

Sl.No.

/ICB

TENDER NOTICE

No.C-47011/01-23/2008-09/ICB/Mat.

Dt.26.08.2008

CENTRAL POLLUTION CONTROL BOARD  
'PARIVESH BHAWAN'  
C.B.D. CUM OFFICE COMPLEX  
EAST ARJUN NAGAR  
DELHI - 110 032.

Website:[www.cpcb.nic.in](http://www.cpcb.nic.in) e-mail:[cpcb@alpha.nic.in](mailto:cpcb@alpha.nic.in)

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CENTRAL POLLUTION CONTROL BOARD  
(MINISTRY OF ENVIRONMENT AND FORESTS)  
'PARIVESH BAHWAN'  
C.B.D. CUM OFFICE COMPLEX  
EAST ARJUN NAGARR, DELHI-32.

TENDER NOTICE NO.C-47011/01- 23/2008-09/ICB/MATERIALS  
DATED.26.08.2008

TENDER DOCUMENT FOR THE SUPPLY OF  
LABORATORY INSTRUMENT/EQUIPMENTS.

Price of Tender Document

- i) By Hand : Rs. 800.00 or US \$ 20.  
ii) By Post : Rs. 1000.00 or US \$ 25.

Date of Sale of Tenders : 26.08.2008 to 22.09.2008 on all working days  
between 11.00 AM to 5.00 P.M.

Last date of submission of tenders : Upto 3.00 P.M. on 23.09.2008 (Tuesday)

Opening of Tenders : 24.09.2008 at 11.00 A.M. (Wednesday)

DELHI  
26.08.2008  
DELHI -110 032

(M. Varghese)  
Section Officer (M)

TELEPHONE : 22308202, 22305792, 22302978, 22306127, 22302073  
FAX : 011-22308202, 22307078,22307079,22304948  
e.mail : [cpcb@alpha.nic.in](mailto:cpcb@alpha.nic.in)  
Website : [www.cpcb.nic.in](http://www.cpcb.nic.in)

Central Pollution Control Board  
(Ministry of Environment & Forests)  
Parivesh Bhawan , East Arjun Nagar.  
Delhi – 110032. India  
Tel. Nos. 22308202, 22305792 – Extn. 230 & 258.

TENDER NOTICE

No. C-47011/ 01-23/2008-09/ICB/Materials.

Dated.26.08.2008

Sealed tenders are invited on behalf of the Member Secretary, Central Pollution Control Board from the manufacturer/supplier in India & abroad for the supply of various Laboratory Instruments/equipments as listed below.

**Ambient Air Quality Monitoring System (Open path technology), Ball Mill Grinder for solid sample (Bench Top), Combustion Analyser, Detector Tubes, Gas Chromatograph with PID-FPD Detectors and reduction Catalyst Based Mechanizer, Gas Generators (H<sub>2</sub>), HAPS Monitor, High Precision flow calibration (Automatic), Hydraulic Laboratory Press (Manual), Hydro Carbons (Methane/Non-Methane HC/THC) (PPM Range) Analyser, Mass flow Controller, Multi Print Recorder, Ozone Generator/Permeation System, Ozone Precursor (individual volatile organic compound) Monitor (ppb range), Permeation Tubes, Precision Pressure Calibrator/Controller (Digital), Solid Phase Extraction (SPE) System, Spectrophotometer- UV Visible, Solvent (Accelerated) Extraction System, Stack Sampling Equipment with VOST, TKN Analyzer with Accessories, Vacuum Pump-Oil Sealed mechanical ( 5 to 21 m<sup>3</sup>/h), Weather Station.**

03. The tender Document with detailed terms & Conditions shall be available in person or through authorized representative on production of authority letter of the firm in duplicate or by post from the office of the Section Officer (Material), Central Pollution Control Board.

04. The following are the schedule governing this tender

Sale of Tender Document	-	From 26.08.2008 to 22.09.2008 on all working days between 11.00 AM to 5.00 PM
Last date & time for submission	-	23.09.2008 (Tuesday) upto 3.00 PM
Opening date of Technical bids	-	24.09.2008 ( Wednesday) at 11.00 AM

The request for Competitive Bidding Document sent by post will be accepted strictly up to 15.09.2008.

The detailed tender documents, terms & conditions and Technical specifications may kindly be seen at our website [www.cpcb.nic.in](http://www.cpcb.nic.in)

**(Member Secretary)**

CENTRAL POLLUTION CONTROL BOARD

(Ministry of Environment and Forests)

"Parivesh Bhavan" East Arjun Nagar,  
Delhi – 110 032, INDIA

DETAILS OF TENDER NOTICE

NO.C-47011/ 01-23/2008-09/ICB/MATERIALS: Dated:26.08.2008

FOR SUPPLY OF LABORATORY INSTRUMENT/EQUIPMENTS

Sealed Tenders are invited on behalf of the Member Secretary, Central Pollution Control Board from Manufacturer/Suppliers in India and abroad for the supply of various Laboratory Instrument/equipments as listed below:

**Ambient Air Quality Monitoring System (Open path technology) 01, Ball Mill Grinder for solid sample(Bench Top) 02, Combustion Analyser 01, Detector Tubes 200 packs, Gas Chromatograph with PID-FPD Detectors and reduction Catalyst Based Mechanizer 01, Gas Generators (H<sub>2</sub>) 01, HAPS Monitor 01, High Precision flow calibration (Automatic) 03, Hydraulic Laboratory Press (Manual) 01, Hydro Carbons (Methane/Non-Methane HC/THC) (PPM Range) Analyser 01, Mass flow Controller 04, Multi Print Recorder 03, Ozone Generator/Permeation System 03, Ozone Precursor (individual volatile organic compound) Monitor (ppb range) 01, Permeation Tubes 01 set, , Precision Pressure Calibrator/Controller (Digital) 03, Solid Phase Extraction (SPE) System 01, Spectrophotometer- UV Visible 01, Solvent (Accelerated)Extraction System 01, Stack Sampling Equipment with VOST 01, TKN Analyzer with Accessories 01, Vacuum Pump-Oil Sealed mechanical ( 5 to 21 m<sup>3</sup>/h) 03, Weather Station 01.**

02. The Tender Documents along with detailed specifications of the instruments can be obtained in person on Production of authority letter of the Firm in DUPLICATE or by post from the office of the Section Officer (Material), Central Pollution Control Board or by the authorized representative with prescribed Tender fee drawn in favour of Central Pollution Control Board, Delhi in the form of Demand Draft only.

03. The Bid must be submitted in English, by the principal only. In no case the Bids of Agents/Representatives will be entertained.

04. The Earnest Money as indicated in Bid document must be submitted by the Bidder along with the Tender in the form of Demand Draft only drawn in favour of "CENTRAL POLLUTION CONTROL BOARD" payable at Delhi (India). It should be either in Indian Rupees or in bid currency (equivalent amount as per the exchange rate prevailing ). The Indian agent/ representative should furnish an authorization letter from their foreign Principal supplier authorizing to deposit the EMD on their behalf.

05. The request for Competitive Bidding Documents sent by post will be accepted strictly Upto 15.09.2008. Request received by post after above mentioned date will not be entertained at any cost. Other details are as follows:

Sale of tender document - From 26.8.2008 to 22.09.2008 on all working days between 11.00 am to 5.00 pm.

Cost of tender document - By hand Rs.800.00 or US Dollar 20. By post Rs.1000.00 or US Dollar 25( through Demand Draft only)

Earnest Money alongwith Tenders - As indicated in the Tender Document

Last date of submission - Upto 3.00 PM on 23.09.2008

Date of opening of tender - At 11.00 a.m. on 24.09.2008

06. Bidders using downloaded tender forms must submit separate tender fee by Demand Draft alongwith technical bid drawn in favour of Central Pollution Control Board, Delhi

(MEMBER SECRETARY)

COMMITTED FOR CLEAN ENVIRONMENT

## 1.0 GENERAL TERMS AND CONDITIONS

- 1.1 This document contains the following:
- i) Copy of the Competitive Bidding Notice
  - ii) General Terms and Conditions of Bid
  - iii) Terms and Conditions for Submission of Bid
  - iv) Payment Terms
  - v) Settlement of Dispute
  - vi) Application Form
  - vii) Undertaking
  - viii) Bid Form
  - ix) Schedule of Earnest Money to be deposited alongwith Tender
  - x) Quantity of Instruments and Locations of delivery and installation.
  - xi) Detailed specification of the instruments.
  - xii) Check List.
- 1.2 The Tender Document is not transferable by the purchaser. The bid form in the tender Document at Annexure-II may be used for bidding. Documents /forms down laded from the net can also be used. Bids made on photocopy etc. will not be considered. However, the additional sheets containing the same proforma may be used for each item. Each sheet including that provided by the Board with this document must be signed by the bidder. The price bid must be in the form provided herewith at Annexure-II.
- 1.3 The tender will not be accepted from the firm to whom the document is not issued by the Board and the bid downloaded from net with out tender fee will not be accepted.
- 1.4 The Board takes no responsibility for delay or non receipt of Tender Document sent by post either way and also reserves the right to accept; or reject any or all the tenders in part or full without assigning any reason thereof.
- 1.5 No bid document will be sold after the last date of sale of Tender Document or between the extended period of opening date, if any.
- 1.6 The bidder is expected to examine all instructions, forms, terms and conditions and specifications mentioned in the bid document. Failure to furnish all information required by the bid documents or submission of a bid not substantially irresponsive to the bid document in every respect will be at the bidder's risk and may result in the rejection of it's bid.
- 1.7 This call of tenders does not bind the Central Board to place order. The Tenders submitted in response to this invitation be rejected without assigning any reason.
- The bidder should be a manufacturer. This tender notice, Tender forms, Schedule of requirement's , Specification etc are also available on CPCB's website [WWW.cpcb.nic.in](http://WWW.cpcb.nic.in) bidders using down loaded tender forms must submit a Separate tender fee by Demand Draft alongwith the technical part of the bid. The tender without requisite tender fee will be rejected.
- 1.8 The Board at its discretion may extend the last date of submission of tender and opening of tenders. The final authority for acceptance of a Tender will rest with the Chairman, Central Pollution Control Board who does not bind himself to accept the lowest tender and is vested with the authority to reject any or all of the tenders received without assigning any reason.
- 1.9 Documents, literature, diagrams/leaflets, samples etc., enclosed in the Tender shall become the property of the Central Board without any payment.

- 1.10 The warranty period for item Sl. No. 1, 2,5,6,7,8, 9, 10, 11, 13,14, 16,17,18,19, 20,21 , 23, will be for thirty six months starting from the date of successful commissioning of the instrument and for the rest of the item warranty will be for a period of twelve months. Under this warranty upon the receipt of such notice supplier/agent shall within the period specified, repair/replaced the defective instrument or spare parts thereof at the ultimate destination. The supplier/agent shall take over the replaced parts/goods, in the event of any correction of defects or replacement of defective material. In such cases, the warranty for the corrected/replaced materials shall be extended till the left over period of warranty.
- 1.11 The Tender would be regarded as turned down, if no award of contract has been obtained till the expiry of the Tender validity. No separate communication will be made in this regard.
- 1.12 The items have to be supplied in standard packing.
- 1.13 In case of the date of opening of Tender is declared as Public Holiday, the Tender shall be opened on the next working day at the same time.
- 1.14 The bid shall contain no interlineations, erasures or overwriting words except as necessary to correct errors made by the bidder, in such case, correction shall be initialed by the person or persons signing the bid.
- 1.15 Late and delayed tenders will not be considered and shall be returned unopened to the Bidder.
- 1.16 It is advised that the outside suppliers should send the Tender through Registered Post. However, the local supplier may drop their Tenders in Tender Box kept in Central Board for the purpose. In no case, Tender should be handed over to any employee of the Board.
- 1.17 Canvassing in any form will disqualify the Bid.
- 1.18 Request for the Tender Document for bidding through Telex, Telegram, Telephone, Money Order and Tele-fax shall not be entertained.
- 1.19 The Tender Notice No.C-47011/01-23/2008-09/ICB/Materials dated.26.08.2008 alongwith the item code number. (The item code number is given in the specification sheet against each items) must invariably be quoted in the bid and for further correspondence in this regard.
- 1.20 All the Tenders should be addressed to:  
THE Section Officer (M)  
CENTRAL POLLUTION CONTROL BOARD  
'PARIVESH BHAWAN'  
EAST ARJUN NAGAR, DELHI - 110032, INDIA

## 2.0 SUBMISSION OF BID

- 2.1 The bid prepared by the bidder and all correspondence and documents relating to the bid exchanged by the bidder and the purchaser, shall be written in English language, provided that any printed literature furnished by the Bidder may be written in another language so long as accompanied by English translation of its pertinent passages in such case, for the purpose of interpretation of the bid, English translation shall govern.
- 2.2 The bid must accompany Annexure-I with Techno Commercial part of Bid, tender fee incase of down loaded Document and Annexure-II & III along with 'Price' part of the Bid duly filled in and signed by the Bidder along with the seal of the Firm.
- 2.3 The Bidders are requested to quote the rates item-wise on FOB basis including total price of each instrument separately indicating the Govt. levies, and other expenditure item-wise. The freight charges and insurance will be borne by the buyer in the case of imported items. For indigenous items supplying by Indian firms, the rate should be FOR CPCB, Excise Duty excluded price should be quoted as necessary exemption certificate as applicable will be supplied. Taxes and other levies, insurance freight etc. if any, should be indicated separately . No C/D form will be issued against VAT.

