TENDER NOTICE

For

Continuous Ambient Air Quality Monitoring Station

Kerala State Pollution Control Board
Pattom P.O.
Thiruvananthapuram - 695004

www.keralapcb.nic.in

2018

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Notice inviting Tender

1. SUPPLY, INSTALLATION, COMMISSIONING, OPERATION & MAINTENANCE OF CONTINUOUS AMBIENT AIR QUALITY MONITORING STATIONS (CAAQMS) AND DISPLAY SYSTEM

KSPCB intends to install continuous ambient real time online air quality monitoring station with online display system for the parameters **Sulphur Dioxide (SO_2), Oxides of Nitrogen (NO_x), Ammonia (NH_3), Respirable Suspended Particulate Matter (PM_{10}), Respirable Suspended Particulate Matter ($PM_{2.5}$), Ozone (O_3), Carbon Monoxide (CO), Benzene, Toluene, Ethyl-Benzene, O,M,P-Xylenes(BTX) and other usual weather parameters like Wind Speed, Wind Direction, Atmospheric Temperature & Pressure, Relative Humidity, Solar Radiation and Rainfall** in Thiruvananathapuram, Kannur, Kollam and Thrissur Corporations. Kerala State Pollution Control Board invites bid for supply, install. Operate and manage continuous ambient air quality monitoring/sampling station in Thiruvananathapuram, Kannur, Kollam and Thrissur Corporations. KSPCB expects the successful bidder to supply, install, commission, operate and maintain the system continuously on 24 hrs a day and 365 days a year basis in the Thiruvananthapuram, Kannur, Kollam and Thrissur Corporations. The measured values of various parameters specified by the Board shall be displayed through online monitors on a real time basis for 24 hours a day and 365 days a year on one display LED screen of size approximately 8ft x 12ft, at the identified locations. Also the measured values of each monitoring stations shall be communicated instantly through online, transferred and stored in the Board's server at Head Office, Thiruvananthapuram.

1.1 **WHO CAN APPLY:** Those who fulfill the criteria shown below can apply:

1. Minimum five years experience in running, maintenance and calibration of centralized continuous air monitoring stations with display system.
2. Should have supplied and installed at least 1 No. CAAQMS with display system in the last 5 years from the date of tender opening.
3. Should have operated and managed similar stations elsewhere in the country.
4. Should have experience in computer integration with the ability to display the values of various parameters and to connect with the central server of KSPCB and CPCB on a real time basis and
5. Should have comprehensive training system for service and supervisory personnel in the implementation of the system.
6. Testimonials of above experience should be enclosed along with the proposal which will be the prime pre qualification for considering

1.2 **TENDER FEE**

An amount of ***Rs 1,04,000/-*** (Rupees One Lakh and four thousand only) shall be remitted online towards tender fee.

2. BACKGROUND: With a view to expand ambient air quality monitoring network including data capture, data transmission, data storage, trend analysis, KSPCB proposes to strengthen the monitoring network across the State. To achieve this goal, KSPCB is planning to procure Real time / continuous ambient air quality monitoring systems for the parameters viz. SO_2, CO, NOx, O_3, NH_3, Benzene, Toluene, Ethyl-Benzene, O,M,P-Xylenes(BTX), $PM_{2.5}$ and PM_{10} notified under the National Ambient Air Quality Standards (NAAQS). The above system shall conform to the standards like FRM (USEPA), FEM (USEPA), TUV (EN) or equivalent.

2.1 OBJECTIVES: Ambient Air Quality monitoring is an important part of air quality management and is essential for the implementation of air quality legislation particularly, in compliance with emissions and ambient air quality standards. The major objectives of the air quality monitoring are :

(a) To determine present air quality status and trends;
(b) To assess the historical trend of the air quality and its health and environmental hazards;
(c) To provide background air quality data as needed for industrial siting and town planning;
and
(d) To control and regulate pollution from industries and other sources to meet the air quality standards.

The ambient air quality monitoring network involves measurement of various air pollutants and meteorological parameters at different locations in the country so as to meet objectives of the monitoring. Any air quality monitoring network thus involves selection of pollutants, selection of locations, frequency, duration of sampling, sampling techniques, infrastructural facilities, man power and operation and maintenance. The network design also depends upon the type of pollutants in the atmosphere from various sources. It is necessary to assess the present and anticipated air pollution through continuous air quality survey / monitoring programs. Therefore, Kerala State Pollution Control Board intends to establish and operate Continuous Ambient Air Quality Monitoring Stations in Thiruvananathapuram, Kannur, Kollam and Thrissur.

2.2 SALIENT FEATURES OF THE PROJECT: The ambient air quality at various locations in the state is being monitored manually by the Board under the National Ambient Air Quality Monitoring Programme (NAMP) presently. Another set of stations are also being operated for monitoring as part of State programme. The values across the stations vary for various parameters and these are reported to the Central Pollution Control Board. Reasons for high values at certain times are also being studied for the purpose of taking remedial action. These values are being compiled in the form of air quality directory for the information of the public. However such a measurement/document will not be able to communicate instant values which will be of more interest to the public, especially for those residing in industrial/commercial areas. Once, Real time continuous ambient air quality monitoring station is established, it helps CPCB/SPCB/other agencies to determine the Air Quality Index which can be made available to the public on real time.

Now the Pollution Control Board has started setting up of stations which can update the values monitored on a real time basis. This can be possible only through a process of continuous ambient air quality measurement coupled with online display system. A computer based integration of measurement and display through a suitable program can ensure a successful monitoring and display system on a real time basis. The Board intends to start one station each at Thiruvananathapuram, Kannur, Kollam and Thrissur. The station proposed at Thiruvananthapuram comes under the scheme "Million plus Cities & State/UTs Capitals" with partial financial support from MoEF. Other stations are being installed by utilizing plan scheme fund of the State Government. The Board also intends to set up such stations in future at various strategic locations across the State. The possibility of providing one control room for multiple stations is envisaged for this purpose.

2.3 DURATION OF THE PROJECT: The Operation and Maintenance (O&M) of the project for Five years tentatively in which warranty period is excluded and this O& M can be extended further, if necessary. It may be noted that during warranty period no maintenance and spares charges shall be paid by the Board and charges for operation on the basis of production of qualitative data shall be paid.

3. ELIGIBILITY CRITERIA: Refer section 1.1 of the document.

4. ROLES & RESPONSIBILITIES, OBLIGATIONS:

4.1 KSPCB

a. The control room and the equipment after the procurement will be owned by KSPCB, though the supply, installation, operation, maintenance etc. are carried out by the successful bidder.
b. KSPCB will provide appropriate space to the bidder for control room operations. The space to be provided shall be in the form of room of size 15'x15'.
c. Ownership of database and Intellectual Property Rights for the database generated shall remain with the KSPCB.
d. KSPCB also retains the right to require the successful bidder to adhere to accreditation by any national / international organization later if required.

