भारत हेवी इलेक्ट्रिकल्स लिमिटेड
Bharat Heavy Electricals Limited
फैब्रिकेशन, स्टैम्पिंग ऐन्ड इंसुलेटर प्लांट, जगदीशपुर
Fabrication, Stamping & Insulator Plant (FSIP), Jagdishpur

TECHNICAL SPECIFICATIONS OF ONLINE CONTINUOUS EFFLUENT MONITORING SYSTEM AT BHARAT HEAVY ELECTRICALS LIMITED, FSIP , JAGDISHPUR

PRE-QUALIFYING CRITERIA FOR SUPPLY OF ONLINE CONTINUOUS EFFLUENT MONITORING SYSTEM

The bidder/vendor has to compulsorily meet the following requirement to get qualified for submitting an offer for the ONLINE CONTINUOUS EFFLUENT MONITORING SYSTEM as per tender terms & conditions:

PQC for item Online Continuous Effluent Monitoring System at outlet of ETP at FSIP Jagdishpur:

S.No.	Pre-Qualification Criteria for the vendor	Document Copy to be furnished
1	GST Registration Certificate	Registration Certificate Copy
2	PAN Number	PAN Card Copy
3	Authorization from Original instrument manufacturer	As nearly all the RTEQMS are manufactured abroad, the Indian Bidder has to provide copy of the authorization from the original instrument manufacturer for bidding on his behalf
4	Systems should be international Certified Like – TUV Germany/ USEPA / MCERTS UK. etc.	Certificate copy
5	Approval letter from CPCB/PPCB.	Copy of approval Letter for Data connectivity to CPCB/PPCB.
6	Execution Capability	Having experience of having supplied and commissioned a similar system* not earlier than 2 years from date of issue of NIT. Evidence: Purchase order Copy or Commissioning certificate from the customer For startups : The Purchase order criteria in preQualification terms shall not be applicable to Start-Up Firms. These relaxations and exemptions are in line with D.O. No. 5(4)/2016-BE-I dated 15.02.2017. However for claiming the Start-Up exemption, the bidders have to submit documentary evidence or undertaking of following: 1. The business being a start-up firm 2. The capacity of the firm to supply a similar system*.

*Similar System refers to Online Continuous Effluent Monitoring System (OCEMS) capable of measuring parameters like TSS, BOD, COD, pH using technology as mentioned in the technical specifications of the NIT.

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Dy.Manager (Civil)

Akhilesh Kumar
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17. VENDOR SUPPLY VERIFICATION / ACCEPTANCE CRITERIA FOR ITEM: Online Continuous Effluent Monitoring System at outlet of ETP at FSIP JAGDISHPUR:

S.No.	Criteria	Remarks
i	Supply, Installation, Testing and Commissioning	An acceptance certificate shall be issued once all these activities are completed. The one-year warranty period shall commence from the date of successful acceptance of the system and same shall be referred for the subsequent Annual Maintenance Contracts for next one year.
ii	Submission of initial calibration certificates	
iii	Instruction manual must be submitted along with the system (hard copy & soft copy both required).	
iv	Demonstration of the successful working of the system continuously for 2 working days with successful data capture, transfer, storage to various locations at FSIP, CPCB/ UPPCB *(Vendor Representative should be available for demonstration).*	

18. TERMS OF PAYMENT

a) 80% payment shall be made to the vendor after supply of equipment in BHEL on actually executed quantities after verification of the Engineer-in-charge.
b) Balance 20% amount shall be released after completion of all works along with final Bill as per tender terms & conditions.
c) From the amount payable, recovery such as advances, security deposit, taxes etc. would be made.