Bidder is expected to examine the bidding Documents carefully and are deemed to have received and read all documents. It shall be the responsibility of the bidder to request copies of any missing documents. Failure to do so will be at bidders risk.

## IMPORTANT

- 2.4 It may be noted that mere quoting lowest rates will not entitle any firm to get the order. The quality of the item being offered, the past performance supply etc will also be taken in to consideration. Prior to award of purchase order the buyer can call any details, explanation, regarding technical & financial aspect.
- 2.5 **IMPORTANT: -** BIDDER CAN QUOTE THE RATES FOR ALL THE INSTRUMENTS OR SOME OF THE INSTRUMENTS AGAINST ONE TENDER DOCUMENT. HOWEVER, SEPARATE PRICE BID AND TECHNICAL BID SHOULD BE SUBMITTED FOR EACH ITEM CLEARLY MENTIONING THE ITEM CODE NUMBER, ITEM NAME ON THE TOP OF THE ENVELOPES WITH SENDERS NAME AND ADDRESS. THE CENTRAL POLLUTION CONTROL BOARD RESERVES THE RIGHT TO ACCEPT THE TENDER IN FULL OR IN PART. THE BID FOR EACH ITEM SHOULD BE IN SEPARATE SHEETS/PAGES AND FOR THE SAKE OF IDENTITY, COMPILATION, INSTRUMENT/ITEM CODE NUMBER AND DESCRIPTION OF ITEM SHOULD BE WRITTEN ON THE TOP OF EACH BID. EMD SHOULD SUBMIT SEPARATELY AGAINST EACH ITEM. ITEMS-WISE TECHNICAL SPECIFICATION AND PRICE SHOULD BE IN SEPARATE SHEETS i.e. THERE SHOULD BE SEPARATE ENVELOPE FOR EACH ITEMS CONTAINING TECHNICAL, PRICE BID & ITEMS WISE EMD, INCASE, BIDDERS DESIRES TO QUOTE MORE THAN ONE ITEM.
- 2.6 The Tender is to be submitted "single stage-2 envelops system" i.e. the first sealed envelope will contain full information required to judge pre-qualification, earnest money, complete details and specification of the instruments offered including the leaflets and catalogues, list of credentials with documentary evidence i.e., purchase/work order etc., Income Tax Clearance Certificate, PAN

Number, VAT/Sales Tax Registration No., Affidavit for not being black listed, Commercial Terms & Conditions etc. It shall be marked "Pre-qualifications, technical and commercial Bid No.C-47011/ 01-23/ICB/2008-09 dated 26.08.2008 due on 24.9.2008 for Instrument/Equipments. The second envelope will contain only price quoted by the bidder in the form given at Annexure -II of this document and shall be clearly marked "Price Bid No.C-47011/01-23/2008-09/ICB/Materials dated 26.08.2008 for Instrument/Equipments. Both the above envelopes must be separately sealed and shall be kept in one envelope bearing the address of Central Pollution Control Board and super scribed with bold letter "TENDER FOR Instrument/Equipments - NOT TO OPEN BEFORE 24.09.2008 AT 11.00 A.M. The senders address should be mentioned in all envelopes. Item Code Number(s) should be mentioned invariably on all envelopes.

- 2.7 Technical & Commercial part of the tender will be opened on due date i.e. at 11.00 A.M. on 24-09-2008 in the office of the Central Board, in presence of the Representative of the Tenders who like to present. Sealed Price part of technically and commercially acceptable tenders will be opened on a later day which will be communicated by the Board on the same day or on a later date.
- 2.8 The bidder shall furnish, as part of its bid, bid security for each instrument/equipment separately for the amount mentioned in schedule IV of this tender. Execution of Bid Security by the bidder's Bank on the basis of prevailing exchange rate shall be used for arriving at the amount of bid security in the Bid Currency.
  - a) The bid security shall be in the form of Demand Draft only in favour of "CENTRAL POLLUTION CONTROL BOARD" payable at DELHI. No Earnest Money shall be accepted in any form. It should be either in Indian Rupees or in bid currency. The Indian agent/representative should furnish an authorization letter from their foreign Principal suppliers to deposit the EMD on their behalf. The Earnest Money shall be forfeited if a bidder withdraws or amends the tender in any respect within the period of validity of his tender or fails to supply the instruments within the specified period in the tender document. Tender shall not entertained where a Tenderer has not furnished adequate earnest money in the prescribed and acceptable Form. In case, the instrument supplied is found defective and not attended by the supplier / authorized agent, the Earnest Money deposited by the supplier /their authorized Indian agent will also be forfeited.
- 2.9 The Firm who seek exemption from depositing earnest money being small scale industry, being registered with NSIC, DGS&D and other Government agencies which entitles them for exemption must submit the valid Registration Certificate - cover the instrument offered by them along with the permissible value. The copy of Government Notification granting exemption from deposit of EMD must be submitted along with the Techno-commercial part of tender alongwith the bid. (EMD Exemption will be granted only to those items specified in the certificate of Registration).
- 2.10 Unsuccessful bidders bid security will be discharged/ returned without any interest in the same form after the concerned purchase is finalized or within four months whichever is earlier and that of successful bidders will be discharged without interest within one month of the successful installation and commissioning of the instrument.
- 2.11 The validity of Tender would be for a minimum period of 180 days from the date of opening of Tenders. A Bid valid for a shorter period may be rejected by the

Board as non responsive. In case the validity is to be extended; the Board may solicit the Bidder's consent to an extension on the period of validity and the bid shall remain valid for the extended period mutually agreed for.

- 2.12 The rates should be quoted both in words and figures.
- 2.13 Arithmetical error will be rectified on the following basis: - If there is discrepancy between the unit price and total price that is obtained by the multiplying the Unit Price and quantity, the unit price shall prevail and the total price shall be corrected. If there is discrepancy between words and figures, the amount in words will prevail.
- 2.14 Tenders not in proper sealed cover or received through tele-graphically or E-mail fax/telex will not be entertained.
- 2.15 Conditional Tenders will be rejected without assigning any reason.
- 2.16 The Bid shall be typed or written in indelible ink and shall be signed by the Bidder or a person duly authorized to the Contract. The letter of authorization should bear the signatures of only the authorized person of the firm. All pages of the Bid, except for un-amended printed literature shall be initialed by the person or persons signing the bid.
- 2.17 To assist in the examination, evaluation and comparison of bids the buyer may, at its discretion, ask the Bidder for a clarification of its bid. However, no change in the price or substance of the bid shall be sought, offered, re-permitted.
- 2.18 Eventual suggestions for modification or subsidiary Tenders are principally not admissible.
- 2.19 The specifications are clearly mentioned in the document and the Bidder is requested to submit Bid only if their offer strictly comply to these specifications. Please note that no deviation in the required specification will be permitted. The bidding for the instruments having different specification will be on Bidder's risk as the Board will not entertain such Bids. BIDS CARRYING THE STATEMENT LIKE "SPECIFICATION AS PER TENDER DOCUMENT" SHALL NOT BE ENTERTAINED. THE PRODUCT SPECIFICATIONS SUPPORTED BY TECHNICAL LITERATURE AND LIST OF USERS, MUST BE ENCLOSED.
- 2.20 The placement of work order/purchase order will be according to technical evaluation of the Tender and after consideration of its price worthiness.
- 2.21 The price to be given in the Tender are fixed prices, irrespective of rise in Materials prices and increase in taxes etc., till the delivery of the overall consign-ment. No request in regard to increase in the price of instruments or in taxes etc., will be entertained after the submission of the tender.
- 2.22 The Supplier should attach a copy of financial bid/Proforma Invoice of the Instrument quoted (without cost/price figures) alongwith the technical bid to assess the item/components quoted in the bid.
- 2.23 The nomenclature of the instruments and spares will be invariably same in Proforma Invoice, Invoice, Packing list and all other relevant papers incase the Bidder is awarded with the purchase order for supply against its offer.
- 2.24 With the submission of his Tender the Bidder accepts the conditions of the Tender.

- 2.25 If the instrument supplied is not in conformity with the specification other than asked for, it will have to be replaced at the risk and cost of the supplier. No Freight and other charges for export and re-shipment will be paid by the Board.
- 2.26 The authorized Indian agent/Representative should have minimum two years continuous agency /partnership/joint venture/participation or collaboration with their principal foreign supplier. The documentary proof of such agency ship /authorization/MOU should submit alongwith the technical part. The bid of the firm does not contain the proof of such nomination/authorization as Indian agent will be rejected.
- 2.27 The installation of the instruments is the entire responsibility of the supplier. It must be done either by the principal/supplier or their authorized agents within one month of the receipt of the instruments by the Board. The supplier or their authorized Agent should be in touch with the Material Section of the Board to know the exact day of receipt of stores supplied/dischached by them.
- 2.28 The list of instruments/equipment, their approximate quantity and point of delivery is given at Annexure-V and the detailed specification of the instrument are given in the tender document (pages ). The quantity mentioned in the tender document may be increased or decreased at the discretion of the Competent Authority in the Central Board without assigning any reason.
- 2.29 Each and every folio of the Tender must be signed by the Bidder.
- 2.30 Bidder can quote the rates for all the instruments or some of the instruments. The Bid shall be considered only for those instruments for which the rates have been specifically quoted. The Board further reserves the right to accept the Tender for all the instruments or some of the instruments for which the Tenderer has quoted the Bid. The bidder should attach a separate list for the consumable/spares required for smooth operation of the instrument at least for three years (as optional items) and two copies of trouble shooting manuals, electric circuits etc. alongwith the bid. Combined EMD and consolidated bids will be rejected. (EMD, technical bid and commercial bid against each item quoted should be on separate sheets).
- 2.31. The bidder should provide a complete list of spares and consumables required for operation and maintenance of the instruments separately alongwith the price list.
- 2.32 Annual maintenance contract: The bidder should quote the charges for annual maintenance contract after the warranty period for the instrument listed in annexure -IV of this tender document at item Sl. No. 1, 2,5,6,7,8, 9, 10, 11, 13,14,16, 17,18,19, 20,21 23
- 2.33 The instrument for which Tenders are invited will have to be supplied within 90 days from the date of L.C. opening in the case of foreign suppliers. A period of 30 days will be allowed from the date of purchase order in the case of Indian manufacturers/suppliers.
- 2.34 The after sales service is most important to be considered for comparison of the bids. Bid of those firms who do not have Indian Agents to provide after sales and service during warranty period will not be considered.
- 2.35 In the case of imported instruments, the bid from Principals will only be considered. The bid if any received from Indian Agents on behalf of their principals will not be considered. The agency commission will be paid in Indian Rupees. Therefore, the charges on account of agency commission should be

clearly mentioned. In the case of indigenous instruments price should be quoted on FOR CPCB basis and in the case of imported instruments the price should be quoted on FOB basis.

- 2.36 The foreign bidders must indicate the following information in their proforma invoice alongwith the Price Bid separately for each instrument/equipment.
- a) Country of Origin.
  - b) Port of Shipment.
  - c) Name & Address of beneficiaries Bank, Branch name with Account No. & SWIFT No.
  - d) Minimum delivery period.
  - e) Whether transshipment/partner shipment is required or not.
  - f) Agency commission, if any payable to the Indian Agent, their Complete address, telephone & fax number.

- 2.37 The items have to be supplied in standard packing. The foreign supplier should use the minimum possible packets and should reduce the size of the packing in volume to avoid extra demurrage in the bonded warehouse in India, if any.

Important - Bank charges: Three months time for shipment and further 21 days for negotiation will be given. All Bank charges inside the country (in India) will be buyers account and all Bank charges outside the country should be borne by the supplier / beneficiary. The bidders may note this and quote the price of the instrument/ equipment accordingly. In the case of Foreign Suppliers, they will have to ensure shipment of the consignment as per the validity of the letter of credit established in this regard. In case of extension of supply date is sought, the bank charges towards the amendment of L.C. should be borne by the Beneficiary/Supplier.