4.2 SUCCESSFUL BIDDER

The successful bidder shall ensure the following:

a. Supply, install, establish and operate Continuous Ambient Air Quality Monitoring Stations with real time display of values of various ambient air parameters in Thiruvananathapuram, Kannur, Kollam and Thrissur Corporations of Kerala State. The display and all data shall be made available on a 24x7 basis 365 days a year. A maximum of 28 days can be permitted for any type of breakdown, service, calibration per year subject to a maximum grace period of 7 continuous non working days only once in a quarter (3 months). In case of breakdown beyond the grace period, Rs 1000/-per analyzer per day shall be charged. The grace period for digital display board is five continuous non working days once in a quarter beyond which Rs.1000/- per day shall be charged. The total penalty per year if exceeds 30% of the O& M cost per year, the contractor has to replace the faulty analyzer with new one on his own cost with immediate effect, failing which the KSPCB shall have a right to terminate O & M contract and to initiate legal proceedings. Failure due to electrical power outage from Electricity Board/department

and other force major conditions shall be considered for levy of penalty.

b. Provide technological, leadership, administrative and managerial support as the Partner in an open and transparent manner to produce mutually agreed outcomes.

c. Provide the Application Software for the project and the hardware components. The successful bidder shall also update the software periodically as per requirement.

d. Recruit, train and position required man power, if any needed, who will be responsible for the trouble free operation of the system.

e. Provide daily technical reports and weekly consolidated operational reports.

f. Bring in technology and service excellence and work towards improving system to global standards over a period of time.

g. All Calibration Gases are to be provided by the bidder along with certificate of concentration, uncertainty values and traceability certificate with National Institute for Standard and Technology from appropriate authority.

h. Warranty period for the equipment shall be specified by the supplier. The bidder should provide details of comprehensive AMC and operation support including arrangement for consumables during the warranty period and for 05 (five) years beyond the above- mentioned period.

i. The equipments make, operation principle & procedures should conform to USEPA automated Federal Reference Method (FRM) / Federal Equivalent Method (FEM),TUV/MCERTS/EN. Preference is to USEPA and in case it is not available, other approvals shall also be quoted. The detailed specifications of the equipment to be setup in an automated CAAQMS should be enclosed.

j. The monitoring station shall be provided with proper housing to protect the instruments from dust and heat without any seepage from sealing of the roof. All infrastructure for setting up the stations including the display system viz. civil works, housing, flooring, frame, paneling, internal electric power supply, air conditioning, Uninterrupted Power supply with 8 hours back up for the station including air conditioners and display system shall be provided by the Operator.

k. Backup power system shall be ensured by the successful bidder to operate the system without interruption due to any power failure. Power failure due to failure of backup shall be treated as break down of the analysers and appropriate penalty shall be imposed

l. Provisions for centralized monitoring system along with provision for more than one monitoring stations shall be facilitated. In addition to the dedicated telephone connection, option for wireless communication with the centralized monitoring system and with data display system shall be provided.

m. A suitable display board with LED display of size approximately 8ft x 12ft that displays the real time air quality data of the station and other data acquired from a

remote server. Telephone modem or GSM technology are preferable.

n. Electricity charges, internet charges and insurance shall be within the scope of the successful bidder on production of actual bill from concerned departments.

4.3 PENAL PROVISIONS: Successful bidder shall ensure that the installation shall be completed within a period of 6 months from the date of signing the agreement or 2 months from intimation of handover of land in each of the four locations, whichever is later. Any delay in commissioning beyond this period, shall result in imposition of a penalty of a sum equivalent to 1% of the delivered price for each week of delay until completion of installation, up to a maximum of 10% of the contract prices after which the KSPCB may consider termination of the contract at the risk and cost of the bidder.

5 CLARIFICATIONS: Organization requiring any clarification on the tender document may notify KSPCB in writing at:

ATTN. OF:	CHAIRMAN Kerala State Pollution Control Board
ADDRESS:	Plamood, Pattom P.O., Thiruvananthapuram 695004 Phone: 0471 2318153, 54, 55 Fax: 0471-2318152,2318134 E mail: chn.kspcb@gov.in

The website **https://etenders.kerala.gov.in** may be regularly visited for any addendum in the tender document/ any news pertaining to the tender.

5.1 LANGUAGE: All related correspondence and documents should be written in English language. Supporting documents and printed literature furnished by the applicant may be in any other language provided that these are accompanied by appropriate translations of the pertinent passages in the English language. Supporting material, which are not translated into English, may not be considered. For the purpose of interpretation and evaluation of the application, the English language translation shall prevail.

5.2 CURRENCY: In all cases where the original figure is in foreign currency' **partial conversion'** option shall be selected in the Currency Conversion column in the financial bid (B.O.Q.).

5.3 Technical Bid

The bidder should furnish the following:

i) Details of Applicant (in case of Consortium, this would need to be provided by all the members of the consortium)
ii) Experience of Applicant (in case of Consortium, Technical experience of Lead Member)
iii) Financial Capability of the Applicant (in case of Consortium, Financial

Capability of all consortium members). In case of Consortium, Memorandum of Understanding (MoU) between the members.

iv) List of clients, with satisfaction certificate from at least two clients from public sector unit/SPCB/CPCB/PCC.

vii) An affidavit clearly mentioning that the Applicant has not been blacklisted by SPCB / CPCB or any of other state government or government organization in the past (in case of consortium, the same needs to be submitted separately for all consortium members)

viii) Detailed technical specification of all equipments/ installation components/ display unit and other hardware components.

ix) The procedure of sampling, monitoring and display shall be described in detail for each parameter.

x) In addition to the soft copy uploaded in the e portal, a hard copy of the technical bid shall also be submitted along with same order of pages in the soft copy to:

The Chairman
Kerala State Pollution Control Board
Plamoodu
Pattom P.O
Thiruvananthapuram

The outer cover shall super scribe the words "Technical bid for the supply of Continuous Ambient Air Quality System "

5.4 Financial Bid

The rate quoted by the bidder shall be inclusive of GST, customs duty as the case may be and freight and insurance charges etc., the price bid shall include all items acquired for:

a. Cost of Container
b. Cost for laying platform to place the container (Height in feet basis)
c. Cost of Individual imported analyser
d. Cost of Individual Indigenous equipment (like UPS, battery, air conditioners)
e. Cost of Other supporting individual Peripherals and calibration gases
f. Cost of Soft ware and hard ware required for installation of soft ware
g. Cost of each display board
h. Cost of operation and maintenance year wise for warranty period and five years (CAMC) after warranty period
i. Cost exclusively for manpower (number of personals should be mentioned)
j. Please mention if any other cost is involved in other components.

The above list is illustrative and not exhaustive.

The tenderer shall submit checklist of document enclosed.

5.5 Earnest Money Deposit (EMD):

Earnest Money **Deposit of Rs. 4,40,000/-(Rupees Four lakh and Four thousand only)** shall be paid online.

5.6 Acceptance of Tender:

1. Tender will be evaluated with reference to various criteria and one of such criteria is L1- i.e. lowest rate
2. KSPCB reserves all the rights to accept or reject the tender.
3. The acceptance of the tender will be communicated to the successful bidder in writing.

5.7 Security Deposit

a. The successful bidder shall be requested to present a Demand Draft @ 5% of the bid value.

b. The security deposit should be paid on or before the due date fixed by the tender inviting authority in the form of DD drawn in favour of KSPCB payable at Trivandrum.