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		2) The vendor/instrument supplier shall make provisions to provide data continuously at least 04 locations in UPPCB, RO/DO of CPCB, and industry directly from the analyzers. Annual maintenance contract charges should be inclusive of all the spares & consumable. 3) The authorized Indian service partner/instrument manufacturer shall ensure that any problem in monitoring system/data acquisition and transfer system does not persist beyond 72 hours. 4) Penalty for non-rectification of fault after permitted time limit of 72 hrs: Recovery @0.5% per week (of annual AMC charges value) shall be recovered, subject to maximum of 5% of annual AMC Charges, for each such incident. 5) The software will give alarm, in case of the concentration of parameter exceeds the prescribed norms by 10% continuously. 6) The instrument supplier will facilitate data transmission on behalf of industries. 7) The vendors/instrument supplier shall install their server in UPPCB and CPCB for transferring data from the real time system. 9) The supplier has to provide comprehensive warrantee for 02 years of complete online effluent quality monitoring system (One Year warranty + one year AMC). AMC charges (as applicable) will be inclusive of all the spares & consumables. 10) Instruction manual and calibration certificates must have to be submitted along with the system (hard copy & soft copy both required. Demonstration of the successful working of the system continuously for 2 days with successful data capture, transfer, storage to various locations at FSIP, CPCB/ UPPCB (Vendor Representative should be available for demonstration). 11) The analyzer must be capable of future software upgrade upto 07 years 12) All the necessary equipment's in order to communicate the data/information with CPCB & PPCB (both) server are in the scope of supplier. 13) All the materials required along with erection and commissioning for sample collecting required is in scope of supplier. 14) All the electrical cable, starter, switches wiring etc. required for the On Line Effluent Monitoring System is in the scope of the supplier. 15) The extension electric power cables from ETP MCC room approx.100 mtrs. in scope of supplier. 16) Connection of the existing water meter with the OCEMS system shall be in the scope of the vendor.
15	BHEL Scope of activities	1) Electricity and water supply during execution work. 2) Provision of earthing work for this system. 3) SIM Card for Internet Connection. 4) Provision of Internet connection for CCTV Camera 5) Water Lab report by third party accredited lab.
16	CPCB Guidelines	Any equipment's / work not mentioned which is required for completion of said system as per guidelines of CPCB & UPPCB is in the scope of supplier.1st Revised CPCB Guidelines dated 10.07.2018 also form a part of these terms and conditions and the technical and other details have to be complied with by the suppliers.

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13	Essential Technical Features	1. All instruments must be operated according to the plug & measure principle. 2. All instruments should be pre-calibrated. 3. The instruments and analyzers must be made of corrosion resistant material. 4. All instruments must have auto-diagnosis procedures are used to ensure best possible operation. 5. System should be international Certified like-TUV Germany, USEPA/MCERTS UK. 6. Vendor Should have approval letter for Date connectivity to CPCB & UPPCB. **a) Spectrometry based Sensor for BOD, COD, and TSS** 1) Measurement Principle: Measurement of full wave lengths spectra (UV-VIS Spectrometry) from 200 – 720 nm. 2) The Sensor should not use any reagents and spare parts like WIPERS and should be easy to use and operate without any running costs. 3) Multi parameter probe ideal for monitoring of BOD/COD/TOC/SAC/DOC/TSS in Waste water. 4) The Sensor should have optimized referencing for excellent zero point and long term stability. 5) The Sensor should provide compensation of interferences by evaluation of the whole measured spectrum. 6) Direct in-situ measurement in outlet of waste water treatment plant. 7) The sensor should be preferably with efficient integrated ultrasonic cleaning facility. If the ultrasonic cleaning can't be provided then the bidder should include the air-pressure cleaning system to ensure long maintenance intervals for this sensor. Air supply for the same will need to be accounted for by bidder. 8)The sensor should be completely reagent free for operation **b) pH and temp. Sensor Specifications** 1) Integrated temperature measurement and compensation should be provided in the pH sensor. 2) Sensor check function to detect broken glass of the pH electrode. 3) The pH sensor should have galvanically separated input. 4) Calibration history should be stored automatically in the sensor. 5) Sensor calibration can be done in the laboratory or field. 6) The pH combination electrodes should require very little maintenance and there should be no electrolyte replacement. 7) **Technical Specification** i) Signal Output –Digital ii) Sensor Check function should be available in the pH sensor iii) Transient Voltage Protection should be integrated in the sensor iv) Sensor body: Stainless Steel or better v) Protection type: IP 68 for both Sensor and Cable vi) Sensor Cable Length: 15 meter
14	Vendor Scope of Activity	1) Supply, Installation, Testing and Commissioning of the complete system: ONLINE CONTINUOUS EFFLUENT MONITORING SYSTEM & CCTV Camera with 1 year Annual Maintenance contract after warranty period of one year.

22/5/20

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		8) The data submitted electronically shall be available to the data generator through internet, so that corrective action if any required due to submission of non-validated data can be initiated by the industry. 9) The software should be capable to verify the data correctness which means at any given point of time the regulatory authorities/data generator should be able to visualize the current data of any locations specific parameter. 10) A system for data validation shall be incorporated in the software with two stage/three stage validation and fixed responsibilities of stakeholders as below;- a) Data Generator b) UPPCB/PCCs c) CPCB CPCB will help UPPCB /PCCs in data validation till such time, adequate expertise for data validation is developed by them. 11) Change Request Management: window for requesting data changes due to actual field conditions shall be provided to the industry in line to UPPCB for consideration. 12) The site surrounding environmental conditions shall also be recorded along with other environmental parameters, as these have the potential to affect the system adversely and influence the data generated. 13) System should have capability to depict data at the actual location of industry over the map. CPCB and or UPPCB shall develop a map-based system for data integration at a single location.
11	Statistical Data Analysis	The software should be capable of analysing the data with statistical tools and shall have the following capabilities: - i) Statistical data analysis (customizable) for average, min., max., diurnal variation. ii) Comparison of parameters of different locations in user selectable time formats i.e. in graphical and tabular formats compatible to MS Excel, MS Word, *.txt etc. iii) Capability of comparison of data with respect to standards/threshold values. iv) Auto report and, auto mail generation etc. v) Providing calibration database for further validation/correction of data. vi) Transmitting data to different locations as per EC, CTE/CTO, and other directives in force. vii) Channel configuration for range, units etc. viii) Providing data in export format on continuous basis through central/station computer system to other system.
12	Data Storage, Transmission and Power backup	1) Data transmission through different media like phone line, Broadband, leased lines (at least any two media supported). 2) Data Storage for next five years. 3) System should be connected to a backup power source with adequate capacity to avoid any power disruption for at least 2-3 hours.4) The firm shall stand the guarantee of all equipment of system at least for one year from the date of completion of work.

