the plant(s) and its location(s)
1.03.00	Client(s) name and its address, Fax and Tel. No.
1.04.00	Name and designation of the responsible person in client's organisation
1.05.00	Contract No. & Date
1.06.00	Date of commissioning
1.07.00	No. of years in successful operation for above batteries
1.08.00	Certificate from client(s) in support of the above stated experience has been enclosed at Annexure.....

Note : 1) Certificates from the client for the successful operation for each of the above shall be Submitted.

2) Supporting documents/ reference data as applicable shall be submitted.

Date :

Place :

(Signature).....

(Printed Name).....

(Designation).....

(Common seal).....

Signature of authorized signatory.....

Indian Electrical & Electronics Manufacturers' Association
501, Kakad Chambers, 132, Dr. Annie Besant Road, Worli, Mumbai 400 018.
Tel: +91 (0) 22 493 6528, 493 6529 • Fax: +91 (0) 22 493 2705.
E-Mail: mumbai@ieema.org • website: http://www.ieema.org

IEEMA/PVC/BTR/2001 *Effective from : 1st January, 2001*

PRICE VARIATION CLAUSE FOR LEAD ACID BATTERIES

The price quoted/confirmed is based on the input cost of raw material and labour cost as on the date of quotation and the same is deemed to be related to the price of lead ingot and all India average consumer price index number for industrial workers as specified in the price variation clause given below. In case of any variation in this price/index number, the price payable shall be subject to adjustment up or down in accordance with the following formula:

$$P = \frac{P_0}{100}\left(40 + 30\ \frac{LD}{LD_0} + 30\ \frac{W}{W_0}\right)$$

Wherein,

P = Price payable as adjusted in accordance with the above formula.

P_0 = Price quoted/confirmed.

LD_0 = Price of lead ingot (refer notes).

This price is as applicable on the first working day of the month, one month prior to the date of tendering.

W_0 = All India average consumer price index number for industrial workers, as published by the Labour Bureau, Ministry of Labour, Govt. of India (Base 1982 = 100).

This index number is as applicable for the month, four months prior to the date of tendering.

For example, if the date of tendering falls in May 2001 the applicable price of lead ingot (LD_0) should be that prevailing as on 1st April 2001 and the applicable all India average consumer price index number (W_0) should be for the month of January 2001.

The above prices/indices are as published by IEEMA vide IEEMA circular reference number IEEMA(PVC)/BTR/_/_ prevailing as on first working day of the month ..... i.e., one month prior to the date of tendering.

LD = Price of lead ingot (refer notes).

This price is as applicable on the first working day of the month, one month prior to the date of delivery.

W = All India average consumer price index number for industrial workers (base 1982 = 100) as published by Labour Bureau, Ministry of Labour, Govt. of India.

This index number is as applicable for the month, four months prior to the date of delivery.

For example, if the date of delivery in terms of clause given below falls in December 2001, the applicable price of lead ingot (LD) should be that as published by IEEMA as prevailing on 1st November 2001 and the applicable all India average consumer price index number (W) should be for the month of August 2001.

IEEMA/PVC/BTR/2001 *Effective from : 1st January, 2001*

The "date of delivery" is the date on which the battery charger equipment is notified as being ready for inspection/despatch (in the absence of such notification, the date of manufacturer's despatch note is to be considered as the date of delivery) or the contracted delivery date (including any agreed extension thereto), whichever is earlier.

Note:(a) The price of lead ingot (in Rs/MT) is the ex-works price of 99.97% pure lead as quoted by a primary producer and is exclusive of modvatable excise duty and of any other central, state or local taxes, octroi etc.

For Indian Electrical & Electronics Manufacturers' Association

Authorised Signatory

CIN No. U99999MH1970GAPO14629

Indian Electrical & Electronics Manufacturer's Association
501, Kakad Chambers
132, Dr. A. B. Road, Worli,
Mumba i 400 018
India
P +91 22 2493 0532
F +91 22 2493 2705
E mumbai@ieema.org
W www.ieema.org

Cir. No. 55/ PVC/BTR CHRG/05 **Date: 03 Apr 24**

To Members of Battery Storage and Charging Infrastructure Division, member manufactures of Battery chargers and SEBs and other listed purchasing bodies

Sub: New PV clause for Ni-Cd Batteries

In view of volatility in prices, current practices and technology used for manufacturing, Ni-Cd battery manufacturers' felt the need for price variation formula. Manufacturers then discussed the subject at length and decided to evolve PV formula for Ni-cd batteries.

Major raw material viz. Nickel hydroxide, Cd hydroxide, cobalt, Lithium, special steel are imported as these metals are not locally available. The lead time of importing these raw materials and converting them into the active mass, it takes @3 -6 months. To address this gap, manufacturers build stocks to meet this market demand. These stocks are built based on specific project requirements forecasted; each battery type requires different raw material. In real life, manufacturer consume stocks which are built based on orders placed 3 - 6 months prior to battery deliveries to customers.

