



BHARAT HEAVY ELECTRICALS LIMITED
PROJECT ENGINEERING MANAGEMENT, NOIDA

Date-13-Sep-24

CORRIGENDUM- 02

PROJECTS	:	2X800MW NTPC LARA STPP-STAGE II
PACKAGE	:	WATER TREATMENT PACKAGES
ENQUIRY NO	:	77/23/6105/SAN Dated 30.08.2024
SUBJECT	:	PRE-BID CLARIFICATIONS + TECHNICAL AMENDMENT-1

Type of Corrigendum			
Technical Corrigendum -	☒	Commercial Corrigendum -	☒

Bidders are requested to go through the following-

- Please refer attached clarification by BHEL against all pre-bid queries raised by prospective bidders. Bidders are requested to comply the same while quoting for this tender enquiry.
- Please refer attached amendment#1 to Technical Specification. Bidders are requested to comply the same while quoting for this tender enquiry.

All the other terms and conditions of the tender enquiry remain unchanged. All the bidders are requested to quote accordingly.

Yours faithfully,

For and on behalf of BHEL

Sanjeev Kumar
Engineer/BOP

PRE-BID CLARIFICATION							
Sl. No	VOLUME	SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION REQUIREMENT	CLARIFICATION	BHEL REPLY
1	NIT	-	Performance Security (PS)	03 of 47	i. Initially 10% of the contract value (total Ex-works price excluding PVC) of Supply/Turnkey Packages. 5% of the contract value (excluding PVC) will be released after completion of E&C based on certification by Project Group/Purchaser. However, 5% of the contract value (excluding PVC) will be released on completion of all contractual obligations, including guarantee/warranty obligations of respective package based on certification by Project Group/Purchaser. OR ii. 5% of the contract value (total Ex-works price excluding PVC) of Supply/Turnkey Packages. Additional 5% of the contract value will be retained from first bill & subsequent bill(s) of the contract for Supply/Turnkey Packages. The retention amount will be released after completion of E&C based on certification by Project Group/Purchaser. However, 5% of the contract value (excluding PVC) will be released on completion of all contractual obligations, including guarantee/warranty obligations of respective package based on certification by Project Group/Purchaser.	Bidder presume that the contract value refers the total EPC value excluding GST, Other taxes and Duties and Operation & Maintenance. Please confirm	Clause is self explanatory. Contract Value includes total Ex-works price excluding PVC.
2	NIT	-	Performance Security (PS)	04 of 47	Performance Security should remain valid for a period of 60 (sixty) days beyond the date of completion of all contractual obligations of the supplier, including warranty obligations	Bidder hereby understands that the Validity of Performance Security for Turnkey package should be 60 (sixty) days beyond the date of completion of all contractual obligations of the supplier, including warranty obligations. Please confirm.	Performance Security for respective package of supply and Turnkey should remain valid for a period of 60 (sixty) days beyond the date of completion of all contractual obligations of the supplier, including warranty obligations
3	NIT	-	Performance Security (PS)	04 of 47	Validity of PS: For Supply Packages- Validity of performance bank guarantee shall be for the entire guarantee period. Initially, it should be at least 18 months from date of last dispatch and later extended to cover the entire guarantee period, one month before its expiry. For Turnkey Packages- As per clause no-11.3 of GCC BOP Rev-00.	Kindly share us the GCC as specified in NIT	Please refer S.no-1 of other terms & conditions of NIT. GCC-BOP Rev-00 along with Corrigendum-01 to GCC-BOP can be downloaded from www.pem.bhel.com. To navigate the same, Pls go www.pem.bhel.com. >Supplier Zone > Important Links to GCC

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4		-	Performance Security (PS)	03 of 47	i. Initially 10% of the contract value (total Ex-works price excluding PVC) of Supply/Turnkey Packages. 5% of the contract value (excluding PVC) will be released after completion of E&C based on certification by Project Group/Purchaser. However, 5% of the contract value (excluding <u>PVC</u>) will be released on completion of <u>all contractual obligations</u>, including guarantee/warranty obligations of respective package based on certification by Project Group/Purchaser. OR ii. 5% of the contract value (total Ex-works price excluding PVC) of Supply/Turnkey Packages. Additional 5% of the contract value will be retained from first bill & subsequent bill(s) of the contract for Supply/Turnkey Packages. The retention amount will be released after completion of E&C based on certification by Project Group/Purchaser. However, 5% of the contract value (excluding <u>PVC</u>) will be released on completion of <u>all contractual obligations</u>, including guarantee/warranty obligations of respective package based on certification by Project Group/Purchaser.	Kindly elaborate the term "all contractual obligations" and "PVC".	For Contractual obligations, pls refer tender documents. PVC shall not be considered for determining the value of performance security.
5	NIT	-	SPECIAL CONDITIONS OF CONTRACT (SCC) Rev.00 25 Construction Facilities to Vendor	32 of 47	Construction Power: Construction Power is chargeable as per customer contract which can be provided at single point source post establishment of Construction Power grid by PSWR. Further distribution is to be done by concerned vendor.	Kindly provide the location of upcoming construction power grid, the distance to the Water Treatment Plant boundary and the applicable charges	Refer attached plot plan of 2x800 MW NTPC Lara Stage II in which location of various PSS (Package Substation) have been marked. The nearest PSS feeder will be allocated to the construction power supply of Water treatment plant boundary. Energy consumption charges shall be as per travelling applicable schedule of Discom.
6	NIT	-	SPECIAL CONDITIONS OF CONTRACT (SCC) Rev.00 25 Construction Facilities to Vendor	32 of 47	Construction Power: Construction Power is chargeable as per customer contract which can be provided at single point source post establishment of Construction Power grid by PSWR. Further distribution is to be done by concerned vendor.	Bidder understands that the construction power is in the scope of bidder and the power incurred during Performance Guarantee tests will be borne by the Customer / Principal. Please confirm	CONFIRMED
7	NIT	-	PRICE ADJUSTMENT FOR SUPPLY AND MANDATORY SPARES FOR ALL WATER TREATMENT PACKAGES	36 of 47	F shall be fixed portion of the Ex-Works Component of the Contract and shall be considered as 0.15.	Bidder hereby requesting the Customer / Principal to change the fixed portion to 0.10. Please confirm	Requirement given in tender specification is firm. Bidder is requested to follow.
8	NIT	-	PRICE ADJUSTMENT FOR SUPPLY AND MANDATORY SPARES FOR ALL WATER TREATMENT PACKAGES	36 of 47	For the indices, subscript '0' refers to indices as on date of completion of delivery as per LOA.	Based on the previous executed jobs, we hereby requesting the Customer / Principal to change the reference date for indices to the 28 days before the bid submission date. Please confirm	Requirement given in tender specification is firm. Bidder is requested to follow.

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9	NIT	-	PRICE ADJUSTMENT FOR SUPPLY AND MANDATORY SPARES FOR ALL WATER TREATMENT PACKAGES	37 of 47	For the indices, subscript '0' refers to indices as on date of completion of Service as per LOA.	Based on the previous executed jobs, we hereby requesting the Customer / Principal to change the reference date for indices to the 28 days before the bid submission date. Please confirm	Requirement given in tender specification is firm. Bidder is requested to follow.
10	Priceformat NIT	-	Currency Payment for	- 35 of 47	- PRICE ADJUSTMENT FOR SUPPLY and MANDATORY SPARES FOR ALL WATER TREATMENT PACKAGES	The Customer / Principal would appreciate the fact that during the execution of contract there are major import items such as UF & RO membranes and pressure exchangers and allied parts. These items may be exported from OEM countries. Such transaction will be affected by fluctuations in currency exchange. Hence we request the Customer / Principal to pay the variation of foreign currency in to equivalent INR at the time of submitting the invoice. Please confirm	Requirement given in tender specification is firm. Bidder is requested to follow.
11	General	-	Advance	-	-	Bidder hereby requesting to provide Interest free advance 10% of Contract Value and will be reimbursed upto each bill. Please confirm	Payment Terms shall be as per NIT.
12	NIT	-	Annexure-B to NIT for Payment Terms	11 of 47	-	Kindly share us the GCC as specified in NIT	Please refer S.no-1 of other terms & conditions of NIT. GCC-BOP Rev-00 along with Corrigendum-01 to GCC-BOP can be downloaded from www.pem.bhel.com . To navigate the same, Pls go www.pem.bhel.com . >Supplier Zone > Important Links to GCC

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Sl. No	VOLUME	SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION REQUIREMENT	CLARIFICATION	BHEL REPLY
13	General	-	Performance Guarantee and Train run period	-	-	Please share us the time period and conditions for Performance Guarantee and Train run period	Bidder to decide time period of Trial Run as per their system requirements during detailed engineering. Further, Bidder to refer ANNEXURE – III (FUNCTIONAL GUARANTEES AND LIQUIDATED DAMAGES) page no. 267 to 281 of 851 in technical specification, in which PG test time period/ criteria has already been mentioned for PTP, DMP, CPU and ETP. In addition to the above, bidder to refer technical amendment 1 for PG test duration requirements for CLO2, STP, CHP WTP and CWT.
14	NIT	-	Annexure-C to NIT for Guarantee Period	13 of 47	-	Kindly share us the GCC as specified in NIT	Please refer S.no-1 of other terms & conditions of NIT. GCC-BOP Rev-00 along with Corrigendum-01 to GCC-BOP can be downloaded from www.pem.bhel.com. To navigate the same, Pls go www.pem.bhel.com. >Supplier Zone > Important Links to GCC
15	Tendernotice_9	38.1.1	Warrenty period	14 of 251	The Contractor's scope shall also include providing Post Warranty Maintenance for 3 years after completion of warranty period of the offered wireless systems and all associated components as per specification. The AMS shall include tools and tackles as required; travel, boarding & lodging of service engineer.	Kindly share us the Warranty period (Defects Liability Period) for the complete system.	Bidder to refer Annexure-C to NIT
16	NIT	-	Liquidated Damages for Delay %	14 of 47	-	Kindly share us the GCC as specified in NIT	Please refer S.no-1 of other terms & conditions of NIT. GCC-BOP Rev-00 along with Corrigendum-01 to GCC-BOP can be downloaded from www.pem.bhel.com. To navigate the same, Pls go www.pem.bhel.com. >Supplier Zone > Important Links to GCC
17	NIT	-	Liquidated Damages for Performance %	14 of 47	-	Kindly share us the GCC as specified in NIT	Please refer S.no-1 of other terms & conditions of NIT. GCC-BOP Rev-00 along with Corrigendum-01 to GCC-BOP can be downloaded from www.pem.bhel.com. To navigate the same, Pls go www.pem.bhel.com. >Supplier Zone > Important Links to GCC