- 2.38 Foreign Principals/their authorized Indian Agent shall intimate the buyer regarding the date of shipment well in advance. A copy of the invoice documents, air way bill, packing list, certificate of country of origin may be forwarded to the purchaser by fax immediately after shipment of the consignment to clear from custom authorities so as to avoid demurrage charges.
- 2.39 At any time prior to the deadline for submission of bids the buyer may for any reason whether at it's own initiative or in response to a clarification requested by a prospective Bidder, modify the bidding documents by an amendment.
- 2.40 The Amendment if any, will be brought to the notice in writing or by fax to all concerned Bidders who have purchased the bidding documents and will be binding on them.
- 2.41 In order to afford prospective Bidder reasonable time in which to take the Amendment into account in preparing their bids, the purchaser may at its discretion, extend the deadline for the submission of bids.
- 2.42 The prices must be quoted item wise i.e. basic price, taxes, packing forwarding, handling installation and training charges etc. The charges must be quoted clearly and not in vague terms like "As Actual" "Approx" etc.
- 2.43 If according to the Bidder, the Tender Documents contain unclear points which could influence price calculations, the bidder has to inform the authority who is issuing the call of Tenders before submission of its Tender, either in writing or by fax, even if he has pointed out this earlier in any other form/reference.

- 2.44 The Packing, Forwarding, charges must be quoted according to the place of delivery as mentioned in the schedule at Annexure-V. The supplier will be held liable for any damage, theft or loss during transit. In the case of Indian suppliers, the instruments are to be dispatched to the respective places directly and to be installed there, by the supplier under intimation to, CPCB Office at Parivesh Bhawan, Delhi-32.
- 2.45 The delivery of stores in case of foreign suppliers shall be taken at New Delhi or other locations mentioned in "annexure-V" of this tender documents, subject to facilities of port and customs clearance in the designated locations (will be mentioned in the purchase order). The price indicated should be on FOB basis. Please note that Proforma Invoice must be separate for each instrument/item.
- 2.46 The warranty/guarantee of the instrument/equipment should be clearly mentioned in the Bid.
- 2.47 MOST IMPORTANT  
PLEASE NOTE THAT ANNEXURE-I OF THIS DOCUMENT MUST BE ENCLOSED WITH THE FIRST PART OF BID i.e. "TECHNICAL AND COMMERCIAL BID" AND ANNEXURE-II AND III WILL BE KEPT IN THE SECOND PART OF BID i.e. PRICE BID.
- 2.48. PLEASE NOTE THAT THERE IS NO NEED TO ENCLOSE THE ENTIRE TENDER DOCUMENT (SUPPLIED BY THE BOARD) WITH YOUR BID. ONLY ANNEXURE-I, II AND III NEED TO BE ENCLOSED AS PER INSTRUCTION STIPULATED IN PARA 2.46 AND OTHER RELEVANT PARAGRAPHS OF THIS BID.
- 2.49 Prior to placing purchase order, incase the buyer desires to inspect the stores/instrument-equipment including demonstration, the same should be arranged by the supplier or their authorized Indian agent in the premises of the Central Pollution Control Board on free of charges.
- 3.0 PAYMENT CONDITIONS
- 3.1 Payment will be made by opening Letter of Credit through Bank. 80% of the purchase order value will be released on shipment and on furnishing 10% performance Bank Guarantee (i.e. 10% of the total purchase order value) by the Principle Supplier or their Authorized Indian Agent from any Nationalize Bank in India. 20% will be released on satisfactory installation/commissioning of instrument/ equipment. No advance payment will be allowed in any case. The defective, substandard and contrary to the specification of instruments supplied have to be replaced by the supplier at their cost and responsibility. Incase of indigenous instrument/ equipment quoted by Indian firms/ representatives/ Indian agents of foreign supplier / manufacturers in rupee terms the payment will be made in Indian rupees directly after supply and satisfactory commissioning/installation of equipment/instruments. No advance payment will be made and no proposal for document and payment through Bank will be considered.
- 3.2 In case several bills are presented, against one order, the reference of supply order, Item code and other details should be mentioned in each and every bill.
- 4.0 SETTLEMENT OF DISPUTE, ARBITRATION
- 4.1 All disputes or difference arising out of or in connection with the contract and supply of any item/equipment assigned under the same (whether during the progress of the works or after their completion, determination, abandonment or

breach of the contract) shall be Settled in accordance with the arbitration and conciliation Act, 1996. the Arbitral Tribunal shall consists of three (3) arbitrators appointed by the Chairman, Central Pollution Control Board. The arbitrators shall elect an umpire among them. In case of failure of the two arbitrator appointed to reach upon a consensus the decision of the umpire shall be final and binding. It will not be an objection to any such appointment that the arbitrators are the Government servants and had any interest in the Board or the contract entered into directly or indirectly. In all cases, the arbitrator shall state their decision in writing of amount of claim in dispute is Rupees one Lakh and above, subject as aforesaid the provision of the Arbitration and Conciliation Act, 1996 or any statutory modification or re-enactment thereof and the rules made thereunder and for the time being in force shall apply to the arbitration proceedings under this clause. Arbitration proceedings shall be held at Delhi/New Delhi, India and the language of arbitration proceedings and that all documents and communication's between the parties shall be in English. The cost and expenses of Arbitration proceedings will be paid as determined by the Chairman, Central Board.

4.2 It is a term of the contract that the party invoking the arbitration shall specify the dispute or disputes to be referred to the arbitration under this clause together with the amount or amount claimed in respect of each such dispute.

4.3 It is also a term of the contract that if the supplier (s) do not make any demand for arbitration in respect of any claim (s) or dispute in writing within 90 days of submission of the final bill for payment, the claim of the supplier will be deemed to have been waived and absolutely barred and the Board will be discharged and released of all liabilities under the contract in respect of these claims.

#### 4.4 LAWS AND REGULATIONS

The formation, validity and performance of this Contract shall be governed as to all matters by and under the laws and regulations of India and courts of Delhi shall have exclusive jurisdiction in all matters arising under this Contract.

The Supplier shall respect and abide by all laws and regulations of India and shall make its best effort to ensure that the personnel of the Supplier and their dependents, while staying in India, shall respect and abide by all laws and regulation of India.

The Supplier shall protect, absolve and indemnify the Board, and their representatives from any claim, loss or damage arising from any non compliance alleged or proved, without claiming them for payment.

#### 4.5 FORCE MAJEURE

Vendor shall not be considered in default if delay in delivery occurs due to causes beyond his control such as acts of God, natural calamities, civil, wars, strikes, fire frost, floods, riots and acts of usurped power. Only those causes which have a duration of more than 7 calendar days shall be considered cause of force majeure. A notification to this effect duly certified by the Local Chamber of Commerce/Statutory Authorities shall be given by the Vendor to the buyer by registered letter. In the event of delay due to such cases a length of time equal to the period of force majeure or at the option of the buyer, the order may be cancelled. Such cancellation would be without any liability whatsoever on the part of buyer. In the event of such cancellation the vendor shall refund any amount advanced by the Purchaser and deliver back any material issued to him by the Purchaser and release facilities, if any, provided by the Purchaser.

## 5.0 INJURY AND DAMAGE

### 5.1 Injury or Death of Persons

The Supplier shall be liable for and shall indemnify the Board against any liability, loss claim or proceedings whatsoever arising under any statute or law in respect of personal injury death or any disability caused by the carrying out the Works unless due to any act or neglect of the Board, or of any person for whom the Board is responsible.

### 5.2 Damage to Property

The Supplier shall be liable for and indemnify the Board against and insure and cause any Manufacturers and subcontractors to insure against any expense, liability, loss claim or proceedings in respect of any damage whatsoever to any real or personal property for any one occurrence in so far as such damage arises out of or in the course of or by reason of he carrying out of the Works and is due to any negligence, omission or default of the Supplier or any person for whom the supplier is responsible or any Manufacturers and subcontractors or person whom the Manufacturers and subcontractors are responsible.

## 6.0 ROYALTY AND PATENTS

6.1 The Supplier shall pay all royalties and licenses fees for the use of any patented item, whether it may be an invention, method, arrangement, article, process or appliance used in connection with the performance of the Contract. The supplier shall indemnify and save harmless the Board against any and all costs, damages and expenses of any nature or kind whatsoever which may arise out of or result from a claim by any person, firm or corporation that the manufacture, purchase, use of sale of any of the inventions, methods, arrangements, articles processes or appliances used in connection with the performance of this Contract infringes any patent of such other rights. The Supplier shall, at the request of the Board, defend the Board against any suit brought to enforce any such claim at the Suppliers expense.

6.2 In case any such patented item used on or in conjunction with the Works is in suit held to constitute and infringement of its use enjoined, the supplier shall either secure for the Board the right to continue using the said item by suspension of the enjoinder, by procuring for the Board a license or otherwise, or will replace such items with a non-infringing item or modify it so that it becomes non-infringing or with the Board's approval remove the said enjoined item and refund to the Board the sums paid thereof.

## 7.0 EFFECTIVENESS

This Contract shall come into force and effect on the date of the Letter of Award and shall be in force until the Works have been completed and all the payments have been made to the Supplier, except the obligation of the warranty period by the Supplier.

Annexure-I

S.No. /ICB  
APPLICATION FORM

(To be filled by the bidder)

- 1) Name and full address of the Bidder including Telegraphic Address/Telex No. and Fax No. :
- 2) Name and Designation of the Head :  
of the Firm/supplier and his Telephone No.
- 3) i) In case the supplier is located out of Delhi; specify the Address/ Authorized Distributor's or Agent's Address in Delhi, if any. :  
ii) Name, Designation, Address :  
Telephone & Fax Numbers of the Authorized Person who may be contacted during the process of the purchase concerned under this document (Applicable for all the suppliers)
- 4) Item Code Number(s) quoted for :
- 5) Whether Earnest Money Deposited :  
(Amount: Rs./US Dollar/ - bid currency)
- 6) If yes, Demand Draft No, Date and :  
Name of issuing Bank.
- 7) Validity of Tender :
- 8) If the tender documents are accepted in full (Yes or No) :
- 9) Income Tax Clearance Certificate :  
attached (Latest) (Yes or No)  
with PAN Number.

Place:

Date :

Legally Binding Signature with stamp

BID FORM

ANNEXURE - II

No. /ICB

Details showing quantity, specification and other details of the instruments offered ( to be filled by the bidder and must be kept in "Price Bid" part of the Tender)

Sl.No and Item code Number of instruments as per our tender Document	Name of Instrument	The Specification offered by the Bidder	Difference in Specifications of tender document and that of Bid, if any	Quantity	Unit Price (in Rupees excluding rates at col. no. 7)	Taxes and other expenditures (Sales Tax/VAT, C.S.T, freight, cost of installation & training (in case of indigenous items)etc.	Total Amount (FOB Value in case of imported and FOR PCB for indigenous in Rupees)
1	2	3	4	5	6	7	8

NOTE: - If this sheet is not sufficient to accommodate the bid the additional sheets containing the same proforma but all such sheets including this one must be signed by the Bidder along with the seal. This Annexure must enclose in the Proforma Invoice price bid for item wise. Separate Bid form should be attached against each item, quoted for.

Section Officer (Material)

Signature with date & stamp of the bidder

UNDERTAKING

DATE \_\_\_\_\_

TENDER NOTICE NO \_\_\_\_\_

TO

THE CHAIRMAN  
CENTRAL POLLUTION CONTROL BOARD  
(MINISTRY OF ENVIRONMENT & FORESTS GOVERNMENT OF INDIA)  
C.B.D. CUM OFFICE COMPLEX  
EAST ARJUN NAGAR DELHI - 110 032.

Sir,

Having examined the conditions of Tender Document and specifications of the instruments, the receipt of which is hereby acknowledged. We, the undersigned, offer to supply, delivery and install the following:

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 8.
- 9.
- 10.
- 11.
- 12.

(Please add additional pages, if required)The above supply, installation shall be in conformity with the specifications and conditions of supply.

We undertake if our bid is accepted to deliver the instruments quoted by us, we shall deliver and install within the period indicated by us in our offer.

We agree to abide by this bid for a period of 180 days from the date fixed for Bid opening and it shall remain binding upon us and may be accepted at any time before expiration of that period.

We are submitting a Demand Draft for Rs...../in bid Currency in favour of "Central Pollution Control Board", Delhi towards the Earnest Money.

This Bid, together with your written acceptance thereof in your notification of award shall constitute a bidding contract between us.

We understood that you are not bound to accept the lowest or any bid you may receive.

Dated this.....day of.....2008

Signature of authorized Person, Name with Stamp & full Address.