5.8 Agreement

The successful bidder shall execute an agreement on a non-judicial Kerala stamp paper of value of Rs.500/- (stamp duty to be paid by the successful bidder) within 15 days from the date of information that the bid has been accepted. The specific form will be made available to the successful bidder.

5.9 Mode of Payment

For indigenous items

(a) On Delivery: Ninety percent (90%) of the Contract Price including material cost, transport and installation and commissioning shall be paid on receipt of the goods at the specified location and upon submission of the following documents:

(b) On Installation and Commissioning: The remaining ten percent (10%) of the Contract Price shall be paid to the Supplier after successful installation and commissioning of CAAQMS.

For Imported items

(a) On Shipment: 100 percent of the Contract Price of the Goods shipped shall be paid through irrevocable confirmed letter of credit opened in favour of the Supplier in a bank in its country, upon submission of the relevant documents as per supply order.

5.10 EMD Refund

The EMD of the successful bidder may at the discretion of KSPCB be adjusted toward the security deposit payable. The EMD of the non successful bidder will be refunded automatically into their own account.

5.11 The package shall include the following Components for each station separately

Sl.No	Details of Component	Detailed specification and Financial bid
I	**Construction of concrete platform** to bear the total load of the monitoring station (Size 15 X 15 Sq.feet and 1 feet height)	
II	**Monitoring Station Container**, Rack for fixing analyzers and other supporting accessories	
III	**Analyzers** (7 nos.)(SO_2, NOx, NH_3, CO, O_3, BTX and PM_{10}, $PM_{2.5}$ with sampling head)	
IV	**Sampling Port** for gaseous pollutants	
V	**Meteorological Sensors (6 Parameters)** (Wind speed, Wind direction, Temperature, Humidity, solar radiation and Rainfall)	
VI	**Telescopic crank**-mast 10 meter height	
VII	**a.Multi gas calibration system** for zero and span and Calibration cylinders for SO_2, NOx, NH_3, BTX, CO- One set **b.** Calibration and calibration check devices for meteorological parameters	
VIII	**Software for data acquisition system for the station and connectivity with local and central servers**	
IX	**Split Air Conditioners** 1.5 tons, 1 tons (I no. each). (The firms may quote for various make and type. Final selection of the make and model shall be decided by Board at the cost of L1)	
X	**Uninterrupted Power Supply (UPS-10KVA).** (The firms may quote for various make and type. Final selection of the make and model shall be decided by Board)	
XI	**Submission of Documents** on following (both soft and hard copy in English language) 1.Operating procedures for all analyzers and meteorological sensors 2. Calibration procedures 3. Calibration schedule 4. Maintenance procedures 5. Maintenance schedule 6. Data validation procedures 7. Quality Assurance procedures	
XII	**List of spares**/consumables supplied during warranty period	
XIII	**Day** light **and Night** Visible Digital Display Board with data transmission device	

XIV	**Warranty Period** for the entire station and individual equipments shall be separately quoted	
XV	**Submission of details of no. of persons and other terms and conditions and cost separately** for comprehensive (including payment of electricity, internet, telephone) AMC during warranty period and five (05) years beyond the warranty period for submitting validated data.	

5.11 COMPLIANCE STATEMENT OF SPECIFICATIONS

No.	SPECIFICATIONS	COMPLIED/ NOT COMPLIED
I	**CONSTRUCTION OF CONCRETE PLATFORM**	
1	**Area**: 15 x 15 Sq.feet	
2	**Height**: 1 ft	
3	The strength of the platform should bear the total load of the monitoring station and condition of the platform should be maintained for at least 10 years. Warranty for 10 years	
II	**MONITORING STATION CONTAINER**	
1	Monitoring station is designed for housing the ambient air quality monitoring instruments to protect them from dust and heat. Temperature and Humidity sensors shall be installed in the housing for checking the humidity and temperature. Up to three numbers of racks of size less than or equivalent 19" shall be installed inside the station so that the analyzers are easily accessible from front & back for calibration and maintenance. Warranty for 10 years	
2	**Dimensions:** **Inside length: Less than Approx. 4.2 metres, Inside width : Approx. 3.5 metres, Inside height Approx. 2.3 metres**	
3	**Frame:** All the material used for the construction of the floor, frame, roof frame etc, the 4 corner posts and 8 integrated, reinforced container corner should be of metal. All the steel parts should galvanized, having minimum rate of galvanization of 275 gram per square meter(IS277) anti rust primed and painted. All joints of like metal such as steel-to-steel or aluminium-to-aluminium shall be protected against corrosion by liberal application of jointing compound. All joints of dissimilar metals such as steel to aluminium shall be protected against corrosion due to galvanic action by liberal application of dielectric compound as well as jointing compound on both mating surfaces. For lifting/ fixing the container, International Standard eyebolts should be provided at the corners.	
4	**Panelling**: The outer paneling will be of 1.6 mm of Pre-coated MS sheet to withstand external impacts and abrasions. Outside of the MS sheet	

	i.e. exposed face of the sheet shall be permanently colour coated with silicon modified polyester coating of dry film of thickness (DFT) 20 microns minimum of approved colour shed over primer. Inner face of the sheet shall be provided with suitable pre-coating of minimum 7 micron off white colour. The inner paneling will be of PVC coated 2 mm thick aluminium sheet, fixed over an inlay of 4 mm marine plywood. 100 mm thick polyurethane insulation will be used between the outer and inner walls (Pre-coated MS sheet and Marine plywood) as insulating material. Z spacers if required shall be made out of at least 2 mm thick galvanized steel sheet of grade 275 as per IS:277	
5	**Floor:** The flooring wherever required will be laid in frame of 600 x 600 mm centre to centre with 50 x 50 x 6 mm MS angle. The floor surface will be of 19 mm marine plywood covered with robust quality Vinyl flooring, 2 mm thick of approved colour. The floor should be of acid and alkaline resistant waterproof, easily cleanable/ washable. Bottom plate of thickness 2mm hot dipped galvanized MS Plate shall be provided.	
6	**Outer door:** One door of size approx. 2000 x 900 mm will be provided at the front side (L= 4200 mm) of the station with isolated 3- point locking & door handle flush fitted.	
7	**Electric Power Supply Box:** Three- phase (3 Ø) electrical wiring has to be laid in ducts. Copper wiring of appropriate gauge to be used. One three phase energy meter (Digital Type) shall be installed. Weatherproof cubicles / enclosure for housing of MCB / TP & N Switch of main power termination (outside shelter) and weatherproof telephone junction box for terminations of telephone line are to be provided. Copper wiring, switches, sockets all other electrical items including earth and indicators and safety requirements should meet rules and guidelines of the electricity board.	
8	**The housing has to be partitioned for keeping UPS, Batteries, Zero and Span gas cylinder and Meteorological mast**. The size will be 2000 x 1400 x 2300 mm. A lockable door of size 900 x 2000 mm along with 3 point locking system shall be provided on the outer wall of the housing. A 300 mm, single-phase (230 volts ± 10 vo;ts AC and 50 Hz± 3%)) exhaust fan with safety grills has to be provided. Mounting brackets in 2 levels for fixing of at least 6 gas cylinders should be provided. Guy ropes shall be provided for supporting the mast. One three phase energy meter (Digital Type) shall be installed. Weatherproof cubicles / enclosure for housing of MCB / TP & N Switch of main power termination (outside shelter) weatherproof telephone junction box for termination of telephone line is to be provided.	