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18	General	-	Limitation of Liability	-	-	Please share us the percentage of Limitation of Liability for the entire package.	Refer clause no-12.4 of GCC BOP Rev-00. Further, risk & cost is not applicable for this tender
19	General	-	Force majeure	-	-	Please share us the applicable Force Majeure	Refer clause no-30.0 of GCC BOP Rev-00
20	General	-	Change in Scope	-	-	Bidder presume that any changes / Addition from the tender insisted by the customer will be discussed mutually and executed. The costs incurred will be extra at actuals. Please confirm	Variation of contract value as per clause no. 6.0 of ITB of BOP GCC shall be +/-10%
21	General	-	Change in Law	-	-	Bidder presume that any change in law from the bid submission date shall be discussed mutually and executed. The costs incurred due to variation will be extra at actuals. Please confirm	Refer GCC BOP Rev00
22	General	-	Sludge Disposal	-	-	Bidder presume that the disposal of sludge from the respective pit / sump will be in the scope of Customer / Principal. Please confirm	Scope of Complete sludge treatment and transfer is well defined in technical specification. Bidder to follow the same.
23	General	-	Electricity during O&M	-	-	Bidder hereby understands that the Electricity during O&M will be in the scope of Customer / Principal. Please confirm	Electricity during O&M shall be provided by BHEL free of cost
24	Tendernotice_3	-	-	-	PRICE ADJUSTMENT FOR SUPPLY AND MANDATORY SPARES FOR ALL WATER TREATMENT PACKAGES	Bidder understands that the Effective date for price adjustment will be date of LOA received. Please confirm	As per PVC Annexure of NIT
25	Tendernotice_5	13.1	SUB-VENDOR ITEMS	114 of 150	The sub vendor list (Annexure- II) enclosed is indicative only and is subject to BHEL and Customer approval during detailed engineering stage without any commercial & delivery implication to BHEL.	As per the discussion on Pre bid clarification meeting, bidder shall proceed with other vendors also but should adhere to the Tender technical specifications. Please confirm	Noted and confirmed
26	Volume 1	Annexure-A	Annexure-A to NIT for Delivery Schedule	10 of 47	CW Chemical Treatment - Personnel for Services shall be deputed within 15 days of intimation.	Kindly provide the Scope matrix of Operation & Maintenance between Contractor and Customer.	Bidder to refer ANNEXURE-XI (OPERATION AND MAINTENANCE) page no. 398 of 851 included in technical specification, in which complete scope is defined. Further, bidder to refer complete Section IA included in technical specification for additional information and scope.
27	Volume 1	Annexure-B	Annexure-B to NIT for Payment Terms	11 of 47	CW Chemical Treatment - As per Clause no-9.4 of GCC BOP	1. Kindly provide the GCC to refer the clause 9.4. 2. Kindly provide the Payment terms of Operation & Maintenance.	Refer GCC BOP Rev-00

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28	Tendernotice_7	ANNEXURE-XI	ANNEXURE-XI OPERATION AND MAINTENANCE	399 of 851	The Bidder's scope covers the Operation and Maintenance (O&M) services for one (1) year CW Treatment Plant O&M shall start after successful completion of PG test of CW System for all the units at full load. Bidder to note that O&M activities of both the units will be staggered and time gap from Unit#1 to Unit#2 may please be considered as 6 months.	We understand the scope of O&M is only for CW Chemical Treatment for the period of 12 months.	O&M is applicable for CW Chemical Treatment only, for complete one year as per criteria given in technical specification.
29	Tendernotice_7	ANNEXURE-XI	ANNEXURE-XI OPERATION AND MAINTENANCE	400 of 851	O&M of CW Treatment Plant I. O&M work under scope of the Bidder shall broadly include but in no way limited to the following: a) Preventive maintenance of the plant. b) Servicing of the CW Treatment Plant and associated equipment's at regular interval. c) Attending to complaints. d) Replacement of worn out or defective components e) Replacing of consumables like greases, oil, lubricants, servo fluids/control fluids, gases, reagents for analysers and etc. as and when required.	We understand that the scope of O&M includes Manpower & Chemicals for the CW Chemical Treatment and exclude all other.	Bidder to refer ANNEXURE-XI (OPERATION AND MAINTENANCE) page no. 398 of 851 included in technical specification, in which complete scope is defined. Further, bidder to refer complete Section IA included in technical specification for additional information and scope.
30	General	-	-	-	-	We understand that no other package than CW Chemical Treatment is included in Scope of Operation & Maintenance. Kindly Confirm.	O&M is applicable for CW Chemical Treatment only as per criteria given in technical specification.
31	Tendernotice_8	STANDARD ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR FOR SKID MOUNTED SYSTEM PACKAGE: PTP/DMP/ETP/STP/CWT/CLO2/CHP Run off WTP/CPU		145 of 150	Bidder Scope of Work	Based on the Electrical Scope Matrix, Bidder understands that the Electrical scope of work is limited as follows: 1. Supply and installation of Motors for all packages 2. Supply and installation of Cable Gland & Lugs for terminating cables in the end of Equipment supplied by the bidder 3. Supply and installation of Conduits and conduit accessories required for cabling of Equipment supplied by the bidder Please confirm	Technical specification is clear. Bidder to follow the same.
32	Tendernotice_8	STANDARD ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR FOR SKID MOUNTED SYSTEM PACKAGE: CDS/LDS/ODS		148 of 150	Bidder Scope of Work	Based on the Electrical Scope Matrix, Bidder understands that the Electrical scope of work is limited as follows: 1. Supply and installation of Motors for all packages 2. Supply and installation of Cable Gland & Lugs for terminating cables in the end of Equipment supplied by the bidder 3. Supply and installation of Power and Control cables within the skid Please confirm	Technical specification is clear. Bidder to follow the same.

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33	TENDER NOTICE-9 SPECIFIC TECHNICAL REQUIRMENT- CONTROL & INSTRUMENTATION	Section -IC	C&I TECHNICAL REQUIREMENT	612 of 851	13) All instruments other than profibus type shall be terminated on JB/LIE/LIR/LCP in field. Number of Junction Boxes shall be sufficient and positioned in the field to minimize local cabling (max 12-15 mtrs) and trunk cable. In case grouping is not possible and these are to be installed individually, anopy with suitable mounting arrangement shall be provided JUunction boxes are in bidder's scope.	Bidder understands that the distance between Junction Box and Field Instuments is approximately 10-12mtrs and scope limits upto junction box , Please confirm.	Technical specification is clear. Bidder to follow the same.
34			General			Kindly provide the document Section IIC "GENERAL TECHNICAL REQUIRMENT-CONTROL & INSTRUMENTATION.	Bidder to refer page no. 844 to 846 of 851 for GENERAL TECHNICAL REQUIRMENT-CONTROL & INSTRUMENTATION.
35	TENDER NOTICE-8 SPECIFIC TECHNICAL REQUIRMENT- ELECTRICAL	SECTION- I B	STANDARD ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR FOR SKID MOUNTED SYSTEM	595 of 851	2. Local control panel	Kindly provide the specifications for Local Control Panel	Bidder to refer page no 634 to 636 of 851 for specifications of Local Control Panel.
36	TENDER NOTICE-8 SPECIFIC TECHNICAL REQUIRMENT- ELECTRICAL	SECTION- I B	STANDARD ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR FOR SKID MOUNTED SYSTEM	596 of 851	5. Junction box for control & instrumentation cable (if applicable)	Bidder Understands that the distance between Junction Box and Field Instuments is approximately 10-12mtrs.	Technical specification is clear. Bidder to follow the same.
37	TENDER NOTICE-8 SPECIFIC TECHNICAL REQUIRMENT- ELECTRICAL	SECTION- I B	STANDARD ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR FOR SKID MOUNTED SYSTEM	596 of 851	7) Any special type of cable like compensating, co-axial, prefab, MICC & fibre optical . Refer C&I portion of specification for scope of fibre Optical cables if used between PLC/ microprocessor & DCS.	Please Provide the distance for the following at each plant 1. cable distance between MCC And DCS panel, 2. Cable distcance between package PLC and DCS panel.	Bidder to note that, cable between MCC and Control panel shall be in BHEL scope. Further PLC is not applicable since all the systems are DCS controlled. Further DCS shall be in BHEL scope.
38			General			Please provide the Control System Architecture and Scope Matrix for Control and Instrumentation	Technical specification is clear. Bidder to follow the same.
39	Tendernotice_8		General			Kindly share us the Water Balance Diagram for the plant.	Water balance diagram is BHEL's internal document and it doesn' t affect sizing of any Water Treatment system.
40	Tendernotice_8	Section -I Sub Section - 1A	2 to 6	551 & 552 of 851	Capacity (Design Flow) of Aerator, Stilling chamber and Inlet Channel and Chamber and HRSCC	The flow rate Aerator and Stilling chamber specified in the datasheet for PT-CW stream is not maching with the down stream flow rate of inlet chamber and HRSCC. Please Clarify.	Bidder to design as per details included in technical specification only.
41	Tendernotice_7	Section-1A	18	395 of 851	Total Suspended Solid	Design values are not specified in tender and kindly share. Kindly provide the details about the source of Raw water.	Bidder to Technical Amendment 1 in this regard.