SCHEDULE OF EARNEST MONEY

Item code No.	Name of Instruments/Equipments	Qty.	Earnest Money amount is shown in Rupees. EMD should submit through Demand Draft either in Rupees or in bid Currency (equivalent amount as per exchange rate prevailing)
1.	<b>Ambient Air Quality Monitoring System (Open path technology)</b>	1	90,000.00
2.	Ball Mill Grinder for solid sample(Bench Top)	2	20,000.00
3.	Combustion Analyser	1	8,000.00
4.	Detector Tubes	200 pkts.	4,000.00
5.	<b>Gas Chromatograph with PID-FPD Detectors and reduction Catalyst Based Mechanizer</b>	1	48,000.00
6.	<b>Gas Generators (H<sub>2</sub>)</b>	1	24,000.00
7.	<b>HAPS Monitor</b>	1	70,000.00
8.	<b>High Precision flow calibration (Automatic)</b>	3	72,000.00
9.	Hydraulic Laboratory Press (Manual)	1	10,000.00
10.	<b>Hydro Carbons (Methane/Non-Methane HC/THC) (PPM Range) Analyser</b>	1	10,000.00
11.	<b>Mass flow Controller</b>	4	64,000.00
12.	<b>Multi Print Recorder</b>	3	6,000.00
13.	<b>Ozone Generator/Permeation System</b>	3	24,000.00
14.	<b>Ozone Precursor (individual volatile organic compound) Monitor (ppb range)</b>	1	30,000.00
15.	Permeation Tubes	1set	6,000.00
16.	<b>Precision Pressure Calibrator/Controller (Digital)</b>	3	36,000.00
17.	<b>Solid Phase Extraction (SPE) System</b>	1	12,000.00
18.	<b>Spectrophotometer- UV Visible</b>	1	12,000.00
19.	Solvent (Accelerated) Extraction System	1	34,000.00
20.	Stack Sampling Equipment with VOST	1	40,000.00
21.	TKN Analyzer with Accessories	1	24,000.00
22.	<b>Vacuum Pump-Oil Sealed mechanical ( 5 to 21 m<sup>3</sup>/h)</b>	3	9,000.00
23.	Weather Station	1	10,000.00

ANNEXURE – V

LOCATION OF DELIVERY AND INSTALLATION OF INSTRUMENTS/  
EQUIPMENT

Item code No.	Name of Instruments/Equipments	Qty.	PLACE OF DELIVERY/ INSTALLATION
1.	<b>Ambient Air Quality Monitoring System (Open path technology)</b>	1	Delhi
2.	Ball Mill Grinder for solid sample(Bench Top)	2	Delhi
3.	Combustion Analyser	1	Delhi
4.	Detector Tubes	200 pkts.	Delhi
5.	<b>Gas Chromatograph with PID-FPD Detectors and reduction Catalyst Based Mechanizer</b>	1	Delhi
6.	<b>Gas Generators (H<sub>2</sub>)</b>	1	Delhi
7.	<b>HAPS Monitor</b>	1	Delhi
8.	<b>High Precision flow calibration (Automatic)</b>	3	Lucknow, Kolkata Bangalore
9.	Hydraulic Laboratory Press (Manual)	1	Delhi
10.	<b>Hydro Carbons (Methane/Non-Methane HC/THC) (PPM Range) Analyser</b>	1	Delhi
11.	<b>Mass flow Controller</b>	4	Lucknow Kolkata Bangalore
12.	<b>Multi Print Recorder</b>	3	Lucknow, Kolkata Bangalore
13.	<b>Ozone Generator/Permeation System</b>	3	Lucknow, Kolkata Bangalore
14.	<b>Ozone Precursor (individual volatile organic compound) Monitor (ppb range)</b>	1	Delhi
15.	Permeation Tubes	1set	Delhi
16.	<b>Precision Pressure Calibrator/Controller (Digital)</b>	3	Lucknow, Kolkata, Bangalore
17.	<b>Solid Phase Extraction (SPE) System</b>	1	Delhi
18.	<b>Spectrophotometer- UV Visible</b>	1	Delhi
19.	Solvent (Accelerated) Extraction System	1	Delhi
20.	Stack Sampling Equipment with VOST	1	Delhi
21.	TKN Analyzer with Accessories	1	Delhi
22.	<b>Vacuum Pump-Oil Sealed mechanical ( 5 to 21 m<sup>3</sup>/h)</b>	3	Lucknow, Kolkata, Bangalore
23.	Weather Station	1	Delhi

**AMBIENT AIR QUALITY MONITORING SYSTEM (OPEN PATH TECHNOLOGY)**

- (i) Measurement Method : Open path DOAS (Differential Optical absorption Spectroscopy To measure UV and IR ranges) US EPA Approved
  - (ii) Monitoring path length : 100 to 500 metres
  - (iii) High pressure Xenon lamp : High pressure Xenon lamp
  - (iv) Complete cycle time : 30 second to 3 minutes  
10 seconds for single gas
  - (v) Parameters : NO-NO<sub>2</sub>-NO<sub>x</sub> , SO<sub>2</sub>, , O<sub>3</sub>, (BTX P, m, o), Formaldehyde, CO, CO<sub>2</sub>, NH<sub>3</sub>, HCL, CH<sub>4</sub> & mercury with meteorological sensor wind speed, wind direction temp .and humidity etc.
- Concentrations compensated : 25 degree C. 101.3 kPa
- Operating temperature : -10 to 60 degree C

**1. Parameter wise specifications:**

<b>Compound</b>	<b>Max. Measurement Range (500 m path)</b>	<b>Min. detectable quantities (monitoring path 500 m, measurement time 1 min.)</b>	<b>Zero drift (500 m path, Max. per month)</b>	<b>Span drift (per month, better than)</b>	<b>Span drift (per year, better than)</b>	<b>Linearity error (of measurement range, better than)</b>
NO <sub>2</sub>	0 - 2000 µg/m <sup>3</sup>	1 µg/m <sup>3</sup>	±2 µg/m <sup>3</sup>	±2%	±4%	±1%
SO <sub>2</sub>	0 - 5000 µg/m <sup>3</sup>	1 µg/m <sup>3</sup>	±2 µg/m <sup>3</sup>	±2%	±4%	±1%
O <sub>3</sub>	0 - 1000 µg/m <sup>3</sup>	3 µg/m <sup>3</sup>	±6 µg/m <sup>3</sup>	±2%	±4%	±1%
NO	0 - 2000 µg/m <sup>3</sup>	2 µg/m <sup>3</sup>	±4 µg/m <sup>3</sup>	±2%	±4%	±1%
Hg	0 - 2000 µg/m <sup>3</sup>	20 ng/m <sup>3</sup>	±40 µg/m <sup>3</sup>	±2%	±4%	±1%
Formaldehyde	0 - 2000 µg/m <sup>3</sup>	20 µg/m <sup>3</sup>	±40 µg/m <sup>3</sup>	±2%	±4%	±1%
Benzene	0 - 2000 µg/m <sup>3</sup>	1 µg/m <sup>3</sup>	±6 µg/m <sup>3</sup>	±2%	±4%	±1%
Toluene	0 - 2000 µg/m <sup>3</sup>	3 µg/m <sup>3</sup>	±6 µg/m <sup>3</sup>	±2%	±4%	±1%
p, m-Xylene	0 - 2000 µg/m <sup>3</sup>	3 µg/m <sup>3</sup>	±6 µg/m <sup>3</sup>	±2%	±4%	±1%
o-Xylene	0 - 2000 µg/m <sup>3</sup>	3 µg/m <sup>3</sup>	±20 µg/m <sup>3</sup> /m <sup>3</sup>	±2%	±4%	±1%
CO	0-100g/m <sup>3</sup>	100 µg/m <sup>3</sup>	±200 µg/m <sup>3</sup>	±2%	±4%	±1%

**3 Temperature compensation at 25degree c 1014 hpa**

**4 Calibration Equipment**

With all the necessary arrangements all the components including ozone transfer standards as per US EPA reference method. All the certified gases along with regulators and necessary arrangements for calibration of the system to be provided by the supplier.

**5 Calibration bench and receivers**

- (i) Length : 1000 mm
- (ii) Material : Stainless Steel
- (iii) Connection : 1½ inch internal thread  
Synthetic Rubber/teflon

**6 Ozone generator**

- (i) Principle : High Voltage Corona Conversion of O<sub>2</sub>
- (ii) Ozone levels : 200 to 1500 ppm
- (iii) Power : 230 V 50 Hz

**7 Ozone transfer standard**

- (i) Principle of operation : UV Absorption Photometer
- (ii) Range : 0 to 1500 ppm
- (iii) Traceability standard : US EPA Reference Methods (Using Dilution)

**B) GENERAL SPECIFICATIONS:**

- ✓ Ambient air monitoring system to measure pollutants in ambient air over long paths. Path lengths over the range 150 to 500 metres are expected but longer paths up to 2000 meters will be preferred.. The instrument is to operate on the Differential Optical Absorption Spectroscopy principle allowing for the simultaneous monitoring of multiple gases using UV and IR specyrum.
- ✓ Open path monitoring is required to give a more representative picture of pollution in selected areas. The DOAS system is preferred as multiple parameters can be measured concurrently and the technology minimizes labor requirements.
- ✓ Instruments must be capable of both bench calibration and in field auditing and prices must include any equipment needed to carry this out.
- ✓ The equipment must have the built in capability to store data as well as the ability to connect to a telephone line and/or GSM interface/radio modem for data retrieval.
- ✓ It must be possible to configure the equipment to sequentially monitor a number of paths This is only being considered as an option but costing for any required hardware and software is sought.
- \* The receiver and emitter should be automatically align able.

## **OPERATING CONDITIONS**

The tenderer must supply detailed operating conditions required for the instrument and confirm it can meet the minimum conditions described herein. Details must include mounting and housing requirements as well as temperature and humidity operating limits

Outdoors components of the instrument must be capable of operating under all weather conditions encountered in India. The equipment should be designed and installed in such a way that it will withstand and operate in conditions of fog, rain or typhoons.

## **GASES TO BE MEASURED**

The equipment must be able to measure the following gases in ambient air both separately and as a mixture:

- Sulphur Dioxide,
- NO-NO<sub>2</sub>-NO<sub>x</sub>
- Carbon Monoxide Ozone,
- Benzene,
- Toluene,
- Xylene,
- Other gases to be measured as mentioned parameter wise specification.

## **EQUIPMENT**

The following components are to be tendered for:

All components both hardware and software to meet Tender requirements

- Sending and receiving components
- Electronic hardware including latest UPS PCs & colour printers for measurement and data storage
- Data processing hardware
- Data processing, set up and calibration software
- Bench calibration equipment
- Field auditing equipment
- Software for instrument operation, calibration, data capture and validation if possible with Barren Hassen Protocol
- Tool kit for routine maintenance and set up
- List of estimated suitable spare parts and consumables for 5 years and their costs. This should include any fragile parts that are susceptible to breakage when moving equipment. Note shelf life of spare parts must be mentioned. Cost of spares, source lamps, optical windows, etc. to be provided

## **SYSTEM DESIGN**

The emitter and receiver shall be possible to use for path lengths up to 1000 metre. The Emitters should be a stand alone unit.

The emitter and receiver units should be made of acid-proof stainless steel with quartz windows in order to withstand the weather and climate conditions in India.

The system should consist of a spectrometer and integrated with latest intel core due processors alongwith necessary software and hardware for data acquisition, data processing and presentation. The software with Barren Hassen protocol will have addition advantage to link the data with the existing system.

## QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) KIT

The QA/QC kit should also be provided along with the instruments:

- a) Span, multi point and zero calibrations according to US EPA regulations must be performed on a regular basis and as recommended.
- b) An ozone calibrator for the range of 200 to 1500 ppm should be supplied. The calibrator should include an integrated generator as well as a photometer for the required output range.

### REFERENCES

Supply at least 3 references/ reports from organizations currently operating the units with comments on:

- equipment reliability,
- ease of operation,
- experience of organization,

Provide reference information on at least 5 installations in Asia with minimum 5 years operation experience. Name of organizations and contact information shall be provided.

### COMMISSIONING

1. The instruments, if purchased, would be commissioned by the supplier in India, with assistance of the manufacturer's engineer.
2. The instruments must operate for ten weeks continuously, within specifications without any component failure to be considered acceptable
3. A commissioning report is required and must include results of
4. Full check of instrument performance to manufacturer's and the required specifications
5. Calibration of SO<sub>2</sub>, NO<sub>2</sub>, Ozone and BTX and other parameters
6. Any faults found actions taken to rectify any and all faults and recheck of performance
7. The tenderer must indicate how he will comply with this clause and give costs associated with it.