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		17) Internal integrated Data logger with minimum data memory for up to 500,000 data sets. 18) The Controller should be able to power all the sensors and terminals or accessories attached to it without having to need any additional power sources in the system for increased protection against lightening and possible electromagnetic interference 19) The system should start automatically after the power is reset to the system (in case of power failure). 20) The controller should be low power consuming with consumption of less than 5W. 21) Sensors connected to the system shall be automatically detected and initialized. 22) No extra system configuration should be needed for substitute / replacement sensors. 23) The system should have Service mode for cleaning/calibration/maintenance activities. 24) It should be possible to download the data via the USB interface an extremely fast data exchange to USB memory stick. 25) The system should be fully programmable with multiple levels of access control with help of Electronic-Key for data security and protection against non-authorized access to avoid any tampering or changes to the system configuration by unauthorized access. 26) The controller should storage the sensor configurations and calibrations 27) The controller should have Logbook to record the data 28) The supplier should provide the firmware update free of cost as and when they are available for the life time of the system. 29) The system should have a status LED that gives reliable and fast information regarding function and status of system. And the Controller/controller should show a LED for diagnostic purposes on the front. This LED should show normal and malfunctions of the system at a glance. 30) Data Output to Control System: The System should have the capability to transmit the required 4-20 mA Analog Outputs as a minimum. 31) In addition to above, the system should have ability to output Profibus, Modbus/RS 485, RS 232, LAN, GPRS, GSM compatible signals in future with addition of respective module as and when required. 32) The system should be able to operate on AC Power (100-240 AC). 33) Ambient Conditions operating temperature: -4 °C - +55 °C. 34) Storage temperature: -10 °C - +65 °C. 35) Housing Material – Non corrosive e.g. Acrylonitrile-Styrene-Acryloester polymer or better. 36)Protection Rating IP 66 / equivalent to NEMA 4X for controller 37) Electromagnetic Compatibility: EN 61326, Class B; FCC Class A, EMC for indispensable operation. 38) Integrated Lightning Protection: According to EN 61326 enhanced overvoltage protection for the entire system, implemented in each component

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7	Installation of CCTV Camera	1. Industrial Grade IP camera with PAN, TILT Zoom (PTZ), 5x or above focal length, with night vision capability with leased line real time connection for data streaming and transmission of the same. 2. The connectivity of the camera is to be provided to CPCB through the web portals on 24x7 basis. The resolution of the camera should be kept as 352 x 240 pixel or above.
8	Quantification: Instrument Calibration and Validation	The following frequency has to be used for calibration of analyser. 1. pH – Temperature (pH Meter correction) – validation is to be performed against traceable calibrated thermometer, once every month and data submitted online to CPCB. 2. Validation for COD, BOD & TSS: Frequency of the validation should be once in three Months or as specified by manufacturer, whichever is earlier. The data logger software must keep all calibration data points in memory for interpretation of matrix change adaption.
9	Reporting	The OCEMS suppliers have to provide central server at cloud operational on 24x7 basis and to provide online data connectivity with CPCB and UPPCB servers. Beside data connectivity they need to provide login credential to respective UPPCB /PCCs and CPCB to view the data in graphical/ tabular format and also to compare the data features. One-minute data averages must be transmitted/retrieved to servers on every 15 minutes. In the event of transmission loss, the time stamped data in the data logger memory must be transmitted to fill from the last transmission break with a stamp of time delay. The software should have two-way communication, so that data from the system can be seen whenever desired and remote of controller/data logger can be taken to visualize the immediate status of the system. The data along with diagnostics and calibration details should be transmitted to CPCB and UPPCB servers
10	Data Management	The basic functional capabilities of such software systems shall include: - 1) The system should be capable of collecting data on real time basis without any human intervention. 2) The data generation, data pick up, data transmission; data integration at server end should be automatic. 3) The submitted data shall be available to the Boards, UPPCB /PCCs and CPCB for immediate corrective action. 4) Raw data should be transmitted simultaneously to UPPCB /PCCs and CPCB 5) In case of delay in collection of data due to any reason, the data transmission should be marked delayed data and reports of delayed data should by displayed on the portal 6) At no point of time, manual data handling shall be permitted. Data validation should be permitted only through the administrator and data changes recorded with date and time stampings. 7) Configurations of the systems once set up and verified, shall not be changed. In case any setting change is required it should be notified and recorded through the authorized representatives only.