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Sl. No	VOLUME	SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION REQUIREMENT	CLARIFICATION	BHEL REPLY
1	NIT	-	Format for Local Content Certificate as per latest MII Order	41 of 47	Further, cost of locally imported items (inclusive of taxes) sourced locally from resellers/ distributors is Rs and cost of licence/royalty paid/technical expertise cost etc. source from outside of India is Rs.....	As per NIT, it will be uploaded in Technical Bid and hence bidder hereby requesting the BHEL / NTPC to remove the same. Please confirm	Since this is condition of MII Order from Govt of India. Bidders to submit documents as per NIT
2	Tendernotice_5	1A	8.4 CONTROL & OPERATION	63 of 851	a) ... The bidder shall submit the complete detail of the system offered by him like the extent of automation offered, operation of the complete system, logic/flow diagrams, type and details of the presentation of information, the type of mimic, hardware details etc. along with detailed circuit descriptions	Bidder hereby understands that the details to be shared during detailed engineering. Please confirm.	Bidder to submit details during detailed engineering after award of contract meeting technical specification requirements.
3	Tendernotice_9	-	5.0 INSPECTION/TESTING	602 of 851	The Contractor shall submit the type tests reports for the tests conducted on the equipment similar to those to be supplied under this contract and the test(s) should have been conducted at an independent laboratory not earlier than ten (10) years prior to supply under this contract.	Bidder hereby understands that the type tests reports for the tests conducted on the equipment similar to those to be supplied under this contract to be submitted post bid. Please confirm.	Bidder to submit details during detailed engineering after award of contract meeting technical specification requirements.
4	Tendernotice_9	8.03.05.03	e-Learning Package:	694 of 851	2. The bidder shall submit e-learning courses each for erection, commissioning, operation and maintenance of each of the equipment / system supplied as above.	Bidder hereby understands that the e-learning courses to be submitted post order. Please confirm.	Bidder to submit details during detailed engineering after award of contract meeting technical specification requirements.
5	Tendernotice_5	6.1.1.22 6.1.2.25 6.1.3.19	SCOPE OF SUPPLY FOR SEWAGE TREATMENT PLANT	38, 39 and 40 of 851	... Inputs for pipe pedestals as per requirement and layout shall be furnished.	Bidder hereby understands that the Inputs for pipe pedestals as per requirement and layout to be submitted post order. Please confirm.	Bidder to submit details during detailed engineering after award of contract meeting technical specification requirements.
6	Tendernotice_9	7.02.00	MAINTENANCE AND AVILABILITY CONSIDERATIONS	679 of 851	Equipment/works offered shall be designed for high availability, low maintenance and ease of maintenance. The Bidder shall specifically state the design features incorporated to achieve high degree of reliability/availability and ease of maintenance. The Bidder shall also furnish details of availability records in the reference plants stated in his experience list. Bidder shall state in his offer the various maintenance intervals, spare parts and man-hour requirement during such operation. The intervals for each type of maintenance namely inspection of the furnace, inspection of the entire hot gas path, turbine & equipments, inspection of the steam path and the minor and major overhauls shall be specified in terms of fired hours, clearly defining the spare parts and man-hour requirement for each stage.	Bidder hereby understands that the details of availability records in the reference plants stated in his experience list and the various maintenance intervals, spare parts and man-hour requirement to be submitted post order. Please confirm.	Bidder to submit details during detailed engineering after award of contract meeting technical specification requirements.

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7	Tendernotice_9	8.01.00	DOCUMENTS, DATA AND DRAWINGS TO BE FURNISHED BY CONTRACTOR	680 of 851	Bidders may note that this is an EPC Package contract.	As stated in 13.5 clause of Tendernotice_5, we understands that all civil scope under the contract is in BHEL scope. Please confirm	Bidder to note that Cl. No. 8.01.00 is general technical requirement, however bidder to refer specific technical requirements (Section I) for scope of work. Further, bidder to refer relevant portion of General technical requirements for bidder's scope of work.
8	Tendernotice_9	38.01.00	SYSTEM DOCUMENTATION	734 of 851	Bill of material (instrument list) for all C&I equipment/ devices shall be furnished by the bidder in standard formats as approved by the Employer.	Bidder hereby understands that the Bill of material (instrument list) for all C&I equipment/ devices to be submitted post order. Please confirm.	Bidder to submit details during detailed engineering after award of contract meeting technical specification requirements.
9	Tendernotice_9	-	SCOPE OF SUPPLY & SERVICES	797 of 851	s) In addition to submission of drawings as stipulated above bidder shall also furnish the data/ documents with respect to following: 1) Thickness calculation of large diameter buried pipes as per AWWA-M-11. 2) System design calculation of Primary closed circuit ECW and secondary circuit ACW system for flow & pressure balancing. 3) Design calculations for condensate storage tank and Drinking water tank. 4) Static Analysis for Long (more than 300 meter straight run) above ground piping wherever required.	Bidder hereby understands that the documents are to be submitted post order. Please confirm.	Bidder to submit details during detailed engineering after award of contract meeting technical specification requirements.
10	Tendernotice_9	2.02.01	Pipes and fittings	802 of 851	The bidder shall furnish the pipe sizing/ thickness calculation as per the criteria mentioned above under LP piping equipment sizing criteria of this Technical Specification.	Bidder hereby understands that the documents are to be submitted post order. Please confirm.	Bidder to submit details during detailed engineering after award of contract meeting technical specification requirements.
11	Tendernotice_7	3.03.03	Turbine Generator Set Capability	411 of 851	The steam turbine generator unit shall be capable of delivering at generator terminals the output as indicated by the BIDDER in the heat balances submitted along with his bid, under the following condition.	Bidder hereby understands that the documents are to be submitted post order. Please confirm.	Bidder to submit details during detailed engineering after award of contract meeting technical specification requirements.
12	Tendernotice_7	3.03.03	Turbine Generator Set Capability	411 of 851	The steam turbine generator unit shall be capable of delivering at generator terminals the output as indicated by the BIDDER in the heat balances submitted along with his bid, under the following condition.	Bidder hereby understands that the the turbine generator is not in the part of bidder's scope. Please confirm.	Bidder to note that turbine generator is not part of bidder's scope.

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13	Tendernotice_8	1A	DETAILS OF DRIVE & DRIVE MOTOR (SCREW CONVEYOR)	483 of 851	Drive Rating To be indicated by the vendor. Necessary backup calculation substantiating the same to be furnished along with the offer	Bidder hereby understands that the documents are to be submitted post order. Please confirm.	Bidder to submit details during detailed engineering after award of contract meeting technical specification requirements.
14	Tendernotice_6	1A	PERFORMANCE GUARANTEES	259 of 851	2. The guaranteed performance parameters indicated/furnished by the bidder in his offer, shall be without any tolerance values whatsoever and all margins required for instrument inaccuracies and other uncertainties shall be deemed to have been included in the guaranteed figures.	Bidder hereby understands that the documents are to be submitted post order. Please confirm.	Bidder to submit details during detailed engineering after award of contract meeting technical specification requirements.
15					Pre Bid Clarification meeting	Kindly share us the minutes of meeting.	Please refer clarifications and amendments issued.
16	NIT	-	Earnest Money Deposit (EMD)	02 of 47	Scanned copy of EMD shall be uploaded by Supplier in the online bid and hard copy of the same (excluding EFT at s.no (i) shall have to be submitted to the bidder within 7 (Seven) working days of bid opening, failing which the bid shall be rejected by giving a suitable cut-off date.	We presume that the BG shall be submitted along with Offer forwarding/ covering letter in Technical bid. Please confirm	NIT is clear regarding same
17	Tendernotice_8	Section I sub section IA	50/4	582 of 851	Mixed bed : Service cycle (Period between 2 successive regenerations) 24 hrs	But in functional guarantees it is mentioned as " Mixed bed shall be regenerated after minimum 30 hrs of operation followed by regeneration period not exceeding 6 hrs.Kindly confirm.	Bidder to refer technical amendment 1.
18	Tendernotice-7	-	Process Flow Block Diagram STP	142	Process Flow Diagram STP (TREATED WATER DISPOSAL PIPING FROM PUMP DISCHARGE TO NEARBY HORTICULTURE AREA)	We presume that bidder shall consider STP Treated water disposal piping within plant battery limit. Further piping from plant battery limit to nearby horticulture area is not in bidder scope. Please confirm	Bidder understanding is not correct. Bidder to refer cl. No. 6.1.1.21, 6.1.2.24 & 6.1.3.18, page no. 38 to 40 of 851 regarding horticulture piping scope.
19	Tendernotice-7	-	PE-DG-508-164-W001	146	P&ID - EFFLUENT TREATMENT PLANT	We presume that bidder shall follow pipe sizes as per Tender P&ID for ETP plant.	Wherever pipe sizes included in technical specification, bidder to follow the same. However selection of pipe sizes shall be done by bidder based upon design criteria given in tender specification and system requirements for other than specified pipe sizes.

PRE-BID CLARIFICATION							
Sl. No	VOLUME	SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION REQUIREMENT	CLARIFICATION	BHEL REPLY
20	-	General	-	-	Pre-Treatment Plant, Demineralization Plant, Condensate Polishing Plant, Sewage Treatment Plant , CW Chemical Treatment Plant,CHP Run-Off Water Treatment System and Chlorine Dioxide Dosing System	We presume that other than ETP plant, Piping sizing shall be as per bidder design based on the pipe line velocity criteria mentioned in the tender document.	Wherever pipe sizes included in technical specification, bidder to follow the same. However selection of pipe sizes shall be done by bidder based upon design criteria given in tender specification and system requirements for other than specified pipe sizes.