9	**Air conditioners shall be mounted on proper rust proof and anti vibration supporting structures with rubber blocks to avoid vibration of structures.** Proper caging / grill should also be provided for the safety of ACs. Sun shades for external AC units shall be provided with fabricated pre-coated MS sheet (same as monitoring station) with supporting arrangements. AC unit's external piping shall be placed in GI trays. Cable trays fixed on exterior wall shall be covered with pre-coated MS sheet, of same colour shade of monitoring station. Roof top sheet is to be levelled and sloped properly. Rain water spout shall be fixed at top with rain water down pipe at two corners.	
10	**Station Furnishing**	
i	**Racks** of size 19" racks – 3 Nos.	
ii	**Fire extinguishers** – 2 Nos. (Clean Agent – 2 KG each)	
iii	**Furniture**	
a	Material – Furniture made of water resistant laminated board	
b	Cupboard – for keeping the Manuals and accessories	
c	Working table – Powder coated MS frame size 1400 x 900 x 750 mm (w x d x h) and top 19 mm thickness Board.	
d	Revolving, tilting executive chair – 2 NOS.	
11	**Miscellaneous**	
a	The exhaust gases from the analyzer should be collected and discharged by a common exhaust pipe and should be vented.	
b	Folding aluminium ladder for roof access	
c	Digital Thermostat for measuring the temperature of station	
d	Digital Hygro meter for measurement of Humidity inside the station	
e	Mounting bracket for the ladder	
f	Tool Kit having following tools: 1. One screw driver set 2. One Digital multi-meter (Philips, Micro or equivalent make) 3. One box spanner set 4. One D spanner set 5. One watch maker set 6. One Hammer set 7. One precision screw driver set 8. One pliers set 9. One Tong tester 10. One Soldering Iron with stand	
g	Sign boards along-with logo of Kerala State Pollution Control Board, to be embedded with size 1500 x 900 mm on the front of the container and on the two sides of the container. The name of the Station i.e. Continuous Ambient Air Quality MONITORING Station, (Location) both in English and Malayalam to be	

	inscribed. The Sign boards to be mounted on the station with proper spacers.	
12	**Container Foundation (RCC) (if required)**	
	L X W 6000 x 6000 mm Height 300 mm from ground **Pillars**: Nine concrete pillars of 300 mm above the ground level and below the ground level with 200 x 200 mm beam and between pillar bricks to be used for filling the space**(concrete ratio of 1:2:4)**. Outer wall of the foundation to be plastered with 1:4, Cement: Sand ratio and same has to be painted with weather proof coat. **Top of the platform**: RCC 150 mm with concrete ratio of 1:1:2 and to plaster and paint with weather proof paint. Separate cost on extended height may separately be quotated	
13	**Staircase**: **(if required)**RCC Steps to approach the main door of the container and the UPS /Gas room door in the side to be provided and each step should not be more than 150 mm high	
III	**AMBIENT AIR ANALYSERS** **GENERAL SPECIFICATION FOR ALL ANALYSERS**	
1	The analyzers should operate at operating voltage 230 volts $\pm$10 volts AC and 50 Hz $\pm$3% frequency. The power supply input to be protected against spikes from and to the analyzer by an LC filter. The power connection cable should be CEE type complete with 15 Amperes plug adaptable to Indian mains socket.	
2	The display of the entire important status signal viz. Sample flow, temperature, concentration, range selection, manual / auto mode, zero / span mode and all error messages should be on front panel.	
3	The analyzers must function properly in Indian conditions without any defect between 0 – 50^{o} C ambient temperature, 10 – 95% relative humidity and in high ambient dust levels. The data capture rate should not be less than 90% of operational time.	
4	The Manufacturer shall provide comprehensive hands-on training for operational & preventive maintenance for one week in the respective districts for three persons per station.	
5	The analyzers should be complete with calibration system. The calibration system should be delivered along-with respective span gas cylinder and permeation tubes. The span gas concentration should be within 60 – 90% of first measuring range. The analyser must have zero point internal calibration system and in agreement with minimum detection limit of each analyzer. The calibration procedures are to be integrated into the software system for automatic calibration & remote calibration.	

6	**CALIBRATION GAS CYLINDER** 1 .The supplier has to supply the calibration gas cylinder (highly polished aluminium 10 liters water capacity), along with SS Regulator, traceable to NIST for each components (SO_2, NOx, CO, NH_3, Benzene & Toluene) along with SS regulator for the multipoint calibration. The synthetic air and N_2 cylinder (99.99% purity with certificate) should be in Carbon Steel cylinder of 47 Liters water capacity along with SS Regulator.	
	2 The analyzers shall be supplied with all ancillaries necessary for operation with pump (preferably in-built) and any other items such as charcoal scrubber, Teflon air sample intake filter, drier, Teflon tubing suitable for connection to air sampling manifold. All such items are to be itemized. Dust filter in all the analyzers should be provided before solenoid valve to protect frequent chocking of solenoid valve.	
	3. The connector systems for out-going signal for recording and the computer terminal should be on back panel with screw type connecting pins.	
	4. All ambient gas analyzers shall be approved by the USEPA / TUV / MCERTS / EN. However, in case of BTX and Ammonia Analyzer specifications as given will be considered. Method of measurement used shall also comply with the stipulation on National Ambient Air Quality Standards (NAAQS) 2009 (Details of Methods of Measurement is available at MoEF and CPCB websites). All analyzers shall be micro – processor controlled with automatic calibration using an external dilution calibrator and calibration standards. All analyzers should be fully integrated in the rack cabinet, fully calibrated & tested before supply and ready for start – up at the respective sites. Analyzer must exhibit performance equal to or better than values specified in the Calibration & test certificate provided with each analyzer.	
	5. The manufacturer shall specify the cross sensitivity of measurement for all the analyzers.	
	6. Each set of analyzers shall be supplied with two copies of elaborate operation manuals comprising details as below: Part (I) should comprise installation, operational and troubleshooting details; Part (II) should have details about preventive, routine and corrective maintenance; Part (III) should comprise details of all electrical, electronic and pneumatic circuit diagrams, details of each spare parts, catalogue No. etc. and details of each electronic card / PCB's; Part (IV) Schematic diagram for possible repair & maintenance. Part (V) Standard Operating Procedure (SOP) for each analyzer and Part (VI) List of equipments and other accessories along with contact details of supplier.	