### LOCAL SUPPORT

The tenderer must have an Indian based representative capable of all repairs, service, calibration and supply of spare parts for the equipment.

### TRAINING

The supplier has to organize the training programme for the following components for 10 persons for at least for one week.

- Instrument installation
- Instrument maintenance
- Instrument calibration
- Data validation
- Operating under different scenarios (industrial, background, traffic)

## **MANUALS**

The tenderer must indicate the ability to supply the following manuals:

Operation Manuals - two copies for each instrument of operational manuals containing

- all required information for set up of the equipment
- operation instructions
- routine maintenance instructions
- calibration procedures for each of the gases in section 2.6
- instructions and set up diagrams for in field auditing
- instructions for full multi-point calibration

## **SAFETY STANDARDS**

1. All components tendered must be built to relevant Indian electrical and safety standards
2. All hardware must operate from 240 Volts  $\pm 10$  AC 50 Hz mains electrical power supply.
3. All communications devices must comply with relevant Indian Standards.

## **Operation and maintenance contract:**

The open path (DOAS) system shall be under comprehensive operation & maintenance contract for 10 years from the date of commissioning of the station which can be further extended for next five years at the mutually agreed rates, terms and conditions. The rates for O&M shall be quoted separately along with the offer. The payments shall be released on quarterly basis after the scrutiny of data generated from time to time as required. Data capturing capacity should be more than 95%.

BALL MILL GRINDER FOR SOLID SAMPLE PREPARATION  
(BENCH TOP LABORATORY)

- a) Maximum feed particle size : 10mm
- b) Feed quantity : up to 225ml
- c) Final fineness : less than 1 um
- d) Electrical details : Should operate on 220 ± 10volts,  
50Hz AC
- e) Weight (in Kg, approx.) : 75 Kg
- f) Dimensions WxDxH, approx. : 37cm × 53cm × 50cm
- g) Grinding vessel : Zirconium oxide, 95% ZrO<sub>2</sub>(approx.)/  
WC
- h) Grinding bowl / useful capacity : 500 ml / 80 to 225 ml
- i) Available balls for grinding : 25 with 20 mm dia.
- j) Other requirements : Should be provided with operational  
manual  
  
and dust Cover. Should ensure safe  
operation and simple maintenance.

## COMBUSTION GAS ANALYSER

1. Gases to be measured : CO, O<sub>2</sub>, CO<sub>2</sub>, combustion efficiency others ie SO<sub>2</sub>, NO, NO<sub>2</sub>, HC. are optional
2. Sensors : IR or Electro-chemical Sensors with high accuracy and life span of 3 to 5 years.
3. Gas Flow : 1 to 2.5 litre / min.
4. Temperature Measure : 0 – 1000 °C.
5. Operating Temperature : 0 – 50 °C.
6. Power Supply : Battery operated alongwith built in charger on Mains 230 V ± 10 VAC, 50 Hz ± 3%.
7. Flue Gas Probe : Stainless Steel Shaft with rubber handle.
8. Pre Programming : For natural Gas, Light Oil, Heavy Oil, LPGs, Propane, Butane, Coke, Coal etc..
9. Parameter wise Specification : As at Annexure – ‘A’.
10. Software / Operator : Easy to handle Key Board operated and user friendly. Data format transferable to user software.
11. Weight : Light Weight / Portable.
12. Certificate : EPA approved / equivalent may be preferred. .With calibration certificate
13. Documents : Instruction manual for operation. Circuit details for each electronic card for repair and maintenance.
14. Supplier should quote the rates of all the sensors for next three years and ensure that all the sensors are available for the next five years.

### Annexure – ‘A’

Parameter	Resolution	Accuracy	Range
Temperature <b>Measurement</b>			
Flue Temperature	0.1 °(C/F)	0.1 ° C ± 0.3%. of reading	0 – 1000 °C Use high temperature probe for gases > 600 °C / 112 °F
Inlet Temperature	0.1 °(C/F)	0.1 ° C ± 0.3%. of reading	0 – 600 °C

<b>Gas Measurement</b>			
Oxygen (O <sub>2</sub> )	0.1%	0.1% + 0.2%	0 – 25%
Carbon Monoxide (CO)	1 ppm	± 20 ppm  < 400 ppm 5% of reading > 2000 ppm ± 10% of reading > 2000 ppm	0 – 10, 000 ppm
Carbon Monoxide (CO)	0.01%	± 5% of reading from 0.1% to 10%	0 – 10%
Nitric Oxide (NO) <b>(OPTIONAL)</b>	1 ppm	± 5 ppm < 100 ppm ± 5% of reading > 100 ppm	0 – 5, 000 ppm
Nitrogen Dioxide (NO <sub>2</sub> ) <b>(OPTIONAL)</b>	1 ppm	± 5 ppm  < 100 ppm ± 5 ppm < 100 ppm	0 – 1000 ppm
Sulphur Dioxide (SO <sub>2</sub> ) <b>(OPTIONAL)</b>	1 ppm	± 5 ppm  < 100 ppm ± 5% of reading > 100 ppm	0 – 5000 ppm
Pressure <b>(OPTIONAL)</b>	0.01 mbar / kpa	± 0.05% Full Scale	0 – 150 mbar
Carbon Dioxide (CO <sub>2</sub> )	0.1%	± 0.3%	0 – Fuel Vale
Efficiency	0.1%	± 1%	0 – 100%
Hydrocarbon (HC) <b>(OPTIONAL)</b>	0.01	± 5% of reading	0 – 10,000 ppm

**DETECTOR TUBE**

S.No.	Description	Range	Quantity (Box)
1.	Carbon Monoxide Tube	0.1 – 10 vol%	2
2.	Carbon Monoxide Tube	2.5 – 2000 ppm	2
3.	Carbon Monoxide Tube	8 – 1000 ppm	2
4.	Carbon Monoxide Tube	5 – 600 ppm	2
5.	Carbon Dioxide Tube	0.13 – 6 vol%	3
6.	Carbon Dioxide Tube	100 – 4000 ppm	3
7.	Ammonia Tube	0.5 – 78 ppm	2
8.	Hydrogen Sulphide Tube	10 – 4000 ppm	1
9.	Hydrogen Sulphide Tube	1 – 240 ppm	1
10.	Sulphur Dioxide Tube	1.25 – 200 ppm	2
11.	Sulphur Dioxide Tube	0.5 – 60 ppm	2
12.	Sulphur Dioxide Tube	0.05 – 10 ppm	2
13.	Chlorine Tube	25 – 1000 ppm	2
14.	Chlorine Tube	0.1 – 16 ppm	2
15.	Nitrogen Dioxide Tube	0.5 – 125 ppm	4
16.	Nitrogen Oxides Tube	0.04 – 16.5 ppm	2
17.	Nitrogen Oxides Tube	5 – 625 ppm	4
18.	Hydrogen Cyanide Tube	0.36 – 120 ppm	2
19.	Carbon Disulphide Tube	0.63 – 100 ppm	2
20.	Hydrogen Chloride Tube	0.2 – 76 ppm	3
21.	Hydrogen Chloride Tube	10 – 1000 ppm	3
22.	Nitric Acid Tube	0.1 – 40 ppm	2
23.	Hydrogen Fluoride Tube	0.25 – 100 ppm	2
24.	Fluorine Tube	1.25 – 50 ppm	2
25.	Ozone Tube	4 – 400 ppm	2
26.	Hydrogen Peroxide Tube	0.5 – 10 ppm	2
27.	Mercury Vapour Tube	0.05 – 13.2 mg/m <sup>3</sup>	2
28.	Phenol Tube	0.4 – 187 ppm	2
29.	Total Mercaptan Tube	0.5 – 120 ppm	2
30.	Acid Test Tube	Qualitative	2
31.	Formaldehyde Tube	0.1 – 40 ppm	2
32.	Formaldehyde Tube	2 – 100 ppm	2
33.	Lower Class Hydrocarbons Tube	0.05 – 2.4 vol%	3
34.	Hydrocarbon Tube	0.05 – 2.4 vol%	3
35.	n-Butane Tube	30 – 1680 ppm	2
36.	Higher Class Hydrocarbons Tube	100 – 3000 ppm	3
37.	Petroleum Distillates Tube	0.5 – 28 mg/l	3
38.	Benzene Tube	2.5 – 120 ppm	4
39.	Toluene Tube	1 – 100 ppm	2
40.	Xylene Tube	5 – 625 ppm	1
41.	Chlorobenzene Tube	2 – 500 ppm	2
42.	Vinyl Chloride Tube	0.25 – 54 ppm	2
43.	Carbon Tetra Chloride Tube	0.5 – 60 ppm	2
44.	Ethylene Tube	0.2 – 50 ppm	2
45.	Acrylonirile Tube	0.1 – 18 ppm	2

## GAS CHROMATOGRAPH WITH FID-FPD- DETECTORS AND REDUCTION CATALYST BASED MECHANIZER

S. No.	Specifications	Requirement
1.0	<b>INSTRUMENT COMPOSITION</b>	
	Gas chromatograph	One set
	FID Detector	One set
	FPD Detector	One set
	Methaniser with reduction Catalyst	One set
	Capillary Column with Accessories	One set
	Data Processing / Automatic Data Station	One set
2.0	<b>TECHNICAL SPECIFICATIONS</b>	
2.1	GC System Type	Computer controlled, Data workstation compatible Gas Chromatograph (GC) with built in diagnostics and comprehensive self test
	Temperature programming/Ramps	At least six ramp oven temperature programming.
	Heated Zones	At least five heated zones (2 inlets, 2 detectors and one auxiliary) in addition to the oven.
	Functional Display	Functional keyboard with four line alphanumeric display. Display should include temperature and pressure / flow parameters, type of carrier gas, carrier gas column pressure, flow rates, split flow, detector gas flow rates and all detector parameters. A dedicated key should allow unattended and automated system leak simultaneous check.
	Memory Protection	Power fail memory protection. Storage of atleast 5 methods and automated sequences.
	Interface	RS-232 interface and LAN
	Injector / Detector mounting	System should be compatible for 2 injectors and 2 detectors simultaneous mounting. System should be compatible for automatic / manual injection.
	Column Mounting	Capable to hold 100 $\mu\text{m}$ to 530 $\mu\text{m}$ different diameter capillary to mega bore columns.
	Purge System	Effective gas saver and septum purge system.
	Start / Stop facility	Remote start / stop facility.
2.2	<b>Column Oven</b>	High performance, large capacity oven accommodating capillary column and mega bore column
	Volume	More than 10 litres
	Operating temperature	Maximum 4 $^{\circ}\text{C}$ above ambient upto <b>400 <math>^{\circ}\text{C}</math></b> Cryo cooling with $\text{LN}_2$ or peltier cooling $-40$ $^{\circ}\text{C}$ or below

S. No.	Specifications	Requirement
	Temperature set point	$\pm 1$ °C
	Temperature stability	$\pm 0.01$ °C for 1 °C ambient change
	Ramp rate	45 °C /minute or more
	Heating time	Maximum 8 mins for (50 – 400 °C) or less
	Cooling time	Maximum 5 mins for (400 – 50 °C) or less
	Column bleed compensation facility Vent temperature control	Computer control in automatic sequence and fast.
2.3	Flow / Pressure Controller	Sufficient Electronic Pneumatics Control (EPC) Channels for inlets, detectors, or auxiliary gases through Data Processor with Screen display of pressure / flow.
	Pressure adjustment	Pressure may be adjusted by increment of 0.01 psi. Atmospheric pressure compensation for altitude and ambient temperature variations
	Pressure programming	2 or more pressure / flow programming ramps.
	EPC Setting	EPC setting facility should be included in computer work station system.
	EPC Sensor	EPC sensor should be provided in inlets and detectors for all gases (carrier gas, make up gas and support gas in detectors, and carrier and split vent gas in inlets).
	Flow / Pressure set points	Flow/ pressure set points on each inlet on detector parameter screen.
	Flow Sensor	Flow sensor for control and storage of split ratio in split / splitless and PTV injector.
2.4	Injector Mounting	Two injectors mounting, one split / splitless and one Gas phase sample injection system.
	Injector Operation	Ambient and sub-ambient operations (-40 °C or below)
	Injector accessories	With heater, temperature sensor and protection from overheating.
	Injector capability	Should be capable to hold all types and all sizes of capillary columns and mega bore columns
	Purge System	Efficient septum purges system, purge time adjustable.
	Inlet	Split/Split less inlet should be compatible for Solid Phase Micro Extraction (SPME) system
2.5	Split/Splitless Injector with back flush	Injector should have forward inlet pressure programming with an optimised modular, uniform thermal profile for split / splitless injections.
	Injection Volume	Injector should permit large volume splitless injections.
	Flow Control	Electronic pressure/flow control.
	Operating temperature	Upto 400 °C operating temperature for split/splitless injector with 1 °C increment