PRE-BID CLARIFICATION							
Sl. No	VOLUME	SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION REQUIREMENT	PRE-BID CLARIFICATION	BHEL Reply
1	NIT	-	Evaluation Criteria	02 of 47	In RA, the loading (technical/commercial), if any, shall be added by bidder while submitting the bid in reverse auction portal. Ordering shall be done after de-loading the commercial/ technical loading from bidder's final price.	Since it is a technology job, it would not be the best option to go for Reverse Auction. In which case, many reputed companies like us will not like to participate. Hence we request you to kindly reconsider not to go for Reverse Auction in this case since this being a technology project.	Reverse Auction (RA) shall be done as per NIT.
2	NIT	-	Local Content Certificate as per latest MII Order	41 of 47	Further, it is also certified that the local content percentage (%) certified above is in line with definition of ocal content given in point no 2 of Public Procurement (Preference to Make in India), Order 2017- revision, having ref. no. P-45021/2/2017-PP(BE-II)-Part(4) Vol.II dated 04.06.2020 & 19.07.2024 an M/s..... qualifies as Class-I/Class-II (strike out whichever is not applicable) local supplier.	We presume that the " ocal " is a typo error and to be read as "local" in the Local Content Certificate. Please confirm	Confirmed

Pre - Bid Clarifications						
Sl. No.	Document Ref	Page No	Clause No.	Specifications Mentioned	Clarification/ Deviation	BHEL REPLY
1	NIT-2024-08-30-03_55_15	1 of 1	Due Date & Time	20-Sep-24; 02:00 PM IST	Considering the magnanimous quantum of work involved under this NIT, we sincerely request you to offer time till 19-Oct-24 for submission of bids.	Considering volume of work involved in this tender enquiry. Bid submission time of 21 days instead of 10 days have been given. Bidders to submit their offer with in due date & time
2	NIT-2024-08-30-03_55_15	2 of 47	EMD	Applicable; EMD Value - 40 Lakhs	We request you to waive off the EMD requirement and in lieu, Letter of Undertaking may please be permitted.	EMD is only exempted for Micro and Small Enterprises (MSEs) or Start-ups as recognized by Department for Promotion of Industry and Internal Trade (DPIIT)). Bidders other than above have to submit EMD as per NIT.
3	NIT-2024-08-30-03_55_15	22 of 47	1.1	The Bidder should have designed, supplied, erected and commissioned at least one (1) number water / waste water treatment plant having capacity of not less than 1000 Cu.m/hr, comprising of clarifiers / tube settlers / thickeners or a combination thereof including civil works. The plant should have been in successful operation for at least one (1) year as on the date of 03.03.2023.	Since Civil works associated with the Pre-treatment Plant is not part of the bidders scope as per the Enquiry document, we sincerely request you to waive off the requirement civil works under respective Technical Pre-Qualification Requirement	Technical PQ requirement is firm, hence no deviation is acceptable. Bidder to follow the same.
4	NIT-2024-08-30-03_55_15	31 of 47	24	Mandatory Spares : Delivery of mandatory spares shall be as per NIT	We request delivery of Mandatory Spares to be aligned / accepted (including MDCC) with the respective Main Equipment. This shall help overall project deliverance in optimized way in both time as well as cost perspective.	Delivery of Mandatory Spares shall be as per NIT

Pre-Bid Clarifications							
S. No	Section	SubSection & Clause No.	Page No.	Area	Tender Clause	Bidder's Query	BHEL Reply
Water Package							
1	SECTION – IA	9.1.2	69 of 851		Supply of all CWT specialty chemicals i.e. HEDP & PBTC (common), Polymeric dispersant, Biodispersant, Corrosion inhibitor (Zn) for first fil, pre-commissioning, commissioning, trial run, PG test and One (1) year operation after PG test of CW system at full load of all units shall be in bidder's scope of supply.	Minimum Manpower required and scope of services for operation of Plant shall be provided in detail.	Bidder to refer technical specification page no. 398 to 403 of 851 (OPERATION AND MAINTENANCE) for details.
2	SECTION – IC	2.22.13	633 of 851	C&I	SIL certification - SIL2	Pls confirm the type of Actuator to be supplied whether Normal Integral Actuator or Profibus with SIL2 Actuator .	Bidder to refer page no. 631 of 851 in which MOTORISED VALVE ACTUATOR - Non Intrusive Profibus Type is required. Hence, Profibus with SIL2 certification is required.
3	SECTION – IC	38	614 of 851	C&I	ANNUAL MAINTAINENCE SERVICE (AMS) FOR (i) ANALYSERS OF DM, PT, ETP (LET), CLO2, CW TREATMENT & CPU PLANT (ii) PROFIBUS INSTRUMENTS OF WATER TREATMENT PACKAGES	What is the minimum and Maximum number of visits to be considered for Annual Maintenance Service for All analysers and instruments.	Bidder to refer technical specification cl. No. 38.2.1, page no. 615 of 851 for number of visit for AMS for Analyzers and Profibus instruments.
4	SECTION – IC	38.1.1	614 of 851	C&I	The Contractor's scope shall also include providing Post Warranty Maintenance for 3 years after completion of warranty period of the offered wireless systems and all associated components as per specification. The AMS shall include tools and tackles as required; travel, boarding & lodging of service engineer. In the event of any malfunction of the system hardware/system software, experienced service engineer shall be made available at site within 48 hours on the receipt of such information from Employer.	We understand Wireless instruments not applicable in this package. If wireless instruments applicable, kindly provide the list of Instruments to be supplied in wireless mode and its AMC requirements. We also undersatnd all Analysers & profibus based transmitters should covder under 3 years AMC in addition to warranty period.	Bidder to note that wireless intruments are not applicable. However, AMS shall be in bidder's scope for profibus instruments and analyzers as per details included in technical specification in addition to warranty period.

Pre-Bid Clarifications					
S.No.	Page	Clause	Title	Clarifications	BHEL Reply
1	556 of 851	18.4 a) & 18.5 a)	Capacity of Measuring Tanks	Kindly confirm the concentration of solution to be stored in the measuring tanks.	Refer Technical amendment 1

Pre-Bid Clarifications					
S.No.	Page	Clause	Title	Clarifications	BHEL REPLY
1	395 of 851		Raw Water Analysis	The individual ions defined in the tender do not match with the total cation / total anions. You are requested kindly to share the correct water analysis.	Bidder to balance the analysis as per details given in tender specification while designing all the systems.
2	111 of 851	13.3	Scope of Supply (Civil)	As per the defined scope under Scope of Supply, only Civil Assignment Drawings shall be furnished by successful bidder during detail engineering. The corresponding civil drawings, Civil Design calculations along with RCC details and construction drawings shall be prepared by BHEL.	Bidder to refer civil design requirements w.r.t. PT plant and CHP run off water treatment package in technical specification. Further, civil design of balance packages (DMP, ETP, STP, CWT, CLO2, CDS, CPU, ODS & LD) shall be done by BHEL.
	285 to 302 of 851		Master Drawing List (MDL)	You are requested kindly to confirm deletion of Civil Design Documents and revise the MDL	Deletion of civil documents is not required in line with above reply.
3	—	—	General	Acid/Alkali proof lining Acid / Alkali Proof Lining in various RCC Sumps, Pits, Floor, Drains etc are excluded from our Scope of Supply as the same are part of Civil Works. Please confirm, if our understanding is correct.	Acid / Alkali Proof Lining in various RCC Sumps, Pits, Floor, Drains etc., shall be in BHEL scope.
4	—	—	General	Civil Sump / Pit / Tank / Clarifier All ladder access for RCC Sump / Pit / Tank / Clarifier, as required, shall be in RCC and only hand railing shall be included in Bidder's Scope. Please confirm, if our understanding is correct.	Bidder understanding is not correct. All ladder access for RCC Sump / Pit / Tank / Clarifier, handrailing shall be in bidder's scope as defined in technical specification.
5			General	All sheds are excluded from our Scope of Supply. Please confirm, if our understanding is correct.	All shed structural/ RCC shall be BHEL scope.
6			General	Kindly provide the criteria for designing of Sludge Transfer Pumps Capacity.	Bidder to refer technical specification page no. 556 of 851 in which minimum capacity of sludge transfer is mentioned for PT plant. Bidder to select capacity of sludge transfer pump in line with upstream and downstream design requirements for CHP un off water treatment system. Further, bidder to refer technical specification page no. 511 of 851 in which minimum capacity of sludge transfer is mentioned for ETP.
7	547 of 851	17.4.1	Pumps - Vertical Sump Pumps in Data Sheet-A for CHP Run-Off WTP	The number of Sludge Transfer Pumps mentioned in the Data Sheet-A of CHP Run-Off WTP as "Two (2x100%)", which is different from the P&ID for CHP Run-Off Water Treatment System (Page-453 of 851) shown as "3x50%". Kindly clarify.	The number of Sludge Transfer Pumps mentioned in the Data Sheet-A of CHP Run-Off WTP as "Two (2x100%) shall be followed by bidder. Bidder to refer Technical Amendment 1 regarding same.

S.No.	Page	Clause	Title	Clarifications	BHEL REPLY
8	557 of 851	19.4	Potable Water Pumps (for PT CLO2 Feed)	Pump Capacity and CLO2 Building Piping Distance from PT Plant required for Pump Head Calculation.	Pump capacity of PT CLO2 dosing system shall be decided by the bidder as per generator capacity requirements. Further,Distance between PT plant area and CLO2 area shall be considered as per 450 meters and piping w.r.t. same shall be in bidder's scope. In addition, CLO2 system dosing piping inside respective areas shall also be in bidder's scope.