	7. Digital Output: a) Multi drop RS 232 port shared between gas Analyzers, Dust Analyzer ($PM_{2.5}$& PM_{10}), Meteorological Sensors and computer for data, status and control. Communication should have a USB port, TCP/IP Ethernet connection	
	8. Quality Control and Standard Data shall be collected and validated according to US EPA standards, using the methodologies included in 40 Code of Federal Regulations. All analyzers shall have current US EPA reference or equivalent method designation and shall be of the latest design. The supplier shall submit a Standard Operating Procedure for the air quality monitoring stations to the Buyer at the time of bid submission. This Standard Operating Procedure shall be approved by the Buyer prior to award. The Standard Operating Procedure shall contain the following: i. Operating procedures for all analyzers and meteorological sensors ii. Calibration procedures iii. Calibration schedule iv. Maintenance procedures v. Maintenance schedule vi. Data validation procedures vii. Quality Assurance procedures viii. Sample quality assurance documentation ix. Sample Air Quality Report The calibration procedures for analyzers shall conform to US EPA methodologies and shall include daily calibration checks, by weekly precision checks and linearity checks every six weeks. All analyzers shall undergo full calibration in every three months. Data obtained from these calibration checks and copies of associated Quality Assurance and calibration documentation, shall be submitted to the Buyer along with the Air Quality Data. Air Quality Data shall be submitted to the Buyer on Real Time basis through automated system and on a monthly basis in the form of an Air Quality Report. This report shall include tabular and graphic information on gas and dust concentrations as well as meteorological data for each site. The data shall be reported in the form of 15 minute averages and shall also include daily, weekly and monthly averages, minimum, maximum, standard deviations, total data captured and percent data captured. It should also have stat validation mechanism and delayed data check mechanism. The Air Quality Report shall also include wind roses where wind speed and direction are measured.	
	Upon 24 hour notice from the Buyer, once per year, the supplier shall agree to submit to an audit of calibrations, conducted, using pre-approved US EPA methodologies, by a third party. The results of these audits shall be made immediately available to both the supplier and Buyer.	

1	**SULPHUR DIOXIDE (SO_2) ANALYZER Conforming to USEPA Automated Federal Equivalent Method (FEM) Designation**	
a.	Principle : UV Fluorescence	

b.	Measurement : Sulphur Dioxide in Ambient Air	
c.	Lower Detectable limit : 0.5 PPB	
d.	Ranges : Auto ranging 500 PPB (Low Range is preferable)	
e.	Display : Digital LCD/LED	
f.	Noise Level : 0.20 PPB	
g.	Response time : 60s to 95% of concentration	
h.	Zero Drift : < 0.5PPB/24 Hrs with automatic zero compensation	
i.	Span Drift : < 0.5 PPB full scale in 24 hrs	
j.	Linearity : 1% of FS	
k.	Analyzer should have internal Zero and accept external Zero and span calibration facility	
l.	Analog Output: 0 – 1 V, 0 – 10 V, 2 – 20 mA / 4 – 20 mA	
m.	Digital Output: Multiple drop RS 232, USB port /TCP/IP ,Ethernet	
2	**OXIDES OF NITROGEN and AMMONIA CONVERTER (NO - NO_2 – NOx-NH_3) ANALYSER Conforming to USEPA Automated Federal Equivalent Method (FEM) Designation**	
a.	Principle: Chemiluminescence	
b.	Measurement NO -NO_2 - NOx and NH_3 in Ambient Air	
c.	Display Digital- LCD / LED	
d.	Ranges Auto ranging 0-2000 PPB (Low Range is preferable with auto selection range)	
e.	Minimum Detectable Limit< 0.5PPB	
f.	Noise Level >0.2 PPB	
g.	Zero Drift < 1 PPB/24 Hrs	
h.	Span Drift < 0.5 full scale	
i.	Response Time: < 60 seconds for NOx ,next 60 seconds for NH3 for 95% of Concentration	
j.	Linearity: ±1% of full scale	
k.	Additional Feature Built-in NH3-NO converter for low level NH3 monitoring	
l.	Analyzer should have internal Zero and accept external Zero and span calibration facility	
m.	Analog Output: 0 – 1 V, 0 – 10 V, 2 – 20 mA / 4 – 20 mA	
n.	Digital Output: Multiple drop RS 232, USB port /TCP/IP ,Ethernet	
3	**OZONE (O_3) ANALYZER Conforming to USEPA Automated Federal Equivalent Method (FEM) Designation**	
a.	Principle : UV Photometric/absorption/ chemiluminescence	
b.	Measurement : Ozone in Ambient Air	
c.	Display : Digital	

d.	Ranges : Auto ranging 0-500 PPB(Low Range is preferable with auto selection range)	
e.	Minimum Detectable limit :< 0.6 PPB	
f.	Noise : ±0.3 PPB	
g.	Zero Drift : < 0.5 % per month	
h.	Span Drift : < 1% per month	
i.	Linearity: ±1% of full scale	
j.	Response Time: <30 s to 95%	
k.	Analyzer should have internal Zero and accept external Zero and span calibration facility	
l.	Analog Output: 0 – 1 V, 0 – 10 V, 2 – 20 mA / 4 – 20 mA	
m.	Digital Output: Multiple drop RS 232, USB port /TCP/IP ,Ethernet	
4	**CARBON MONOXIDE (CO) ANALYZER Conforming to USEPA Automated Federal Equivalent Method (FEM) Designation**	
a.	Principle : Non dispersive Infra-Red (NDIR) with Gas Filter Correlation	
b.	Measurement : Carbon monoxide in Ambient Air	
c.	Display : Digital	
d.	Ranges : At least four ranges Auto ranging 0-100 PPM (Low Range is preferable with auto selection range)	
e.	Minimum Detectable limit : 0.05 PPM	
f.	Zero Noise : 0.02 PPM with time constant ± 30 sec	
g.	Zero Drift: : < 0.1 ppm for 24 hrs	
h.	Span Drift : < 0.5% full scale in 24 hrs.	
i.	Linearity: ±1% of full scale	
j.	Response time: 30 seconds or less	
k.	Analyzer should have internal Zero and accept external Zero and span calibration facility	
l.	Analog Output: 0 – 1 V, 0 – 10 V, 2 – 20 mA / 4 – 20 mA	
	Digital Output: Multiple drop RS 232, USB port /TCP/IP ,Ethernet	
5	**BETA GUAGE AUTOMATIC PM10 SUSPENDED PARTICULATE MATTER (SPM) MONITOR Conforming to USEPA Automated Federal Equivalent Method (FEM) Designation**	
a.	Principle: ß -ray attenuation Continuous measurement of PM_{10} in ambient air	
b.	Particle Size Cut Off: 10 Microns	
c.	Measuring Range: 0 to 1000 µg/m3(Low Range is preferable with auto selection range)	
d.	Resolution: 0.1 µg/m3	
e.	Minimum Detectable Limit : <2 µg/m3	