S. No.	Specifications	Requirement
	Solvent rejection / back flush	Software controlled facility for solvent rejection and back flush
	Deans Switched Heartcut Device	Deans Switched Heartcut Device for connecting two column/detector (two fractions of same sample can be chromatographed on different columns)
2.6	Gas Phase Injector	Gas phase should have a single 10-port GC sample injection valve (with auxillary EPC and heating upto 325 <sup>o</sup> C or a group of valves sufficiently fitted with a sample loop (1 ml, 2 ml – 2 each in number) and back flush facility compatible to on column injection.
	Pressure / Flow control	Electronic pressure/flow control.
	Operating temperature	Operating temperature should be upto 325 <sup>o</sup> C.
	Temperature programming ramp	Atleast 6 temperature programme ramps
<b>3.0</b>	<b>DETECTORS</b>	Detector combinations would be FID-FPD.
	Temperature range	Temperature range upto 400 <sup>o</sup> C
	Pressure control	All the detectors should have Electronic Pressure Control (EPC) and electronic on/off facility for all detector gases.
	Detector	Detector with make up gas and automatic zeroing facility and over heat protection.
3.1	FID	Programmable Electronic Pressure/Flow Control
	Operating temperature	Operating temperature (maximum) should not be less than 400 <sup>o</sup> C (1.0 <sup>o</sup> C step)
	Flame detection	Flame out detection facility
	Minimum detection limit	<5 pg carbon/sec or less
	Linear dynamic range	< ± 10%, 10 <sup>7</sup> with N <sub>2</sub>
	Ignition	Auto ignition facility through computer
3.2	FPD	Electronic pressure control.
	Minimum detection limit	<75 fg P/sec or less, <5 pg S/sec with methyl parathion
	Operating temperature	Temperature operating limit should not be less than 250 <sup>o</sup> C.
	Dynamic range	Should be better than 10 <sup>6</sup> .
4.0	<b>METHANIZER</b>	Should be compatible to be attached with main GC system.
	Gas phase injection	Automatic gas phase injection after proper reduction of samples (for CH <sub>4</sub> , and Non-Methane Organics)

S. No.	Specifications	Requirement
	Reduction catalyst	Should have a Reduction catalyst packed with 100-mesh pure nickel powder to convert CO and CO <sub>2</sub> to CH <sub>4</sub> .
	Reduction catalyst tube	Reduction catalyst tube should be mounted vertically in atleast 400°C furnace.
	GC connection	Catalyst sections should have independent channels to be connected to GC gas injection system for calibration check.
	Control	Should also be operated and controlled by computer.
5.0	<b>COLUMNS</b>	<p>DB 1701 or DB1 or equivalent 30 - 60m x 0.25 - 0.32 mm ID having 0.25 µm -1µm film thicknesses</p> <p>Film - 14% cyanopropyl phenyl and 86% dimethyl polysiloxane co-polymer column</p> <p>HP-5-MS or equivalent 60 m X 0.25 mm ID with 0.25 µm film thickness Ultra-low bleed column</p> <p>Film - 5% di-phenyl and 95% dimethyl polysiloxane copolymer column</p> <p>Carboxen 1006 or Alumina alumina/Na<sub>2</sub>SO<sub>4</sub> PLOT 50 m X 0.32 mm ID with 1.0 µm film thickness</p> <p>HP – Ultra2 or equivalent 50 – 60 m X 0.22 – 0.25 mm ID with 0.25 – 0.33 µm film thickness (5% phenyl and 95% dimethyl polysiloxane)</p>
6.0	<b>DATA STATION</b>	
6.1	<b>Application Software</b>	<p>Basic Programming facility</p> <p>Provide accurate and reproducible integration</p> <p>Compatible for atleast two simultaneous chromatograms, Provide accurate and reproducible integration</p> <p>Data acquisition. Reintegration report, multilevel calibration, baseline correction, area calculation, background subtraction and custom/tailored report format facility</p> <p>Battery backup for memory protection is required.</p> <p>Facilities for data Export/Transformation to data base software i.e. Excel and Access</p> <p>Software for Quality Control Protocols</p> <p>Software for data display, handling, data export/import and reporting</p> <p>Retention Time Locking Software</p>
6.2	<b>Computer System</b>	
	Make	Reputed brand such as HP/Compaq / IBM / Dell

S. No.	Specifications	Requirement
	Processor	Intel Pentium IV processor 2.8 GHz or above
	FSB	533 MHz or above
	RAM	1 GB (upgradeable to 4 GB)
	FDD	1.44 MB FDD
	HDD	160 GB ultra DMA or higher HDD (7200 RMP),
	Monitor	19" SVGA Flat Colour (Digital)
	VRAM	16 MB
	CD ROM	52x CD-ROM
	DVD-CDRW	DVD-ROM and CDRW-Combo Drive Max speed 48x24x48 or latest
	Ports	2 Serial, 1 parallel and 2 USB front 6 Rear USB2 PS/2 Port, 1VGA integrated Port1line in/out port,
	Key board	Cordless 104 Key IBM Compatible
	Mouse	Cordless Optical mouse with pad
	Ethernet	32 bit auto selectable 10/100 MBPS
	Graphics	Internet ready with integrated Graphics
	Sound	Integrated sound card and inbuilt stereo speakers
	Printer	HP LaserJet Printer 1200 x 1200 dpi 12 PPM black
<b>6.3</b>	<b>Software</b>	Pre-loaded Windows XP Professional operating system with Licensed CD (latest version) MS Office 2000 Standard with media, manual and Licensed CD (latest version) Preloaded Antivirus with latest version along with Licensed CD
<b>7.0</b>	<b>ACCESSORIES</b>	Manufacturers Standard accessories, start up kit including tools, Digital gas flow meter (0.1 ml/min to 1000 ml/min) Operation /maintenance manual Application note Service manual Hydrogen regulator Nitrogen regulator Air regulator Carrier gas purifier/cartridge H <sub>2</sub> gas purifier/ cartridge Air purifier/ cartridge
	Operation /maintenance manual	Operation and maintenance manual 1 No.
	Application note	Application notes (in CD) for pesticides, NMHC,PAH, PCB's, PCP's, VOC's, THM's, Dioxins & Furans in environmental samples 1 No.
	Service manual	Service manual 1 No.
	Hydrogen regulator	H <sub>2</sub> gas regulator with (2 stage) with necessary tubing and connectors 1 No.
	Nitrogen regulator	N <sub>2</sub> gas regulator with (2 stage) with necessary tubing and connectors 1 No.
	Air regulator	Air regulator with (2 stage) with necessary tubing and connectors 1 No.
	Carrier gas purifier/cartridge	High capacity carrier gas purifier 2 Nos.
	H <sub>2</sub> gas purifier/ cartridge	High capacity H <sub>2</sub> gas purifier 2 Nos.
	Air purifier/ cartridge	High capacity air purifier 2 Nos

S. No.	Specifications	Requirement
	Moisture trap	Moisture Trap (Silica Gel – Molecular Sieve 50:50; length 10”2 Nos.
	Hydrocarbon trap	Activated charcoal filter for Hydrocarbon removal length 10”2 Nos.
	Oxygen trap	High Capacity Oxy trap capacity more than 125 cc 2 Nos.
<b>8.0</b>	<b>SPARES AND CONSUMABLES</b>	To be supplied for two years trouble free operation
	Column nut	2 Nos.
	Washer	2 Nos.
	Graphite / vespel ferrules	20 Nos.
	Inlet Septa (self sealing for injectors)	100 Nos
	O ring	20 Nos.
	Copper tubing with connectors	30 mtrs.
	Micro syringes for manual injection (5 µl )	2 Nos.
	Micro syringes for manual injection (10 µl)	2 Nos.
	Gas tight syringe (100 µl)	2 Nos
	Copper tube cutter	1 No.
	Column cutter	1 No.
	Brass/Stainless Steel Nuts	1/8 inch – 10 Nos.
	Brass/Stainless Steel Ferrules	1/8 inch – 10 Nos.
	Tees	1/8 inch – 10 Nos.
	Other essential spares	Provide a list
<b>9.0</b>	<b>Installation</b>	Satisfactory Installation at CPCB Laboratory & hands on training to concerned user.
<b>10.0</b>	<b>OPTIONAL ITEMS</b>	
	<b>GAS STANDARDS</b>	
	Propane gas standard	Gas standards of Propane (one each for 100 ppm) in air
	Gas mixture standard	Gas mixture standard containing 50 ppm CO, 50 ppm CH <sub>4</sub> 1 % CO <sub>2</sub> and 20 ppm C <sub>3</sub> H <sub>8</sub> prepared in Air
	Gas mixture standard	C <sub>2</sub> H <sub>4</sub> , C <sub>2</sub> H <sub>6</sub> , n butane, I-Butene ,H <sub>2</sub> S, and Carbonyl Sulphure (COS ), Methyl Mercaptan, Ethyl Mercaptan
	<b>Gas Regulator</b>	Regulators Dual Stage, SS body, Matching for above referred gas standard cylinder (Two No. to be compatible most of them)

S. No.	Specifications	Requirement
	<b>AUTOSAMPLER</b>	
	Number of vials	Optional 7-8 vials or more
	Syringe capacity	Should accommodate up to three different capacity syringe ranging from 1 to 200 micro litre or more.
	Injection volume	Selection of the injection volume between 1 and 200 micro litre or more.
	Washing solvent	Should accommodate up to four different washing solvents.
	Injection capability	Should be capable to access two injections without requiring an additional tower.
	Internal standard calibration	Should allow automated internal standard calibration and "sandwich" technique.
	Programming	Should be completely programmed by either a dedicated controller or the GC keyboard.
	<b>Deans Switched Heart cut Device</b>	One Deans Switched Heart cut Device for connecting two column/detector (Two fractions of same sample can be chromatographed on different columns)
	<b>TCD</b>	Electronic pressure control.
	Minimum detection limit	<400 pg of tridecane/mL with He carrier
	Operating temperature	Operating temperature (maximum) should not be less than 400 °C (1.0 °C step)
	Dynamic range	Should be better than 10 <sup>5</sup> .
	<b>GAS CANISTERS</b>	Stainless steel canister with electro polished interior wall (Suma or equivalent) having high quality vacuum pressure gas sampling off/on valves capacity 6 litre - 3 Nos
11.0	<b>Training</b>	One week training for two concerned scientists with Principal /Manufacturer in operational, methodology development & routine maintenance aspects free of cost.

## GAS GENERATORS H<sub>2</sub>

### H<sub>2</sub> GAS GENERATOR

Compact H<sub>2</sub> gas generator providing clean and dry high purity hydrogen with automatic H<sub>2</sub> gas leak detection for Gas Chromatograph

- H<sub>2</sub> Flow rate - 160 cc/min (optional 250 cc/min)
- H<sub>2</sub> Purity - >99.9999% or better
- H<sub>2</sub> Pressure - 0-7 bar (0-100 psi) (electronically adjustable)
- De-ionised Water Quality Compatibility - >1 Mega ohm
- Water Capacity - 4-5 Liters approx
- Supply Voltage - 230V  $\pm$  10V AC, 50 Hz  $\pm$  3%
- Electrical Consumption - 100W /170W
- Remote start/stop/alarm
- Self test fault diagnosis with Digital Display and audible alarm.
- Detection of internal and external H<sub>2</sub> leaks , H<sub>2</sub> Over pressure, Water level, Water Conductivity,
- Display of H<sub>2</sub> Product flow and total Flow
- Weight (Empty) - 24Kg (53 lbs)
- Drying Type Desiccant
- Ambient Operating Temperature - +5 - 40°C (41 - 104°F)
- Outlet Connector 1/8" Compression (Swagelok)
- Accessories - Operation & maintenance Manuals, Toolkit
- Spares & Consumable – for two year trouble free Operation & maintenance

(Pl provide list of items)

## HAPS MONITOR

It should be meet USEPA requirement for method 8260 B. i.e. field operation of GC-MASS. HAP Monitor system should be safe and reliable for dual environmental applications (i.e. VOCs, SVOCs in AIRI & Toxic Industrial Chemicals, Chemical Agents Like , Arsine, Sulphur Mustard etc ) in the field as well as in the laboratory .