Pre -Bid Clarifications					
Sl. No.	TENDER DOC	Document No	AS PER TENDER DOC	CLARIFICATION POINTS	BHEL REPLY
1	TENDER NOTICE 8	Drawing No . 9587-001-136-PVM-F-207 (page No. 452 of 851)	Reference Drg No. 1. Process Design & Equipment sizing calculation for CWT (9587-001-136-PVM-U-211)	Drawing No. (9587-001-136-PVM-U-211) is missing. Kindly provide the circulating water flow to calculate the quantity chemicals required for the CW System.	Drawing No. (9587-001-136-PVM-U-211) is listed in reference only. Bidder to generate this document during detailed engineering after award of contract. Further, bidder to refer page no. 396 of 851 in technical specification for required data of CW system.

Pre - Bid Clarifications					
Sl. No.	TENDER DOC	CLAUSE	AS PER TENDER DOC	CLARIFICATION POINTS	BHEL REPLY
1	TENDER NOTICE 7, ANNEXURE X, WATER ANALYSIS AND INFLUENT QUALITY	Raw Water Analysis Sr. No 18		Kindly provide inlet TSS value for design of clarifier	Bidder has to consider TSS value as 500 mg/lit in Raw Water analysis for designing of the systems. Bidder to refer Technical Amendment 1 regarding same.
2	TENDER NOTICE 8, DATA SHEET – A FOR DM PLANT	Sr. No 8	Outlet Quality : CO2 less than 2 ppm	CO2 at the outlet of Degasser shall be 5 ppm.	Effluent from degassifier should not have CO2 content more than 5 ppm. Bidder to refer Technical Amendment 1 regarding same.
3	TENDER NOTICE 8, DATA SHEET – DATASHEET A FOR CHP RUN OFF WTP	Sr. No. 12.1	Filter Press Quantity - 2 Nos	Please confirm that filter press shall be 2 X 50% or will be 2 X 100%.	Bidder to refer technical specification cl. No. 10.3.6 (Filter Press), page no. 79 of 851 regarding sizing criteria of each filter press. Bidder to adhere.
4	TENDER NOTICE 6, ANNEXURE II	Sub vendor List -	UF RO membrane	UF/RO membrane shall be IEI Make only.	Make shall be proposed by bidder during detailed engineering after award of contract and same shall be subjected to acceptance by BHEL and NTPC.
5	TENDER NOTICE 6, ANNEXURE II	Sub vendor List -	Resin Make	Resins shall be IEI Make.	Make shall be proposed by bidder during detailed engineering after award of contract and same shall be subjected to acceptance by BHEL and NTPC.
6	TENDER NOTICE 5, SECTION – I, SPECIFIC TECHNICAL REQUIREMENTS - MECHANICAL	13.5 Exclusions:	Dismantling or rerouting of any underground pipeline/ buried utilities.	Please share underground survey report.	Dismantling or rerouting of any underground pipeline/ buried utilities shall not be in bidder's scope. Hence, underground survey report is not required to be shared.
7	Local Content			As there is no imported component applicable for the said Project, We hereby request you to accept bidders self declaration about local content instead of letter from statutory auditor. We request you to accept our request	Since this is condition of MII Order from Govt of India. Bidders to submit documents as per NIT
8	Tendernotice_9 SECTION- IC SPECIFIC TECHNICAL REQUIREMENT-	CONTROL & INSTRUMENTATION C&I TECHNICAL REQUIREMENT 24	For PT CLO2 System, Two (2) Nos. Online Residual Chlorine dioxide analyzer in the potable/raw water systems.	There are 6 different Dosing point for PT (to Filtered water Tank of PT potable comp 1, Filtered water Tank of PT potable comp 2, Stilling chamber of PT CW system, Aerator of PT CW system, stilling chamber of PT CW system, Aerator of PT DM system. Hence please confirm location of RCDA and its distance from Chlorination Building (PLC room)	Bidder to take tapping for RCDA from suction/ discharge of PT CLO2 dilution water pumps located in CLO2 area. Further, RCDA shall be kept in analyzer room inside CLO2 building.

Sl. No.	TENDER DOC	CLAUSE	AS PER TENDER DOC	CLARIFICATION POINTS	BHEL REPLY
9	Tendernotice_9 SECTION- IC SPECIFIC TECHNICAL REQUIRMENT-	CONTROL & INSTRUMENTATION C&I TECHNICAL REQUIREMENT 25	CW CIO2 System, 2 Nos. (one per unit) of Online Residual Chlorine dioxide analyzer in the Cooling Water Return Header. As per TP Distance between CW return header to residual CIO2 analyser located in CLO2 area for sampling shall be 325 meters for each cooling tower. Hence, total sampling Piping of 650-meter length is in bidder's scope.	Based on this point we assume there are 2 headers for CW CLO2 system. But please confirm the distance between PLC room to RCDA, Cables required will be in whose scope.	There are 2 headers for CW CLO2 system. RCDA shall be kept in analyzer room inside CLO2 building. Further, bidder to refer cable scope as per "ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR" included in technical specification page no. 595 to 597 of 851 for cable scope.
10	Tendernotice_9	CONTROL SYSTEM FOR WATER TREATMENT PACKAGES Si. 6 STANDARD ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR FOR SKID MOUNTED SYSTEM pt 7	6 CIO2 System Control from DCS –Yes Local Control Panel - No DCS in BHEL scope Refer C&I portion of specification for scope of fiber Optical cables if used between PLC/ microprocessor & DCS.- Vendor Scope	We understand JB shall be in IEI Scope. Beyond that cables, cable trays, PLC/ DCS etc shall be in BHEL's scope. FO Cable is not applicable	JB shall be in bidder's scope. Scope of cable and cable tray shall be in line with "Electrical Scope between BHEL and Vendor Scope" included in technical specification. DCS based control system is applicable for Water treatment packages and same shall be in BHEL scope. Further, FO cable between DCS panels supplied by BHEL, shall be in BHEL scope.

Sl. No.	TENDER DOC	CLAUSE	AS PER TENDER DOC	CLARIFICATION POINTS	BHEL REPLY
11	Tendernotice_5	Design Requirements 4.3.1 4.6.5	provided at aerators, stilling chambers of PT systems For controlling organics in circulating water system, CLO2 dosing may be provided in CW Forebay channel and/ or in Cooling tower basins as per system requirement for disinfection and maintaining residual CLO2. Distance between Chlorine di oxide dosing area and CW forebay channel is 296 m and piping for the same is in bidder's scope. Further, Bidder to refer plot plan attached with this specification and consider additional piping distribution in side CW cooling tower basin and forebay as per dimension given elsewhere in this specification. Piping for CLO2 dosing from CLO2 area up to both cooling tower basins is also in bidder's scope, if CLO2 dosing is required in cooling tower basins, further distance shall be considered by bidder as per plot plan attached	Please confirm the Location and distance from Dosing Building We understand CLO2 dosing has to be done in Fore bay channel which is at 296 m. But Please provide the distance between CLO2 building to CT basin to be considered.	Bidder to refer technical specification sl. No. 4.6.6 (terminal points), page no. 32 of 851 regarding location and distance from dosing building. Further, bidder to refer plot plan for distances as required.
12	Tender Notice 5	4.3.7	Certifications/ Statutory clearances from directorate of explosives or any other authorities; if any required, shall be obtained by the contractor.	Certifications/ Statutory clearances from directorate of explosives or any other authorities shall be excluded from IEI Scope. We shall provide Technical support required if any.	Tender specification is clear, bidder to follow the same.
13	Tender Notice 5,	4.6 TERMINAL POINTS (also refer P&I Diagrams enclosed) 4.6.3	Potable water for dilution water requirement for PT CLO2 dosing system shall be taken by bidder from PT CLO2 pumps feed pumps located in Filtered water storage tanks (Potable).	Please provide the distance to be considered between PT CLO2 feed Pumps located in Filtered water storage tanks (potable) to CLO2 building / distance at which piping is to be tapped.	Distance between PT plant area and CLO2 area shall be considered as per 450 meters and piping w.r.t. same shall be in bidder's scope.

Sl. No.	TENDER DOC	CLAUSE	AS PER TENDER DOC	CLARIFICATION POINTS	BHEL REPLY
14	Tender Notice - 5,	4.6.6	Distance between Chlorine di oxide dosing area and PT plant dosing location shall be 450 m. Piping for the same is in bidder's scope. Further distribution piping is in bidder's scope	We understand the total area to be considered for PT Dosing is 450 (including 6 different pipes) Please provide the flow rate of each stream to be considered so as to consider the piping sized and dosages at each point.	Distance between PT plant area and CLO2 area shall be considered as per 450 meters and piping w.r.t. same shall be in bidder's scope. In addition, CLO2 system dosing piping inside respective areas shall also be in bidder's scope. Flow rate shall be decided by bidder based upon CLO2 dilution water requirement.
15	Tender Notice - 5,	4.1 SCOPE OF SUPPLY 4.1.11	2 Nos. Online Residual Chlorine dioxide analyzer in the PT CLO2 systems	Please confirm Location of Analyzers and distance between Analyzers to PLC system.	Bidder to note that PLC is not applicable for CLO2 system. Control system shall be DCS based (in BHEL scope). Location of analyzers shall be in CLO2 analyzer room located in CLO2 building. Further, cabling between analyzer room and DCS room shall be in BHEL scope.
16			2 Nos. Online Residual Chlorine dioxide analyzer (one per unit) in the cooling water return header. Location of tapping shall be provided by BHEL in each CW return header near to TG hall area for sampling. CLO2 analyzers shall be installed by bidder in common SWAS room of both TG units	We understand 2 Nos of Return headers available at site. Provide Distance between SWAS room to PLC for CW system.	Bidder may please read cl. no. 4.1.12, page no. 27 of 851 as below "2 Nos. Online Residual Chlorine dioxide analyser (one per unit) in the cooling water return header. Location of tapping shall be provided by BHEL for sampling from each Cooling tower return header. CLO2 analysers shall be installed by bidder in CLO2 building inside CLO2 analyzer room."
17	Tender Notice - 5,	4.1 SCOPE OF SUPPLY 4.1.23	The cell assemblies shall have a maximum design operating pressure of 10 kg/cm2 and should be tested for 1.5 times system design pressure before shipment.	Cell Assembly is NA for this package.	Tender specification is clear, bidder to follow the same.
18	Tender Notice - 5,	13.5.4	Air conditioning, ventilation & firefighting facilities. However, heat dissipation data for all motors & panels as applicable shall be finished by the bidder during detail engineering for sizing of HVAC equipment.	We presume Air conditioning, ventilation & firefighting facilities shall free of issue at site.	Tender specification is clear, bidder to follow the same.