27/9/2020.

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		15) Record of calibration and validation should be available on real time basis on central server from each location / parameter. 16) System should have full spectrum scanning compared with the double wavelength background subtraction technique, full spectrum (200-720nm) measurement technique and chemo metric algorithm that allow more parameters to be measured. 17) All sensors e.g. pH, BOD, COD, TSS and Controllers should be of same Make and parameter to be displayed on Single Screen. 18) Record of online diagnostic features including sensor status should be available in database for user friendly maintenance. 19) Expandable program to calculate parameter load daily, weekly or monthly basis for future evaluation with flow rate signal input 20) Should have facility to send SMS and email/mail alerts to designated officials for any deviation from permissible effluent discharge standards limits. The facility to be provided for updating mobile no. / email for any change in contact details/Mobile No./ email due to transfer, retirement etc. 21) Must have low operation and maintenance requirements with low chemical consumption and recurring cost of consumables and spares.
6	Multi-parameter Controller System	1) Should have USB-interface for data transfer, upgrading firmware etc 2) Should have backup controller function to increase reliability (in terminal mode) 3) Control unit with keys and toggle switch for the quick selection of software functions 4) With large graphic display with backlight 5) With integrated backup controller function 6) Input voltage 90 - 264 VAC 50/60 Hz 7) Line power consumption approx. 25 VA. 8) Max. Power delivery 18 Watt. 9) 6 galvanically separated current outputs (0/4-20 mA) that can be assigned arbitrarily 10) With Sensor ID recognition 11) High EMC interference immunity. 12) Integrated lightning protection. 13) Should have the latest features of highly advanced Multiparameter Controller having capability of handling at least 18 sensors in a single controller configuration and more as and when required. 14) Should have the capability to be operated as Controller (having programmability feature) or just a terminal (that can display the data without any way to make changes). 15) Display should be with improved reading precision through special backlit graphic display. 16) Easy User Intuitive operating keys: including keys for functions such as: Measurement, calibration, set/system settings, additional keys for: confirmation/switching menu O.K. (OK), Escape (ESC) etc.

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S.No	Specification	Details
1	Parameters to be measured	Temp, pH, TSS, BOD , COD
2	Measurement method	Non sampling type(continuous) , no external sample preparation shall be required for measurement , measurement method must be online or in line/ Open Tank In situ Type as per CPCB and UPPCB
3	Measuring accuracy and range as per CPCB guidelines	A) pH accuracy ± 0.2 (0-14) using Electrode Method. B) TSS accuracy ± 10% (0-900 mg/l) using UV-Vis Spectro- photometry (Single spectrum scanning) C) COD accuracy ± 10% (0-800 mg/l) using UV-Vis Spectro-photometry (Entire spectrum scanning) D) BOD accuracy± 10% (0-500 mg/l) using UV-Vis Spectro-photometry (Entire spectrum scanning)
4	Techniques/ Instrumentation for online measurement	1. Online 2. Inline or In situ
5	Basic requirement of an efficient on line Analyser	1) Should be capable of operating unattended over prolonged period of time. 2) Should produce analytically valid results with precision and repeatability. 3) The instrument/analyzer should be robust and rugged, for optimal operation under extreme environmental conditions, while maintaining its calibrated status. 4) The analyzer should have inbuilt features for automatic water matrix change adaption. 5) The instrument / analyzer should have on-board library of calibration spectra for different industrial matrices with provision of accumulating further calibration matrices. 6) Should have data validation facility with features to transmit raw and validated data to central server. 7) Should have Remote system access from central server provisioning log file access. 8) Should have provision for Multi-server data transmission from each station without intermediate PC or plant server. 9) Should have provision to send system alarm & SMS to central server in case any changes made in configuration or calibration. 10) Should have provision to record all operation information on log file. 11) For each parameter there should be provision for independent analysis, validation, calibration & data transmission. 12) Must have provision of a system memory (non-volatile) to record data for at-least one year of continuous operation 13) Should have provision of Plant level data viewing and retrieval with selection of Ethernet, wireless, Modbus & USB. 14) The correlation/interpretation factor for estimating COD and BOD using UV-Visible Absorption Technique shall be regularly authenticated / validated and details provided.

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