f.	Detector: Silicon Semiconductor Beta Detector /Geiger Muller Detector (subject to USEPA approval)".	
g.	Air Flow Rate : At least 16.7 LPM	
h.	Filter Material: Glass Fiber Filter Long Roll (30MMX21mtrs)	
i.	Display : LED / LCD	
j.	Sampling Head: Suitable heated sampling heads for measurement of PM_{10} with adjustable temp. 20^{O}-50^{O}C	
k.	Linearity: ±1% of full scale	
l.	Printer: In built and integrated with RS 232	
m.	Measurement Result : min 15 minutes, 30 minutes, 1 hour and more.	
n.	Calibration: Reference membrane facility should be provided for calibration of analyzer	
o.	Compatibility : Analyzer should be compatible with protocols of DAS system to be used in station.	
p.	Analog Output: 0 – 1 V, 0 – 10 V, 2 – 20 mA / 4 – 20 mA	
q.	Digital Output: Multiple drop RS 232, USB port /TCP/IP ,Ethernet	
6	**BETA GUAGE AUTOMATIC PM2.5 SUSPENDED PARTICULATE MATTER (SPM) MONITOR Conforming to USEPA Automated Federal Equivalent Method (FEM) Designation**	
a.	Principle : ß-ray attenuation continuous measurement of PM2.5 in ambient air	
b.	Particle Size Cut Off : 2.5 Microns	
c.	Measuring Range : 0 to 2000 µg/m3 (Low Range is preferable with auto selection range)	
d.	Resolution : 0.1 µg/m3	
e.	Minimum Detectable Limit : 2µg/m3	
f.	Detector: Silicon Semiconductor Beta Detector /Geiger Muller Detector (subject to US EPA approval)".	
g.	Air Flow Rate: At least 16.7 LPM.	
h.	Filter Material : Glass Fiber Filter Long Roll (30MMX21mtrs)	
i.	Display: LED / LCD	
j.	Sampling Head: Suitable heated sampling heads for measurement of $PM_{2.5}$ with adjustable temp. 20^{O}-50^{O}C	
k.	Linearity: ±1% of full scale	
l.	Printer : In built and integrated with RS232	
m.	Measurement Result : min 15 minutes, 30 minutes, 1 hour and more.	
n.	Calibration: Reference membrane facility should be provided for calibration of analyzer	
o.	Compatibility : Analyzer should be compatible with protocols of DAS system to be used in station.	
p.	Analog Output: 0 – 1 V, 0 – 10 V, 2 – 20 mA / 4 – 20 mA	

q.	Digital Output: Multiple drop RS 232, USB port /TCP/IP ,Ethernet	
7	**AMBIENT BTX ANALYSER**	
	General: A complete analyzer system comprising of sampling pump, transfer line, analyzer, detector, calibrator, computer hardware and software for instrument control, data storage, display, acquisition, processing and for selective determination of volatile compounds in ambient air optimized for Benzene, Toluene, Ethyl Benzene and o,m, p – Xylenes. Continuous unattended measurement system of individual BTX should work without external cryogenic cooling. System should have protocol compatible to communicate & transfer data to DAS. Raw data storage capacity without erase minimum for three month or more. The system should be delivered with all necessary spares, consumables, tubing etc. for making it functional.	
8	**TECHNICAL SPECIFICATIONS** A single stage membrane Pump to collect ambient sample automatically in an inbuilt adsorption trap. Subsequently, the sample will be dissolved and injected on wide bore capillary gas chromatographic separation. Sample volume controlled by thermal mass flow controller (dust protected). Sample flow range may be 20 -100 ml/min or more (adjustable). Sample volume should be between 400 ml – one liter or more of ambient air over a 10-15 min sampling cycle. All sample transfer tubing should be in stainless steel and flow & pressure sensor to be preferred with digital display.	
9	**DETECTOR** Photo Ionization Detector (**PID**) or other equivalent detector **as per EPA/EU/TUV/MCERT** approved specifications, which do not require hydrogen or other gas to operate it. The system should have auto-clean & auto calibration facilities. PID Lamp eV should be 10.6 eV. PID sensitivity sensor should be available to check sensitivity.	
10	**MINIMUM SPECIFICATIONS**	
	Principal : Based on gas Chromatographic separation and Photo Ionization Detector (PID)	
	Measurement : Benzene, Toluene, Ethyl-benzene, m.p-Xylene and 0-Xylene.	
	Display : Digital	
	Range : 0 - 100 ppb (0.32 – 325μg/m_3)	
	Lower detectable limit: 0.2 ppb (0.65μg/m_3) for 15 min cycle for Benzene	
	Temperature Range : 5 - 35^{o}C or more	
	Repeatability : Retention Time : <0.1% RSD Concentration: <1.0% RSD	
	Typical Cycle Time : Total Cycle Time should not exceed 15min i.e. Sample Collection Time -15 min approx. Analytical Time- 15 min approx.	
	Sample Volume : 1 liter for 15 min cycle	
	Desorption tube : Carbotrap	
	Pre concentration : Carbopack	
	Span Check Built in permeation bench with NIST certified Benzene& Toluene permeation tube.	
	Calibration : The Analyzer should be capable to calibrate through Multi	

	Calibration System also. Please see Multicalibration section And also calibration section in General Specifications	
	Analog Output : 0 – 1 V, 0 – 10 V, 2 – 20 mA / 4 – 20 mA	
	Digital Output : Multi drop RS 232 port, USB port /TCP/IP ,Ethernet	
IV	**SAMPLING PORT AND SAMPLING SYSTEM FOR GASEOUS POLLUTANTS**	
a.	Height of the sampling system: Approx 1.0 meter above the roof	
b.	Outer pipe : High Grade Stainless Steel of 50 mm dia, High grade of Inner Borosilicate glass 40-45 Mm dia Sampling head: made up of High Grade Stainless Steel	
c.	Manifold: Inner dia should have minimum 3 times dia of outer pipe. The total length of manifold not more that 25 cms. The manifold should have 10 port for tubes 6 x 1 mm, self-tightening	
d.	Sampling system: should be attached with moisture removal system and excess air be properly vented outside the monitoring station	
V	**METEOROLOGICAL SENSORS** The meteorological instrumentation should be interfaced directly with the Data Acquisition System (DAS) after passing through a lightening protection isolation box and the entire system should be weather proof reflective white paint coated equipped with adequate shade. All out puts should be connected to PC based logger and facilitate to data acquisition and transfer through modem/wireless.	
1	**Wind Direction**	
a.	Sensor: **Has to provide low starting threshold, fast response and accuracy, a wide operating range in adverse environmental conditions**	
b.	Principle: Van coupled to linear potentiometer/ultrasonic	
c.	Sensor: Potentiometer/ultrasonic	
d.	Accuracy: ±3degree or better	
e.	Wind Direction: 0 to 360°	
f.	Resolution: 1 degree	
g.	Starting Threshold: > 0.3 m/s	
h.	Response time: 10 second or better	
2	**Wind Speed**	
a.	Principle: Frequency proportional to wind speed	
b.	Sensor: 3 cup Anemo meter	
c.	Operating Range: 0-60 m/s or better	
d.	Temperature Range : 0^{o} to 60^{o} C	
e.	Starting threshold : 0.3 m/s	
f.	Accuracy : ±0.5 m/s or better	
3	**Ambient Temperature**	
a.	Principle: Standard Platinum RTD Element	
b.	Range of Temperature : -10^{o} C to 50^{o} C	