Sl. No.	TENDER DOC	CLAUSE	AS PER TENDER DOC	CLARIFICATION POINTS	BHEL REPLY
19			The design of chlorine dioxide system should include safety, handling of precursor chemicals viz NaClO2 and HCl, water source, chlorine dioxide distribution and physical location of all generation equipment & associated accessories.	Supply of First Fill Chemicals (HCL, NaClO2, SMBS), Chemical required for E & C till Guarantee period will be in whose scope.	ClO2 system chemicals such as HCL, NaClO2 and neutralization chemicals are excluded from bidders scope.
20				VFD to control the speed for varying the flow rate shall be in whose scope of supply	VFD required as technical specification shall be in bidder' scope. Further, if process demands VFD operated drives, then the same shall also be in bidder's scope. Further bidder to refer additional requirements for VFD panels in Technical Amendment 1.
21				Please confirm structural piping supports required shall be in BHEL Scope of supply.	Structural piping support shall be in bidder's scope. However, main pipe trestle used for piping shall be in BHEL scope.
22			As per Layout and Datasheet BULK HCL STORAGE TANKS / BULK NaClO2 STORAGE TANKS. Quantity - 3 X100% Tanks shall have net effective storage capacity of 15 days (minimum 4 hours dosing/day in case of CW System and continuous dosing in case of PT system) requirement or 3x 35 m3 whichever is higher	Considering net effective storage capacity of 15 days with minimum 4 hours dosing/day in case of CW System and continuous dosing in case of PT system, Total Capacity comes out to 105 m3 for HCL and 110 m3 for NaClO2. Hence we can provide Tank of 3 x 35 m3 (i.e total 105 m3) but Shall not meet 3 x 100 % capacity as specified in Tender. Please note such a huge tank of capacity 105 m3 is not recommended. Hence we can consider 3 x 50%. i.e 55 m3 each tank – 3 Nos (2W+1S). Please confirm the capacity.	Tender specification is clear, bidder to follow the same.
23	Datasheet A for Chlorination	Point 9	Neutralization system for NaClO2	HCL and Na2SO3 tanks are shown but as per IEI design engineering we use only SMBS Dosing to neutralize NaClO2	Minimum Capacities and number tanks defined shall remains in line with technical specification, irrespective of whatever neutralization system selected by bidder.

Sl. No.	TENDER DOC	CLAUSE	AS PER TENDER DOC	CLARIFICATION POINTS	BHEL REPLY
24	TECHNICAL SPECIFICATION FOR WATER TREATMENT PACKAGES	8.1 SCOPE OF SUPPLY/B. REGENERATION SYSTEM	22) All analysers (pH, conductivity, concentration etc) shall be provided in air conditioned panel/ cabinet. Air conditioning equipment required for all analysers panel shall be in bidder's scope	As civil work is in client scope of work hence only analyzer like Silica analyzer, sodium analyzer etc will be kept in air conditioner room which is civil work work done by client with AC, however Ph, conductivity, turbidity, ORP etc will be field mounted as such air condition is not required.	Tender specification is clear, bidder to follow the same.
25	TECHNICAL SPECIFICATION FOR WATER TREATMENT PACKAGES	CONTROL PHILOSOPHY FOR AMMONIA DOSING SYSTEM	A local panel comprising of 'START' push button, 'STOP' push button along with 'ON/OFF/TRIP' indication, local/ remote indication, stroke position indicator, raise/ lower push button for stroke position and local annunciation shall be provided for local operation. The 'START' push button and 'STOP' push button shall be routed to DDCMIS.	Since MCC and DCS are client scope of work hence required communication cable between MCC to DCS along with normal and special Cable, cable tray and its support are in client scope of work. For pump application local control panel is not applicable and individual motor will be operated through LPBS which is in client scope of work. As per application wherever dosing pump provided with regulating stroke controller then dedicated stroke controller panel (as per manufacturing standard) will be provided and feed back from stroke controller panel to DCS/RIO panel provision profibus/hardwired cable will be considered however all cabling will be in customer scope of work.	AMMONIA DOSING SYSTEM is a supply package and bidder has to supply complete skid mounted system within skid boundary, which is well defined in tender specification. Beyond skid, all scope shall be in BHEL's scope.
26	SECTION- IC SPECIFIC TECHNICAL REQUIREMENT-CONTROL & INSTRUMENTATION	C&I TECHNICAL REQUIREMENT	All weather Local Panel fitted with integral Air Conditioner shall be provided for housing analyzers etc., if not kept in AC room.	As civil work is in client scope of work hence only analyzer like Silica analyzer, sodium analyzer etc will be kept in air conditioner room which is civil work work done by client with AC, however Ph, conductivity, turbidity, ORP etc will be field mounted as such air condition is not required.	All weather Local Panel fitted with integral Air Conditioner shall be provided by bidder for housing analyzers.
27	SECTION- IC SPECIFIC TECHNICAL REQUIREMENT-CONTROL & INSTRUMENTATION	C&I TECHNICAL REQUIREMENT	All the outdoor field instruments such as analysers/transmitters/meters etc. shall be provided with suitable Free standing cabinet(s)/panel/rack so that the equipment are protected against rain/sunlight etc.	As per NTPC standard, instrument will be mounted in field on stanchion pipe support.	Tender specification is clear, bidder to follow the same.

Sl. No.	TENDER DOC	CLAUSE	AS PER TENDER DOC	CLARIFICATION POINTS	BHEL REPLY
28	TECHNICAL SPECIFICATION FOR WATER TREATMENT PACKAGES	11.1 SCOPE OF SUPPLY (MECHANICAL	11.1.51 Bidder to provide Profibus based PT (Pressure Transmitters)/ DPT (Differential Pressure Transmitters/TT (Temperature Transmitters) for entire PT Plant package.	Instrument selection will be done as per the requirement however profibus cable, field Junction box, power cable from the profibus JB to DCS with cable, cable tray will be considered in client scope of work.	Profibus cable, field Junction box (except for Temperature Transmitters), power cable from the profibus JB to DCS shall be in BHEL scope. However, Field junction Box for Temperature Transmitters(TT-JB) shall be in Bidder's scope. Further, bidder to refer cable and cable tray scope as per "ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR" included in technical specification page no. 595 to 597 of 851 also.
29	TECHNICAL SPECIFICATION FOR WATER TREATMENT PACKAGES	11.1 SCOPE OF SUPPLY (MECHANICAL	11.1.50 All motorized valves to be supplied with Non-intrusive Profibus based Electric Actuator for PT plant package along with necessary interface units for linking to corresponding Control System as applicable.	MOV selection will be done as per the requirement however profibus cable, field Junction box, power cable from the profibus JB to DCS with cable, cable tray will be considered in client scope of work.	Profibus cable, field Junction box, power cable from the profibus JB to DCS shall be in BHEL scope for MOV. Further, bidder to refer cable and cable tray scope as per "ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR" included in technical specification page no. 595 to 597 of 851 also.
30	SECTION- IC SPECIFIC TECHNICAL REQUIREMENT-CONTROL & INSTRUMENTATION	C&I TECHNICAL REQUIREMENT	Redundancy of sensors shall be provided by bidder (i) Triple redundancy for all analog and binary inputs required for protection of system/drives. (ii) For all other control functions dual redundancy of the sensors shall be provided by the bidder.	Need to discuss on the mention point.	Tender specification is clear, bidder to follow the same.

Sl. No.	TENDER DOC	CLAUSE	AS PER TENDER DOC	CLARIFICATION POINTS	BHEL REPLY
31	SECTION- IC SPECIFIC TECHNICAL REQUIRMENT-CONTROL & INSTRUMENTATION	Applicable for ClO2 package	All electrical devices like switches/ transmitters/ controller/ analyzer/ solenoid valves which are located in the in hazardous areas shall be made intrinsically safe by providing suitable type of transformer isolated barrier / Zener barrier of standard make & shall be provided with explosion proof enclosure suitable for hazardous areas described in National Electric Code (USA), Article 500, Class-I, Division-I or EN60079-14 or shall comply with the essential requirements of ATEX directives.	Need to discuss on the mention point.	Tender specification is clear, bidder to follow the same.
32	SECTION- IC SPECIFIC TECHNICAL REQUIRMENT-CONTROL & INSTRUMENTATION	Applicable for CW Treatment package	All electrical devices like switches/ transmitters/ controller/ analyzer/ solenoid valves which are located in the in hazardous areas shall be made intrinsically safe by providing suitable type of transformer isolated barrier / Zener barrier of standard make & shall be provided with explosion proof enclosure suitable for hazardous areas described in National Electric Code (USA), Article 500, Class-I, Division-I or EN60079-14 or shall comply with the essential requirements of ATEX directives.	Need to discuss on the mention point.	Tender specification is clear, bidder to follow the same.