1. Should have in built programmable air sampling low flow internal pump & real time clock facility.
2. Should be battery operated in the field as well as mains operated (AC 220Volt, 50 Hertz electric main). Should operate through in built carrier gas cylinder in the field as well as it should be compatible to be operated through high pressure cylinder in the laboratory.
3. Calibration Span with cylinder & regulator (filled with low concentration .i.e. ppb level Mix Calibration Standard), Compatible with Nitrogen as carrier gas .
4. Micro trap concentrator made-up of Tenax / Carbopack
5. Suitable Capillary Column (analytical) capable of detecting parts per trillion (ppt) level. Dynamic Range- having up to 7 decades dynamic range.
6. Re-chargeable NiMH battery pack capable of lasting for at least 3 hrs or more in one charge with minimum life of one year or more.
7. Temperature Programmable GC Column - Oven can be temperature programmable from 45 to 250 deg C @ 4 to 20 deg C/min rate. with 3 Isotherms and two ramps or more.
8. MS Interface is through a membrane (70% dimethyl silaxone / 30% Poly carbonate) that provides permeability to VOC`S. (45 amu to 300 amu. or more & up to 250 deg C Boiling Point).
9. Should have a hand control unit with a LCD display (4" (H) x 5 " (W) or bigger, min four line, with backlight).The Instrument having heated (35 °C) conduit for sample inlet to Hap Monitor Unit ( sampling point to analytical module) .
10. Dimensions: less than 20 INCH (L) X Less than 20 INCH (W) X les than 10 INCH (H) & Weighs less than 20 Kg completely self contained & portable by a single person having all the utilities (built-in) like N2 carrier Gas Canisters; Standard Gas Canisters for the analysis of VOC`S in the field.
11. MASS must be operated in FULL SCAN; SIM & MS modes. The instrument must have enough memory to save analytical data & results on its hard drive. Mass tuning & calibration (4-Bromofluoro benzene).Tune check be verifiable by (TRIS) & (BPFB) compounds.
12. Column: SBP -1 (Supelco) Capillary Column (30 m X 0.32 mm X 1.0 um) OR Equivalent. Environ. Conditions Tolerance. Temp: 5 Deg C to 45°C; Humidity :(0-100%).
13. Vacuum System: 15L/sec.

14. SIM Channels:-10 Sets each with 20 ions set per.

15. Carrier Gas -Nitrogen

16. Internal power consumption: less than 40 watts.

17. **Data software system** with laptop to store & process data in desired report formats, averaging periods & statistical analysis ( word, excel, power point, graphics etc) compatible for data acquisition & retention (up to 10 year or so) from HAP Monitor. Software must be 32 bit Windows based for compound Identification with Built-in NIST& AMDIS Mass Spectral Libraries and Quantification Facility. Diagnostic software for routine self-tuning, and preparing for sample analyses

18. RS-232 Interface with adaptor cable & 8 pin DIN connector in line socket.  
Head Space sampling unit with oven (180 deg C) for minimum four standard 40 ml vials operating from rechargeable battery or from a 24 volt (DC) converter when external power is available.

19. Operational & Service Manuals /Application Notes

- (A) Application Notes for following to be provided in duplicates
  - 1.VOC`s in AIR; Water; Soil & Solids. 2.Toxic Industrial Chemicals .
  - 3. Chemical Agents like , Arsine, Sulphur Mustard.
- (B) Operational & Service Manuals (in Duplicate).
- (C) System should have proper carrying case for transportation.

20. Additional Spares, Column, Battery & other consumables for two year operation.

21. Installation & Warranty-free of cost Installation at CPCB office premises (air lab) along with on site Training to two CPCB officials (at least one week) as well as free of cost Annual Maintenance & repair Contract .

22. Optional

Service module for Transportable Van Mode operation should have power supply; Battery changer; turbo-molecular Vacuum pump and its auxiliary diaphragm rotary pump to field conditions.

**HIGH PRECISION FLOW CALIBRATOR (AUTOMATIC)**

**The system should operate on near frictionless graphite piston technology with advanced photo optic sensing.**

Measuring range	5 ml/min to 50 lit./min
Accuracy	<b>Volumetric: <math>\pm 0.25\%</math></b> Standardized: $\pm 0.40\%$
Display system	LCD Should indicate Flow rate, average flow rate and number of readings, as well as battery charge level
Sensors	For measuring temperature and atmospheric pressure
Power supply	To work on 12V DC from AC to DC converter (230V AC, 50 Hz.) suitable to Indian socket

**HYDRAULIC LABORATORY PRESS (MANUAL)**

- a. Maximum Pressure(KN) : 200
- b. Maximum plunger stroke(mm) : approx. 40
- c. Net weight(kg) : approx. 150
- d. Other requirements : Should be provided with all accessories, spares, operation manual, dust cover etc. Should ensure with safe operation and simple maintenance.

## HYDRO CARBONS (METHANE / NON METHANE HC / THC) (PPM RANGE) ANALYSER

Portable Hydro Carbons (Methane/ Non-Methane HC/THC) Analyzer for Source Monitoring complying USEPA Method 25 / 18 with suitable hardware & consumables including source-sampling facilities as per method.

It should consists of following components

Instrument Configuration	:	Explosion proof , Microprocessor controlled system with data logger, Preferably LEL alarm settings facility for HCs It should be designed to be able to rapidly analyze for a wide range of Fixed Gases and Volatile Hydrocarbons i.e C1-C12/VOC's in stack & fugitive emissions
Principle	:	The Field Portable (NDIR or TCD or other Non FID) or other EPA Technique based instrument should be capable to measure Methane, non-methane hydrocarbon and total hydrocarbons (with suitable columns) and report separately. Built in temperature compensation. Analytical procedures follow the guidelines set forth in EPA Method 25 , 18 with rapid analysis time 5 to 10 analyses during each 1-hour . Typical detection limit should be approx 1.0 ppmv for VOC's and 0.010% for fixed gases preferably
Sample line	:	Proper heated Sampling probe at about 140 degree Celsius and of suitable length (Minimum 2-3 meter or more) to prevent condensation with proper online filtering system
Sampling System	:	Should be in built (preferably diaphragm pump) which draw the sample streams through the lines at approximately 1-5 litres per minute, keeping them continually purged and then attached to a sampling manifold which introduces the samples to the analytical system
Sensitivity and Linearity	:	The Sensor/detector sensitivity should be 1 ppm for Hydrocarbons and linearity should be from its MDL to 100% of its maximum range
MDL	:	2 ppm as Methane , 1 ppm Propane or better
Resolution	:	1 ppm or better
Precision	:	3% of Measured Value
Analysis Time	:	<180 Seconds to 90 % of reading or better
Output	:	Analog Standard as well as Digital display, RS-232 output

	:	
Software, Data Exchange	:	Windows based data station compatible to any IBM PC and should be compatible to either serial port or USB port. Dynamic data exchange compatibility for converting analytical results into EXCEL / WORD etc. Preferably in built Printer for printing reports
Power	:	Rechargeable battery with one additional pack of battery
Accessories	:	<ul style="list-style-type: none"> <li>§ Operation and Maintenance Manual in English language</li> <li>§ Sampling probe &amp; Calibration adapter</li> <li>§ Toolkit</li> </ul>
Calibration Standards	:	Methane and Propane (20 ppm - 100ppm) in Helium/Nitrogen with cylinder & regulator sufficient for 2 year-One each
Spares and Consumables	:	Suitable Package (Provide list of items) for three years trouble free operation
Installation	:	Satisfactory Installation at CPCB Laboratory & hands on training to concerned users .

## MASS FLOW CONTROLLERS

Parameter	SO <sub>2</sub>	NO	CO	Air	Air	Air
Flow range	0.1 – 5.0 ml/min	01 – 50 ml/min	10 - 500 ml/min	0.1 – 5.0 l/min	1 – 50 l/min	2-100 l/min
Operating Temp.	25 °C (should not exceed 70°C)	25 °C (should not exceed 70°C)	25 °C (should not exceed 70°C)	25 °C (should not exceed 70°C)	25 °C (should not exceed 70°C)	25 °C (should not exceed 70°C)
Up stream Pressure(Bar g)	1.5	2	2	2	4	4
Down stream Pressure(Bar g)	0	0	0	0	0	0
Pressure Rating (Bar a)	64	10	64	64	64	64
Max. Static Pressure (Bar a)	10	10	64	64	64	64
Material of construction	SS 316 body	SS 316 body	SS 316 body	SS 316 body	SS 316 body	SS 316 body
Supply Voltage	15 – 24V DC	15 – 24V DC	15 – 24V DC	15 – 24V DC	15 – 24V DC	15 – 24V DC
Output Signal	0-5 V DC	0-5 V DC	0-5 V DC	0-5 V DC	0-5 V DC	0-5 V DC
Accuracy	± 1% FS	± 1% FS	± 1% FS	± 1% FS	± 1% FS	± 1% FS
End Connections	Compression type, 1/8" O.D.	Compression type 1/8" O.D.	Compression type ¼" O.D.	Compression type 1/4" O.D.	Compression type 1/4" O.D.	Compression type 1/4" O.D.
Seals	EPDM (SO <sub>2</sub> )	Kalrez (NO)	Viton (CO)	Viton (Air)	Viton (Air)	Viton (Air)

The above mass flow controller in ml range shall be used for gases SO<sub>2</sub>, NO,CO etc. and in lit. range for zero air supply.

### (ii). Digital Readout and Control system/unit

- The instrument should be 19" rack mounted model with facilities for fixing the instrument from front side.
- The instrument should operate at operating voltage 230 V ± 10% and 50 Hz ± 3%, AC supply and the plug should be adaptable to Indian main socket.
- The model should be for eight (8) channel, suitable for flows control.
- Input 0-5 V DC from mass flow controller (MFC)
- The unit shall be used for the MFC's to be used for gaseous flow as mentioned in specifications of MFC's.

**Features:**

- Storage of polynomial calibration function (max 8 per channel)
- Internal/external set point control mode.
- Master/slave control mode.
- Set point slope control.

**Technical specifications:**

- Output/set point signal : 0-5 V DC
- Front : 2 line x 16 Character Backlit LCD
- Connection : Sub-miniature D connector socket for instruments
- Accuracy :  $\pm 0.5\%$  of reading + 0.1% of FS
- Operating temp. range : 0 to + 50°C
- Configuration : Through key pad on front panel including power supply for MFC's

**Item code 12**

## MULTI PRINT RECORDER

No. of Channels	:	8 Channel
Supply Voltage	:	230 V $\pm$ 10% , 50 Hz Single Phase AC supply.
Display	:	Alphanumeric LED Display
Communication	:	RS 485 or RS232
Input	:	Isolated Universal Input (T/c, RTD, mV, mA,V)
Relays	:	Should be provided for alarm
Chart Width	:	250 mm
Max. Chart Speed	:	1500 mm/Hr.
Software	:	Review Software
Graphics	:	Bar and Trend Charts, alpha-numeric display through PC
Annotation	:	Clear text printing of time/ date & custom messages
Mounting Type	:	Panel Mounted
Protection	:	IP 54

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## OZONE GENERATOR/ PERMEATION SYSTEM

- The instrument should be 19” rack mounted model with facilities for fixing the instrument from front side.
- The instrument should operate at operating voltage 230 V ± 10% and 50 Hz ± 3%, AC supply and the plug should be adaptable to Indian main socket.
- The instrument should contain the following components :-

**i. An ozone producing module consisting ozone oven and UV lamp with the specifications –**

- Ozone Oven : Special heatable ozone generator oven with max temp. 70°C. Oven material should be aluminium, internally PFA coated.
- Temp. of O<sub>3</sub> oven : The oven temp. should be set between 63 to 65 °C. The LCD should indicate the actual temp. of the ozone generator oven. The temp controller can be set 0-70 °C.
- Temp. adjusting pot. temp. : A pot. should be to set the ozone generator oven
- UV lamp current : 0-20 mA LCD  
The LCD element should show the actual measured lamp current for the UV lamp. The indicated range should be 0-20 mA with a resolution of 0.01 mA.
- UV lamp current set point : UV lamp current adjustable by 10 turn dial potentiometer to generate ozone concentration between 3 -30ppm at flow rate of atleast 1 l/min.
- Length of the UV lamp : The Oven should equipped with mercury UV lamp special length about 5” (12.5 cm)
- Gas connection : The gas connection arrangement should be on rear side and indicated as “O<sub>3</sub> OVEN IN” and O<sub>3</sub> OVEN OUT”. The fitting shall be made of PFA material for ¼” Teflon tubing’s.

The Zero air to the Ozone oven should have kept at a constant flow in the range of 0-5 lit. / min. Any change in the flow range should effect the outlet concentration.

**ii. A permeation module consisting of the permeation oven for housing atleast two permeation sources with the specifications:**

- Permeation oven                      Double chamber permeation oven PTFE coated aluminium.
- Permeation oven temp              There should be minimum two operating temp either 40°C or 50 °C with a stability of 0.1 °C. The LCD display should indicate the actual temp. of the permeation oven.
- Toggle switch                        There should be a toggle switch to select the oven temp. either 40°C or 50 °C.
- Gas connection                      The gas connection arrangement should be on rear side and indicated as “PERMEATION IN” and PERMEATION OUT”. The fitting shall be made of S.S (Swagelok type) material for ¼” Teflon tubing’s.