Based on the collected inputs from manufacturer, IEEMA had circulated the draft formula vide **Cir. No. 50/ PVC/BTR CHRG/05 dated 11 March 24** to all stakeholders for their review and comments.

Since there are no adverse comments received; we are making it operational from 1st March 2024; enclosed Final PV clause applicable for 'NiCd Batteries'. This PV formula will be applicable for **ONLY** NiCd Pocket Plate Batteries used in stationary applications and not for the Fibre and sintereted technology NiCd Batteries.

We request and recommend all the users & stakeholders including Utilities, PSUs etc. to incorporate these new PV formulae in all the new tenders/contracts henceforth.

Director

CIN No. U99999MH1970GAPO14629

Indian Electrical & Electronics Manufacturer's Association
501, Kakad Chambers
132, Dr. A. B. Road, Worli,
Mumba i 400 018
India
P +91 22 2493 0532
F +91 22 2493 2705
E mumbai@ieema.org
W www.ieema.org

IEEMA/PVC/BTR-NiCd/2023 **Effective from: 01 Mar 2024**

PRICE VARIATION CLAUSE FOR NICKEL CADMIUM BATTERY

applicable **ONLY** for NiCd Pocket Plate Batteries used in stationary applications and not for the Fibre and sintereted technology NiCd Batteries

The price quoted/confirmed is based on the cost of raw materials/components and labour cost as on the date of quotation and the same is deemed to be related to prices of raw materials and all India average consumer price index number for industrial workers as specified in the price variation clause given below. In case of any variation in these prices and Index numbers, the price payable shall be subject to adjustment up or down in accordance with the following formulae:

$$P = \frac{P_{\circ}}{100}\left(38 + 20\frac{Ni}{Ni_{\circ}} + 42\ \frac{W}{W_{\circ}}\right)$$

Wherein,

P = Price payable as adjusted in accordance with the above formula.
P_0 = Price quoted/confirmed.

Ni_0 = Price of Nickel in INR (refer notes)
This price is as applicable from IEEMA PV circular, **ONE** month prior to the date of tendering.

W_0 = All India average consumer price index number for industrial workers, as published by the Labour Bureau, Ministry of Labour, Govt. of India (Base: 2016 = 100)

This index number is as applicable for the month, **THREE** months prior to the date of tendering.

For example, if the date of tendering falls in June 2024, the applicable price of Nickel (Ni_o) should be for the month of May 2024 from IEEMA PV circular and all India average consumer price index number (W_o) should be for the month of March 2024.

The above prices and indices are as published by IEEMA vide circular reference number IEEMA(PVC)/ BTR/(R-1)/_/_ **ONE** month prior to the date of tendering.

Ni = Price of Nickel in INR (refer notes)
This price is as applicable from IEEMA PV circular, **ONE** month prior to the date of delivery.

W = All India average consumer price index number for industrial workers, as published by the Labour Bureau, Ministry of Labour, Govt. of India (Base: 2016 = 100)

This index number is as applicable for the month, **THREE** months prior to the date of delivery.

For example, if the date of delivery falls in August 2024, the applicable price of Nickel (Ni) should be for the month of July 2024 from IEEMA PV circular and all India average consumer price index number (W) should be for the month of May 2024.

HEAD OFFICE - DELHI
Rishyamook Building, First Floor, 85 A, Panchkuian Road, New Delhi 110001
P +91 11 2336 3013 / 14 • F +91 11 2336 3015 • E delhi@ieema.org • W www.ieema.org

CIN No. U99999MH1970GAPO14629

Indian Electrical & Electronics Manufacturer's Association
501, Kakad Chambers
132, Dr. A. B. Road, Worli,
Mumba i 400 018
India

P +91 22 2493 0532
F +91 22 2493 2705
E mumbai@ieema.org
W www.ieema.org

IEEMA/PVC/BTR-NiCd/2023 **Effective from: 01 Mar 2024**

The "date of delivery" is the date on which the Battery is notified as being ready for inspection/despatch. (In the absence of such notification the date of manufacturer's despatch note is to be considered as the date of delivery) or the contracted delivery date (including any agreed extension thereto), whichever is earlier.

Notes:

(a) All prices are exclusive of GST amount and exclusive of any other central, state or local taxes etc.

(b) The details of prices are as under:

1. Nickel Price in Indian Rs./MT, Nickel price on LME index, average of previous THREE months monthly average price and is converted to INR by applying appropriate exchange rate and adding appropriate import duty.

Authorised Signatory

HEAD OFFICE - DELHI
Rishyamook Building, First Floor, 85 A, Panchkuian Road, New Delhi 110001
P +91 11 2336 3013 / 14 • F +91 11 2336 3015 • E delhi@ieema.org • W www.ieema.org