Sl. No.	TENDER DOC	CLAUSE	AS PER TENDER DOC	CLARIFICATION POINTS	BHEL REPLY
33	SECTION- IC SPECIFIC TECHNICAL REQUIRMENT-CONTROL & INSTRUMENTATION	REQUIREMENTS SPECIFIC TO VARIABLE FREQUENCY DRIVE (VFD)	Fiber optic cable connection shall be provided preferably to ensure high network reliability.	if VFD's are in contractor scope of work then prvision for profibus will be considered however required communication cable , cable tray with support from VFD TO DCS will be done by client. Same can also discuss during meeting.	VFD required as technical specification shall be in bidder' scope. Further, if process demands VFD operated drives, then the same shall also be in bidder's scope. Further, bidder to refer cable and cable tray scope as per "ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR" included in technical specification page no. 595 to 597 of 851 also. Requirement of cable tray support is also defined in "ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR", however ISMC/ ISMB required to support Cable tray shall also be supplied and erected by bidder. FO cable between VFD panels and DCS panels shall be supplied by BHEL scope.
34	SECTION- I B SPECIFIC TECHNICAL REQUIRMENT-ELECTRICAL	STANDARD ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR FOR SKID MOUNTED SYSTEM	Any special type of cable like compensating, co-axial, prefab, MICC & fibre optical	Regarding the special cable for analyzer from sensor to transmitter will be provided by contractor however cable from transmitter, MOV, VFD, MCC to DCS/RIO panel not in IEIL scope of work. And fibre optic cable from RIO panel to DCS also not in IEIL scope nof work.	Bidder to refer cable scope as per "ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR" included in technical specification page no. 595 to 597 of 851 also. Further, FO cable between RIO panels and DCS panels shall be supplied by BHEL scope.
35	General	Bid Submission Date		We hereby request you to extend date of bid submission from Due date to further 15 working days.	Considering volume of work involved in this tender enquiry. Bid submission time of 21 days instead of 10 days have been given. Bidders to submit their offer with in due date & time

Pre-Bid Clarifications

S. No	Section	SubSection & Clause No.	Tender Clause	Bidder's Query	BHEL Reply
1		Technical Pre Qualification Requirement, Pg 1 of 2, clause - 1.2	Plant DM Plant Osmosis Reverse with osmosis reverse offers Bidder the case In the water, DM for plant combination bed mixed erected supplied, designed, have should Bidder commissioning supervised / commissioned and Plant RO)) Osmosis Reverse number (1) one of 120 of flow) tepermea) capacity minimum of in Plants RO numbers (2) two OR Cum/hr capacity minimum of each contracts separate (3) three OR Cum/hr 60 of flow) permeate) of each contracts separate in Plants RO numbers 40 of flow) permeate) capacity minimum be should s)) plant RO above The Cum/hr. ppm 500 ≤ TDS with Water feed inlet having water permeate producing of capable and OR ppm 100 than more not TDS with quality of capable and water sea as feed inlet having not TDS with quality water permeate producing have should s)) ntpla The ppm. 500 than more (1) one least at for operation successful in been 03.03.2023 of date the on as year	Request you to consider RO plant of minimum capacity 110 m3/hr instead of 120 m3/hr. We are interested in this tender and trust if given a chance we will put in a competitive techno-commercial offer with high quality deliverables and workmanship.	Technical PQ requirement is firm, hence no deviation is acceptable. Bidder to follow the same.



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The following modifications with respect to Technical Specification for Water Treatment Packages for LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW), BHEL's Technical specification no PE-TS-508-404-W001 shall apply.

Bidder to note that existing clauses as appearing in the specification stands modified. Bidder to note and follow the same.

MODIFIED CLAUSES.

SL NO.	SECTION	SUB-SECTION/ DESCRIPTION	CLAUSE NO	PAGE NO	EXISTING	ADDITION/ MODIFICATION
1.	I	Section – IA/ ANNEXURE – XIII (DRAWINGS)	P&ID for CHP Run-Off Water Treatment System	453 of 851	Sludge transfer pumps "3x50%".	Sludge transfer pumps "2x100%".
2.	I	Section – IA/ ANNEXURE - X (WATER ANALYSIS AND INFLUENT QUALITY)	Raw Water Analysis Sr. No 18 (Total Suspended Solids, TSS)	395 of 851	--	Bidder has to considered TSS value as 500 mg/lit in Raw Water analysis for designing of the systems
3.	I	Section – IA/ DATA SHEET – A FOR DM PLANT	6.8	395 of 851	Outlet Quality: CO ₂ less than 2 ppm.	Outlet Quality: CO ₂ less than 5 ppm.
4.	I	Section – IA/ DATA SHEET – A FOR DM PLANT	50 (4)	582 of 851	Service Cycle (period between two (2) successive regenerations): 24 hrs.	Service Cycle (period between two (2) successive regenerations): 30 hrs.
5.	I	Section – IA/ ANNEXURE – III FUNCTIONAL GUARANTEES AND LIQUIDATED DAMAGES	--	--	--	Bidder to adhere following PG test criteria for CLO2, STP, CHP WTP and CWT. CLO2: Duration of PG test shall be 72 hours for each CLO2 generator. STP: Duration of PG test shall be 72 hours for each STP system. CHP WTP: Bidder to follow PG test requirements for CHP run off WTP same as mentioned for PT plant PG test requirements, as applicable. CWT: Duration of PG test shall be as per proven practice and the performance of various parameters including scale, corrosion, fouling and biofouling etc.



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						shall be monitored and guaranteed by bidder at mutually agreed intervals & period as decided during detailed engineering.
6.	I	Section – IC	39	615 of 851	REQUIREMENTS SPECIFIC TO VARIABLE FREQUENCY DRIVE (VFD)	Bidder to refer Annexure I included in this Technical Amendment for addition scope and technical requirements for VARIABLE FREQUENCY DRIVE (VFD). Bidder to adhere the same.
7.	I	Section – IA/ DATA SHEET – A FOR PT PLANT	18.5 a (Tank)	556 OF 851	PAC UNLOADING & DOSING SYSTEM Number- Two (2) numbers. Type-Vertical cylindrical with dished end bottom & with cover at the top. Capacity (each)- To hold coagulant for 12 hours requirement of all the clarifiers operating at design capacity and a design dosage rate of 2 ppm minimum, Whichever is maximum. Material- MSRL (Dished End) Motorized Stirrer (MOC (impeller & Shaft)-SS316)- One (1) number per tank.	PAC UNLOADING & DOSING SYSTEM Number- Two (2) numbers. Type-Vertical cylindrical with dished end bottom & with cover at the top. Capacity (each)- To hold coagulant for 12 hours (18% W/W) requirement of all the clarifiers operating at design capacity and a design dosage rate of 25 ppm minimum, Whichever is maximum. Material- MSRL (Dished End) Motorized Stirrer (MOC (impeller & Shaft)-SS316)- One (1) number per tank
8.	I	Section – IA/ ETP	7.1.19	43 of 851	Two (2) nos. trolley mounted portable oil Centrifuge complete with all accessories as required.	Two (2) nos. trolley mounted portable oil Centrifuge complete with all accessories as required for WWSWS. In addition, two (2) nos. trolley mounted portable oil Centrifuge with drum (200 Lit) complete with all accessories as required for TG area ETP sumps.
9.	I	Section – IA/ DATASHEET A FOR ETP	16 (f)	506 of 851	MRS UNIT-1 OILY WASTE WATER TRANSFER PUMPS Rated capacity, each m3/ hr.: 10	MRS UNIT-1 OILY WASTE WATER TRANSFER PUMPS Rated capacity, each m3/ hr.: 25
10.	I	Section – IA/ DATASHEET A FOR ETP	18 (f)	507 of 851	MRS UNIT-2 OILY WASTE WATER TRANSFER PUMPS Rated capacity, each m3/ hr.: 10	MRS UNIT-1 OILY WASTE WATER TRANSFER PUMPS Rated capacity, each m3/ hr.: 25
11.	I	Section – IA/ P & ID FOR ETP	--	446 of 851	MRS UNIT-1 WASTE WATER	MRS UNIT-1 WASTE WATER



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					TRANSFER PUMPS TYPE: VERTICAL CENTRIFUGAL CAP.- 10 M3/HR (1W+1S) & MRS UNIT-2 WASTE WATER TRANSFER PUMPS TYPE : VERTICAL CENTRIFUGAL CAP.- 10 M3/HR (1W+1S)	TRANSFER PUMPS TYPE: VERTICAL CENTRIFUGAL CAP.- 25 M3/HR (1W+1S) & MRS UNIT-2 WASTE WATER TRANSFER PUMPS TYPE : VERTICAL CENTRIFUGAL CAP.- 25 M3/HR (1W+1S)
12.	I	Section – IA/ P&ID FOR ETP	--	446 of 851	Transfer piping from MRS WASTE WATER SUMP UNIT-1 to Node 5: 50 NB & Transfer piping from MRS WASTE WATER SUMP UNIT-2 to TP 18: 65 NB	Transfer piping from MRS WASTE WATER SUMP UNIT-1 to Node 5: 65 NB & Transfer piping from MRS WASTE WATER SUMP UNIT-2 to TP 18: 80 NB
13.		Section-IA	Scope of chemicals	-	-	For RO-DM Plant: Anti-Scalant and Membrane cleaning speciality chemicals for RO-DM plant, required for 6 months regular operation shall be in Bidder's scope. For CWT Plant: All CWT speciality chemicals shall be in Bidder's scope of supply, as specified in Technical Specification. H ₂ SO ₄ is not in Bidder's scope of supply. For Other Water Treatment Packages (turnkey): Chemicals are excluded from Bidder's scope of supply.
14.		Section – IA/ P&ID DIAGRAM FOR OXYGEN DOSING SYSTEM/ SHEET 2 OF 2	Notes No. 2	434 of 851	One number skid per location shall be provided for dosing at Deaerator outlet (total = 2 nos.).	Two number skids per location shall be provided for dosing at Deaerator outlet (total = 4 nos.).