c.	Response : 10 seconds in still air	
d.	Linearity : + 0.1^{o} C	
e.	Accuracy : ± 0.2 ^{o} C or better(with radiation shield)	
4	**Relative Humidity**	
a.	Principle: Solid state Capacitive Type Sensor	
b.	Measuring Range : 0 to 100% RH	
c.	Accuracy : ±1.0% (5-95% RH)	
d.	Response Time : < 2 minutes for RH 10% to 90%, <5 minutes for RH 40-90%, Typically 20 seconds	
e.	Linearity : Better than ± 2%	
5	**RAIN FALL**	
a.	PRINCIPLE: Tipping Bucket Rain Gauge or any other suitable sensor	
b.	SENSOR: Magnet & Read Switch On Off Out Put	
c.	Accuracy : <5 %	
6	**Solar Radiation**	
a.	Range : 0 to 1500 W/m2 or better	
b.	Accuracy : ± 5.0 % or better	
c.	Resolution: 5W/m2	
d.	Sensor type: Silicon Photo diode	
VI	**TELESCOPING CRANKUP - METEOROLOGICAL MAST**	
a.	Height: 10 meters	
b.	Number of sections : 4	
c.	All the meteorological sensors are to be fixed with telescopic crank and the crank shall be made of Galvanised steel or aluminium and hand driven adjustment of the height for rise and fall levels	
d.	Retracted Height of 2 meters, Wind load Limit : 0.7896 sq.m (8.5 sq. ft) at 50 mph	
VIIa	**Multi Gas Calibration System For Zero And Span And Calibration Cylinders For SO_2, NO, NH_3, CO, BTX ANALYSER -ONE SET**	
a.	Can be used as Manual and Remote multi point generation/dilution of Gas concentration from low to several level concentration of span gas cylinders. The multi gas calibration system should meet the USEPA/ automated Federal Reference Method (FRM) / Federal Equivalent Method (FEM),TUV/MCERTS/EN specifications.. Preference is to USEPA and in case it is not available, other approvals shall also be quoted	
b.	Gas cylinders supplied along with dual regulator	
c.	Flow measurement Accuracy: +1% FS	
d.	Linearity of Flow Control: 0.5% FS	

e.	Repeatability of Flow Control: 0.2% FS	
f.	Flow range of Diluting Air: 0- 10 SLPM	
g.	Flow Range of Cylinder gases: 0-100cc/min	
h.	Calibration gas inputs: minimum 3 points	
i.	Dilution gas Inputs: minimum 1 point	
j.	Response Time: 60 s at 95%	
k.	System should have test channel out puts and digital input and out controls	
l.	Gas Phase Titration (GPT) with O_3 generator having 100% converter efficiency for conversion of NO_2 to NO.	
VIIb	**METEOROLOGICAL, FLOW AND ELECTRONICS CALIBRATION** The supplier should provide calibration devices or calibration check devices for all the meteorological parameters namely temperature, wind speed, wind direction, relative humidity, solar radiation, rain fall as per the specifications of the manufacturers	
VIIc	**Zero Air Generator: approved by FRM or CE**	
a.	Zero air generator should generate calibration standard of ultra pure zero air after removing maximum pollutants. (purity - 99.9%)	
b.	Output: 20 SLPM " 30 PSIG	
c.	Dew Point: -20^{o}C upto 15 LPM	
d.	Air dryer: Must be of Regenerative heatless driver	
e.	All the calibration gases must be NIST traceable. The system should also include calibration of Ozone analyzer.	
VIII	**DATA LOGGER AND SOFTWARE FOR DATA ACQUISITION SYSTEM**	
1	**Data logger**: with 8 analog and 10 digital inputs.	
2	Ability to log channels at different intervals and should have capability of averaging and displaying real time data and averaged data over a period of 1 min, 10 min, ½ hr, 4 hrs, 8 hrs, 24 hrs, 1 month and year.	
3	Communication between data logger and computer using standard RS232 connector. Capable of connecting at least 99 stations. PC may also be used.	

4	**Data Acquisition System :** Windows XP or latest software for data acquisition from the DAS and for statistical analysis and reporting of the monitored parameters	
5	The data Acquisition System (DAS) should be able to collect transmit via RS232 and store meteorological data and air quality data from all instruments.	
6	Support remote communication through radio, switched telephone, cellular telephone, as well as short haul modems. Capable to send SMS message to Cellular dives for location-specific or in the event of fault or incase of data limitation error.	
7	The data storage capacity must be very high and dual protected storage	
8	The software should support all sorts of Statistical analysis of data for maximum, minimum, average and standard deviation for various time intervals and for various pictorial presentations and interpretations	
9	The software should able to generate wind rose and pollution rose with the already stored data and by accepting any kind of numerical inputs	
10	**Specification for station Computer** (Latest version having additional features shall be preferred)	
11	**The DAS** and data linking system shall be compatible with the server already provided at head quarters of Kerala State PCB	
12	Laser printer of the latest Model having additional features	
IX	**DATA DISPLAY AT WEB:** **Specification :** Display should be in **ENGLISH** and **MALAYALAM**	
X	**SPLIT AIR CONDITIONERS**	
1	**Split Air Conditioners with Voltage Stabilizer:** If the bidders quote the make and type differently, the final selection of the make and model shall be decided by Board based on the performance of the air conditioners in the market as well within the Board and based on the cost. Capacity 1.5 and 1 tonne 1 no each , Power supply: 230 volts ±10volts AC and 50 Hz ± 3% . The operation of air conditioners should be automatically controlled with time and temperature based. The latest model of higher star rate is preferable.	

XI	**ON LINE UNINTERRUPTED POWER SUPPLY (UPS)**	
1.1	**ON LINE UNINTERRUPTED POWER SUPPLY (UPS):** 10KVA If the bidders quote the make and type differently, the final selection of the make and model shall be decided by Board based on the performance of the UPS in the market as well within the Board and based on the cost. Three phase 10 KVA UPS along with Automatic Delayed Restoration Device (ADRD) with 8 hours backup in full capacity should be provided for the smooth operation of the station including air conditioners and display system. a) Capacity : 10.0 kVA b) Technology : PWM using IGBT / MOSFETS c) Crest Factor : More than 3: 1 d) Input Voltage : 415 V AC Voltage Range : ± 25% Frequency : 50 Hz ± 3% e) Output Voltage : 415 VAC Voltage regulation : ± 1% Frequency regulation : ± 0.01% f) Battery type : Sealed maintenance free Back up time : 8 Hour at full load Battery Capacity : For required backup time Recharge time : 4 hrs to 90% after complete discharge g) Distortion : Less than 1% on linear load h) Power factor : 0.8 to 1 I) The UPS should have all sorts of Protective over voltage, overload, indicators and annunciates necessary for fault findings	
XIII	List of spares/consumables during warrantee period	
XIV	**DISPLAY BOARD DATA TRANSMISSION DEVICE**	
Sl No	**Item Description**	
1	PROCESSOR - Intel® Atom™ Processor E3815 (1.46 GHz Single Core, 512 KB Cache, 5W TDP) or equivalent Or 900 MHz or higher quad-core ARM Cortex-A7	
2	Memory- Memory slots for MicroSD or full size SD card slot with Memory support for at-least 8 GB	
3	Ports- a. One HDMI b. LAN Port for Ethernet Network Connection c. Minimum of 3 USB Port with support for USB	