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ANNEXURE – I

1	DATASHEET - VARIABLE FREQUENCY DRIVE (VFD)	
1.1	OPERATING CONDITIONS	
	Ambient Temperature	50 Deg
	Relative Humidity	95% at 40DegC
	Rated frequency	50 Hz with a variation of +3% & -5%, and 10% combined variation of voltage and frequency unless specifically brought out in the specification.
	Voltage level for the VFD output to be fed to motor (Upto 400 kW)	415V/690V, Low Voltage, Three Phase AC (LV VFD)
1.2	SYSTEM DESCRIPTION	
	Type of drive	3-Phase Diode / Thyristor / Multi Stage IGBT / IGCT / SGCT/ IEGT
	Type of Cooling of VFD	Naturally air cooled/forced air cooled/Liquid cooled
	Converter Type	Full wave diode rectifier/active front end type
	Inverter Type	Thyristor/IGBT/IGCT/SGCT/IEGT
1.3	GENERAL REQUIREMENTS	
	Design	Modern proven design in power plant/industry
	415 V/690 V LV VFD	Current Source Inverter (CSI) or Voltage Source Inverter (VSI) type with minimum Twelve (12) pulse design / 6 pulse with active front end harmonic filter.
		For drives less than 100 KW Six (6) pulse
	Impact of VFD operation on Motors/ cables & supply system	no inherent detrimental impact
	Multiple VFDs for particular application	shall be of same design so as to ensure 100 % interchangeability of components
1.4	TECHNICAL AND OPERATIONAL REQUIREMENTS	
	System Design	Shall be designed to deliver the motor input current and torque for the complete speed torque characteristics of the driven equipment, with worst input supply voltage and frequency variation.



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		Shall be suitable for the load characteristics and the operational duty of the driven equipment
	Overload capacity of the controller:	
	- for constant torque applications	150% of the rated current for one minute
	- for variable torque applications at rated voltage	110% of rated current for one minute
	- If the motor load exceeds the limit	Automatically reduction of the frequency and voltage to the motor to guard against overload.
	Operating modes	Variable torque changing as a function of speed / Constant torque over a specific speed range / Constant power over a specific speed range / Any other
	Total harmonic voltage and current distortion limits	Shall comply to IEEE 519 & IEC 61000
	Withstanding power	Capable of thermal, dynamic stresses and transient mechanical torque, resulting from short circuit
	Damage control	Any damage resulting from short circuit or internal fault shall be limited to the component concerned.
	Easy access to hardware	To be provided
	Provision for replacement of card (in case of failure)	To be provided
	Allowable speed variation	Within range 10-110% or as per the requirement of driven equipment with speed set accuracy of +1% of rated maximum speed and steady state regulation of +0.5% of rated speed as per system requirement
	Power Factor for LV VFD	0.95 (minimum)
	Maximum allowable audible noise	85 dB (A) at a distance of one meter under rated loaded with all cooling fan operating conditions.
	Circuit components protection	Suitably protected against over voltages, surges, lightning etc.
	Programmed warning and fault protection function	Display a message in complete English words or Standard English abbreviations
	Drive's fault history	At least 30 time tagged fault messages to be stored
	AC environment for VFDs ($\geq 100\text{KW}$)	Required
	AC environment for VFDs ($< 100\text{KW}$)	Not required



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	Fiber optic cable connection	To be provided preferably to ensure high network reliability
1.5	VFD COMPATIBILITY WITH THE MOTOR	
	Inherent output harmonic resonance	Shall not be present in operating speed range
	Limitations of the motor cable length	VFD shall provide stable operation of motor from high-voltage dv/dt stress, regardless of cable length to motor, in case of any limitation, the vendor shall clearly state the limitations in the motor cable distance in his proposal
	If cable length becomes critical due to system requirements & constraints	filters/ chokes etc. shall be provided by the VFD manufacturers as an integral part of the VFD to mitigate the reflected wave effect of harmonics.
1.6	BYPASS ARRANGEMENT (Optional)	
	Bypass mode	Operation of Motor with VFD bypassed
	Bypass mode operation	During starting (under rated conditions) the motor will be switched on in VFD Mode to limit the starting current and after gaining speed, the load would be switched over to bypass mode.
	Comprehensive motor protection scheme for protection and control	Shall be decided during detailed engineering
1.7	STANDBY VFD ARRANGEMENT (Optional)	
	Common standby arrangement with auto/manual switchover	Required
	Changeover module	Complete protection, interlocks & control required
1.8	EFFICIENCY	
	Efficiency	Minimum 98%
	Efficiency evaluation parameters	Input transformer, harmonic filters and power factor correction (if applicable), VFD converters, cooling fans and output filter, as applicable in the system. Auxiliary controls: VFD control boards, cooling fans/pumps
	Valid test report	Required
1.9	COOLING SYSTEM	



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	Type	Air cooled Design
	Air-flow pressure switches	Required for monitoring purpose
	Temperature detectors	Required for monitoring purpose
	Cooling fans	Integral to the VFD/ enclosure, If the fan fails, the system must generate the alarm/trip for the fan failure
1.10	MOTOR	
	Type	Three (3) phase squirrel cage inverter duty Induction motor with VPI insulation (Resin poor) suitable for VFD application
	Bearings	Insulated bearing on at least one side for motor frame size above 250 frames
	Power Supply Requirement	Solid state power supply consisting of an adjustable frequency inverter for speed control Motor shall be suitable for the current waveforms produced by the power supply including the harmonics generated by the drive.
	Motor Insulation design	To accept the applied voltage waveform, within the Vpeak and dv/dt limits as per IEC-61800
1.11	OUTPUT FILTER (AS APPLICABLE):	
	Output/ dv/dt filter	Required for protection of motor from high voltage dv/dt stress. Shall be included within the VFD enclosure
1.12	DC LINK CAPACITOR (AS APPLICABLE):	
	Type	Self-healing film or electrolytic type having high life time
	Discharge resistors	Required, shall be capable of reducing the residual charges to zero just after the capacitor is disconnected from the supply source.
	Suitable for high ripple currents	Yes
1.13	AC/DC Reactor (As applicable)	
	Type	Dry type, air cored, self-cooled, indoor type. Suitable for withstanding earth fault continuously
	Insulation	Thermal Class 155(F), temperature rise is limited to thermal class 130 (B)
	Noise level	Shall not exceed value specified in NEMA TR-1
1.14	VFD PANEL REQUIREMENTS	



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	Enclosure frames	Required
	Load bearing members	Required
	Cable entry	Bottom of the panel with a removable bolted un-drilled gland plate.
	Protection (as per IS/IEC 60947)	IP: 4X or better for LV VFD
	Enclosure Design Criteria	Shall avoid harmonic and inductive heating effects and to shield any outside equipment from interference, to eliminate any radio frequency interference
	Protection against electromagnetic emissions	To be provided
	Illuminating lamp	Required
	Space heater with switch fuse	Required
	Variable setting thermostat.	Required
	Ventilation using air filters and fans/pumps	Required, to ensure that maximum temperature inside the cubicle is within permissible limits for reliable and continuous operation of the system.
	Terminal block	Separate Terminal block for power and control cable
1.15	LT & HT CABLES	Required, suitable for VFD system
1.16	CONTROL AND PERFORMANCE REQUIREMENTS	
	Automatic current limiting feature	Required, to control motor currents during startup and provide a "soft start" torque profile for the motor load combination
	Current and torque limit adjustments	Required
	Drive Speed control	Local or Remote mode
	Local / Remote selection provision	from VFD panel



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	Parameter Monitoring	- Input and output voltage of Drive - Input and output current of Drive - Motor speed - Input and output power frequency of Drive -Torque - Output kWhr of Drive - Ambient temperature - Run/stop and local/remote status displayed
	Operator console panel features	Front mounted
		Backlit alphanumeric display
		A keypad with keys for parameterization and adjusting parameter
		Facility / port to connect external hardware
		Upload and download of all parameter settings from one drive to another drive for start-up and operation
		User-friendly licensed software for operation and fault diagnostic
	Protection features	i) Converter transformer: short circuit, over current, earth fault & winding temperature high protection.
		ii) Incoming and outgoing line surge protection.
		iii) Under / over voltage protection
		iv) Phase loss, phase reversal, overload, negative phase sequence, locked rotor protection.
		v) Instantaneous Over current & Earth fault protection
		vi) Converter/Inverter module failure indication.
		vii) Over frequency/speed protection.
		viii) Ventilation failure indication & alarm.
		ix) Over temperature of VFD
		x) Bearing temperature protection.
		xi) System earth fault protection.
		xii) Speed reference loss protection.
	Operator Control Panel	Start / stop (in local/remote mode)



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	(on the front panel door)	Speed control (Raise / lower)
		Acknowledge/Accept/ Test Push Button for annunciation
		Auto / Manual / Test Mode select
		Emergency stop
		Trip-Remote Breaker
1.17	DIAGNOSTIC FEATURES	Microprocessor/PLC based digital diagnostic system which monitors its own control functions and displays faults and operating conditions
		Information regarding failure of any of the system including shut down of the system shall be available.
		It shall be possible to retrieve the record of events prior to tripping of the system or de-energization.
		Auxiliary supply to the system components or to the electronics (firmware) for the diagnostics / display shall be taken care of by the manufacturer for this purpose.
1.18	SERVICEABILITY / MAINTAINABILITY	
	Power Component Accessibility	All power components in the converter sections shall be designed for rack-out accessibility for ease of maintenance and to minimize repair downtime
	Marking / Labelling	Sleeve type wire marker tags or other acceptable means of permanent identification shall be applied to power and control wiring. Individual labels shall be provided for all major components of the VFD system