	2.0 or USB 3.0.	
4	OS Support- Linux, or Windows OS	
5	Communication Options- a. LAN Communication b. Wifi Communication – Wifi Hotspot enabled/ GPRS Comm. Enabled	
6	Power Supply- 5 to 12 V DC through 220 V 50Hz AC Supply adapter or USB driven.	
7	Size- Mechanical Chassis Size not to exceed 9'' x 6''x 6'' with stand alone tower/box.	
8	Operating Environment- Operating Temperature 0° C to +50° C Humidity upto 90%	
9	Device Support- 05 Years	
10	Antivirus- It should be secured If Windows then life time antivirus should be there.	
11	General- Supplier will configure and deploy the communication mechanism. Complete manual of the device should be provided.	
12	Accessories -01 Meter HDMI Cable	
13	Internet- To be provided by the vendor either through GSM SIM or through Wifi Enabled Dongles.	
14	Display Board should show Last data saved.	
15	Display board should show Last updated time should be displayed	
16	Software: The vendor is responsible to provide software which can download the data from Station computer, AQI, Advertisements etc. store it and display on the Display Board seamlessly.	
17	**DAY LIGHT & NIGHT VISIBLE DATA DISPLAY SYSTEM**	
1	Size of Display System (H X W) feet and Pixel- 8 X 12 feet , 20 mm (+/- 0.6 mm) pixel pitch, 2300 m^2 minimum pixel Density	
2	Visibility Range 50 Meters (Day time)	
3	Brightness 8500 NIT or higher	
4	Display of Colour Elements 1Red , 1Green, 1Blue pixel	
5	Minimum Life span of the system LED Life 100000 Hours	
6	Viewing angle Viewing angle of 140^o Horizontal/59^o Vertical	
7	Operating and non-operating Temperature .-15-55^o C	
8	No of Color: 281 trillion Colors , 256 brightness level dimming capability	
9	Video processing 24 bit Video processing, 100 % Digital	
10	Diode Density 7000m2 (minimum)	

11	Scan rate and refresh frequency Scan Ratio 1:1 and with minimum 20000 hz refresh frequency	
12	LED internal and External Cabinet type , Serviceability - Internal LED frame should be made of Aluminium and External cabinet should be factory made without pin holes , LED Display should be serviceable from front and back	
13	Color Temperature - Adjustable 4500 - 9000 K range	
14	input Power Requirement/ Consumption 120/240v, 50/60Hz , Power consumption 180 W (maximum) / m^2	
15	Type :Discrete Diode	
16	Display Mounting Structure based upon location . Uni Pole or hanging	
17	General The system should also have the facility to display the environmental picture through video camera/vcr/cd player etc. for public awareness.	
18	Power Cable Laying Depending upon location, cabling is to be done by the firm	
19	Device at station to pick up data and transmit it to LED: Display data connectivity device with GSM SIM has to be installed near by LED board which will pick up data from station computer through Internet. LED to be placed away from through Internet .LED to be placed away from the station premises.	
20	Certification CE, UL/ULC listed	
21	IP Rating Display Module IP67, Cabinet IP 65	
XV	**Warranty Period**	
XVI	**Submission of details of no. of persons and other terms and conditions and cost separately** for comprehensive (including payment of electricity, telephone) AMC during warranty period and five (05) years beyond the warranty period for submitting validated data.	

APPENDIX 1

Format for Letter of Application

[On the Letter head of the Applicant (in case of Single Applicant) or Lead Member (in case of a consortium)]

Date:

To
The Chairman
KSPCB
Thiruvananthapuram 695004

Re: Continuous Ambient Air Quality Monitoring Station

Sir,

Being duly authorized to represent and act on behalf of ……. (hereinafter referred to as "the Applicant"), and having reviewed and fully understood all of the qualification requirements and information provided, the undersigned hereby apply for qualification for Continuous Ambient Air Quality Monitoring Station (CAAQMS).

We confirm that our Application is valid for a period of six months from ---------- *(Application Due Date)*. We have read the entire Tender notice document and shall abide by the instructions contained therein.

Yours faithfully,

_____

(Signature of Authorised Signatory)

(NAME, TITLE AND ADDRESS)

Appendix 2

Format for Power of Attorney for Signing of Application

(On a Stamp Paper of relevant value)

Power of Attorney

Know all men by these presents, We…….(name and address of the registered office) do hereby constitute, appoint and authorise Mr / Ms……(name and residential address) who is presently employed with us and holding the position of ……. as our attorney, to do in our name and on our behalf, all such acts, deeds and things necessary in connection with or incidental to our bid for Continuous Ambient Air Quality Monitoring Station (CAAQMS) in the district of Thiruvananthapuram/Kollam/Thrissur/Kannur including signing and submission of all documents and providing information / responses to the Kerala State Pollution Control Board (KSPCB), representing us in all matters before KSPCB, and generally dealing with KSPCB in all matters in connection with our bid for the said Project.

We hereby agree to ratify all acts, deeds and things lawfully done by our said attorney pursuant to this Power of Attorney and that all acts, deeds and things done by our aforesaid attorney and shall always be deemed to have been done by us.

Dated this the _____ day of _____2018

For _____

(Name, Designation and Address)

Accepted

_____(Signature)

(Name, Title and Address of the Attorney)

Date : _____

Note:

- *The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executant(s) and when it is so required the same should be under common seal affixed in accordance with the required procedure.*

- *In case the Application is signed by an authorised Director of the Applicant, a certified copy of the appropriate resolution/ document conveying such authority may be enclosed in lieu of the Power of Attorney.*
- *In case the Application is executed outside India, the Applicant has to get necessary authorisation from the Consulate of India. The Applicant shall be required to pay the necessary registration fees at the office of Inspector General of Stamps.*

Appendix 3

Format for Power of Attorney for Lead Member of Consortium

(On a Stamp Paper of relevant value)

Power of Attorney

Whereas the Kerala State Pollution Control Board (KSPCB), has invited applications from interested parties for Continuous Ambient Air Quality Monitoring Station (CAAQMS);

Whereas, the members of the Consortium are interested in bidding for the Project and implementing the Project in accordance with the terms and conditions of the Tender Notice Document and other connected documents in respect of the Project;

And Whereas, it is necessary under the Tender Notice Document for the members of the Consortium to designate the Lead Member with all necessary power and authority to do for and on behalf of the Consortium, all acts, deeds and things as may be necessary in connection with the Consortium's bid for the Project who, acting jointly, would have all necessary power and authority to do all acts, deeds and things on behalf of the Consortium, as may be necessary in connection with the Consortium's bid for the Project.

NOW THIS POWER OF ATTORNEY WITNESSETH THAT;

We, M/s. _____(Lead Member), M/s _____(Member) (*the respective names and addresses of the registered office*) do hereby designate M/s. _____ _____ being one of the members of the Consortium, as the Lead Member of the Consortium, to do on behalf of the Consortium, all or any of the acts, deeds or things necessary or incidental to the Consortium's bid for the Project, including submission of application/proposal, participating in conferences, responding to queries, submission of information/ documents and generally to represent the Consortium in all its dealings with the Department, any other Government Organization or any person, in connection with the Project until culmination of the process of bidding and thereafter till the Concession Agreement is entered into with KSPCB.

We hereby agree to ratify all acts, deeds and things lawfully done by Lead Member, our said attorney pursuant to this Power of Attorney and that all acts deeds and things done by our aforesaid attorney shall and shall always be deemed to have been done by us/Consortium.

Dated this the _____day of 2018

(Executants) *(To be executed by all the members of the Consortium)*

Note: The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executant(s) and when it is so required the same should be under common seal affixed in accordance with the required procedure.

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