**iii. It should contain all necessary power supply and electronic circuitry to operate the module.**

**Item code 14**

**OZONE PRECURSOR (INDIVIDUAL VOLATILE ORGANIC COMPOUND) MONITOR (PPB RANGE)**

General	:	Dual Column , Dual Detector (FID/PID ) GC based Individual Volatile Organic Compound as per EPA Standard Method TO 15/17 /Ozone precursor Monitor (C2-C5 & C6-C10) with built in pre concentration trap required for direct assessment/ monitoring of Ambient air fitted with required capillary column(s), auto sampling/ trapping/ injection facilities ,detectors, and calibration VOC Mixture (US-EPA Compliant Measurement Principle)
Dual Detector System	:	PID/FID Ensuring high quality of sensitivity & identification of analytes
Dual Column	:	Suitable Precolumn /Capillary .Analyt. Column for Aliphatic HCs ie 5+30m, 0.32 mm ID, 5 µm film or so , and Suitable Capillary. Column for Aromatics ( i.e.EPA 624 equivalent) 30m, 0.32 mm ID, 1.8 µm film or so Ensuring high quality of sensitivity & identification
Accuracy	:	± 5% of reading or ± 1ppb
Low Detection Limit	:	For butadiene 0.05 µg/m <sup>3</sup> , for other hydrocarbons 0.5 –1 µg/m <sup>3</sup> or better and For benzene 0.5 µg/m <sup>3</sup>
Resolution	:	0.1 ppb
DRIFT	:	Zero gas: < 0.1 ppb (as isobutylene) over 24 hours. Span : For 100 ppb isobutylene, < 3 % over 24 hours
Operating Concentration Range	:	up to 300 ppb or more
PID Lamp	:	10.6 eV (life span > 6000 hrs)
Sample/Pump Flow Rate	:	Adjustable 0.08– 0.5 L/ min with low flow alarm, auto shut off at low flow conditions
Cycle Time	:	30 Min
Operating Temperature Range	:	0 – 40°C
Operating Humidity Range	:	0 – 95% relative humidity (non-condensing)
PC,Software & Data Output	:	PC-PIV preloaded with Windows XP & MS Office and antivirus software besides Instrument Control & Data acquisition software Serial Output – RS232 for downloading of data ,CD Rom ,2 x USB, Ethernet, PS2 key/mouse, Laser printer, Direct control via keyboard or mouse, or via remote host (RS232/Ethernet/ modem), data exchange protocols

Data Display, Alarms, Storage & Software	:	Digital Direct read-out of VOC concentration by volume, average, high and low values, Fault, TWA and STEL alarms with auto storage of monitor serial number, user ID, site ID, date and time Data storage of approx. 15000 data points or more with software capability of processing data in various averaging time hourly (1,2,4,8,12,24 hrs) & monthly in the form of min. max. average & std. deviation etc. in excel format
Calibration		Preferably Internal Calibration facility, Calibration of Zero and standard reference gas, calibration memory of > 5 calibration levels gases standards, and calibration date, method storage & reactivation
Calibration Gas Certification	:	NIST Traceable VOC Calibration Mixture One set of each as per EPA Method TO15,TO17 & a set of Mixture as per list i.e. (Propane, Propene, n-Butane, 1-Butene,n-Pentane, 1-Pentene, 1-Hexene, n-Hexane, Isoprene, Methylpentane,Dichloromethane, Trichloroethane, Benzene, Toluene, m,p-Xylene, Ethylbenzene, o-Xylene, 1,3-Butadiene Trimethylbenzene, Acetonitrile, Acrylonitrile, Chlorobenzene, Acetone, , Chloroform, Carbon Terachloride, Vinyl Chloride, Freon, , Butanol, , Chloromethane, Ethyleneoxide, Ethylenedibromide, Dichloromethane, Trichloroethylene, Carbon di- sulphide, Formaldehyde, Styrene) in Nitrogen, standard volume in one, two or max three (as per compatibility) standard Aluminium cylinder water capacity 0.9-1.3 lit , Net gas 104 lit at specified pressure ( 1800psig) with dual stage SS regulator and syringe adapter with silicone rubber septum(Concentration Range 20 to 100ppb, NIST traceable )
Power Supply		210-230 VAC, 50/60Hz
I) Accessories/Spares, cables ,chords & Consumables II) Calibration Gas Concentration (certified & traceability certificate)  I) Addl.PID lamps II) Operation & maintenance Manuals, Toolkit		For uninterrupted Operation of two years(Provide a list of items)  One calibration gas cylinders with 20-100 ppb of VOCs each as per EPA Method TO15/17 and as per given list given above in Nitrogen, standard volume (NIST traceable) in standard Al cylinder water capacity 0.9-1.3 lit , Net gas 104 lit at specified pressure ( 1800psig) with dual stage SS regulator and syringe adapter with silicone rubber septum.  10.6 eV (life span > 6000 hrs) one additional  1 set with each
Installation		Satisfactory Installation at CPCB Laboratory & hands on training to users.

Training		1 to 2 weeks training for two concerned scientists With Principal /Manufacturer in operational, methodology development & routine maintenance aspects free of cost.
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## PERMEATION TUBES

### NO<sub>2</sub> WAFER DEVICE

S. No.	PARAMETER		DESCRIPION	QTY
1.	Rate	:	630 ng/min $\pm$ 5% Accuracy	05 Nos.
2.	Temperature	:	Certified at 40°C	
3.	Length	:	4.6 cm	
4.	Diameter	:	1.6 cm	
5.	Useful Life	:	More than one year	
6.	Traceability	:	Certified and Traceable to NIST Standard alongwith certificate	

### SO<sub>2</sub> WAFER DEVICE

S. No.	PARAMETER		DESCRIPION	QTY
1.	Rate	:	400 ng/min $\pm$ 5% Accuracy	05 Nos.
2.	Temperature	:	Certified at 40°C	
3.	Length	:	4.6 cm	
4.	Diameter	:	1.6 cm	
5.	Useful Life	:	More than one year	
6.	Traceability	:	Certified and Traceable to NIST Standard alongwith certificate	

### NO<sub>2</sub> WAFER DEVICE

S. No.	PARAMETER		DESCRIPION	QTY
1.	Rate	:	630 ng/min $\pm$ 5% Accuracy	02 Nos.
2.	Temperature	:	Certified at 50°C	
3.	Length	:	4.6 cm	
4.	Diameter	:	1.6 cm	
5.	Useful Life	:	More than one year	
6.	Traceability	:	Certified and Traceable to NIST Standard alongwith certificate	

### SO<sub>2</sub> WAFER DEVICE

S. No.	PARAMETER		DESCRIPION	QTY
1.	Rate	:	400 ng/min $\pm$ 5% Accuracy	02 Nos.
2.	Temperature	:	Certified at 50°C	
3.	Length	:	4.6 cm	
4.	Diameter	:	1.6 cm	
5.	Useful Life	:	More than one year	
6.	Traceability	:	Certified and Traceable to NIST Standard alongwith certificate	

**BENZENE PERMEATION TUBE**

S. No.	PARAMETER		DESCRITPION	QTY
1.	Rate	:	115 ng/min/cm +10% at 40°C	02 Nos.
2.	Temperature	:	Certified at 40°C	
3.	Size	:	1.5 cm	
4.	Useful Life	:	More than one year	
5.	Traceability	:	Alongwith Concentration Certificate	

**TOLUENE PERMEATION TUBE**

S. No.	PARAMETER		DESCRITPION	QTY
1.	Rate	:	72 ng/min/cm ±10% at 40°C	02 Nos.
2.	Temperature	:	Certified at 40°C	
3.	Size	:	1.5 cm	
4.	Useful Life	:	More than one year	
5.	Traceability	:	Alongwith Concentration Certificate	

**ETHYL BENZENE PERMEATION TUBE**

S. No.	PARAMETER		DESCRITPION	QTY
1.	Rate	:	32 ng/min/cm ±10% at 40°C	01 No.
2.	Temperature	:	Certified at 40°C	
3.	Size	:	1.5 cm	
4.	Useful Life	:	More than one year	
5.	Traceability	:	Alongwith Concentration Certificate	

**p-XYLENE PERMEATION TUBE**

S. No.	PARAMETER		DESCRITPION	QTY
1.	Rate	:	21 ng/min/cm +10% at 40°C	01 No.
2.	Temperature	:	Certified at 40°C	
3.	Size	:	1.5 cm	
4.	Useful Life	:	More than one year	
5.	Traceability	:	Alongwith Concentration Certificate	

**m-XYLENE PERMEATION TUBE**

S. No.	PARAMETER		DESCRITPION	QTY
1.	Rate	:	21 ng/min/cm ±10% at 40°C	01 No.
2.	Temperature	:	Certified at 40°C	
3.	Size	:	1.5 cm	
4.	Useful Life	:	More than one year	
5.	Traceability	:	Alongwith Concentration Certificate	

**o-XYLENE PERMEATION TUBE**

S. No.	PARAMETER		DESCRITPION	QTY
1.	Rate	:	21 ng/min/cm +10% at 40°C	
2.	Temperature	:	Certified at 40°C	

3.	Size	:	1.5 cm	01 No.
4.	Useful Life	:	More than one year	
5.	Traceability	:	Alongwith Concentration Certificate	

**Note:** Total length of Permeation Tube / Wafer device should not be more than 5 cm.

## PRECISION PRESSURE CALIBRATOR/CONTROLLER (DIGITAL)

### Pressure measurement

#### Standard pressure ranges:

70 and 200, 350, 700 mbar, 1, 2, 3.5, 7, 10, 20, 35, 70, 100, 135 and 210 bar gauge. All versions should be available with negative gauge calibration as an option.

#### Barometric Reference:

750 to 1150 mbar absolute measurement range with resolution of 0.01 mbar. It should be capable to switch between gauge and absolute operating modes and to provide a barometric pressure reading as demanded.

Absolute pressure ranges as above.

#### Over range

10% above full scale pressure range (measure mode only).

#### Pressure media

Dry, oil free, non-corrosive gas i.e. dry air or nitrogen maintained at a value of 10% above the full scale pressure range.

### Display

#### Panel

Large area, high-contrast, emissive graphics LCD.

#### Readout

±9999999 maximum, updated 2 times per second.

#### Pressure units

24 scale units plus one user-defined.

bar, mbar, Pa, hPa, kPa, MPa, kgf/cm<sup>2</sup>, kgf/m<sup>2</sup>, mmHg, cmHg, mHg, inHg, mmH<sub>2</sub>O, cmH<sub>2</sub>O, mH<sub>2</sub>O, In H<sub>2</sub>O<sup>20</sup>, In H<sub>2</sub>O<sup>04</sup>, In H<sub>2</sub>O<sup>04</sup>, In H<sub>2</sub>O<sup>60</sup>, ft H<sub>2</sub>O<sup>20</sup>, ft H<sub>2</sub>O<sup>04</sup>, psi, lb/ft<sup>2</sup>, torr, atm, special.

### Language

English

### Performance

#### Precision

- § Precision 0.01% full scale from 700 mbar to 210 bar.\*
- § Precision 0.03% full scale below 700 mbar.\*
- § Precision includes non-linearity, hysteresis, repeatability and temperature effect between 18°C and 28°C, for both absolute and gauge pressures.
- § Plus 0.004% full scale for 10°C to 45°C.\*
- § Calibration Standard (Deadweight Tester) accuracy 0.005% of reading.

### **Negative gauge precision**

Maximum error at any negative pressure value is equal to maximum error at the equivalent positive pressure value.

### **Measurement stability**

0.03% of reading per annum.

### **Barometric reference precision**

Precision for the optional barometric reference 0.15 mbar.

Includes non-linearity, hysteresis, repeatability and temperature effects between 5°C and 50°C. Long term stability 0.15 mbar per annum.

### **Controller stability**

Better than 0.001% of span for ranges between 0.5 bar and 70 bar.

For pressures above 70 bar better than 0.0015% of span.

For pressures below 0.5 bar better than 0.003% of span.

### **Controller response**

Less than 10 seconds into a 50 cm<sup>3</sup> volume, up to 10% full scale steps within 20 ppm of set point.

### **Gas consumption**

All supply gas is delivered to the system. No gas is used in measure mode, or when the instrument is turned off.

*\* Note: Precision assumes regular zeroing.*

### **Dual Range**

A single unit may have a combination of any two pressure ranges regardless of the ratio between them. Gauge and absolute ranges may be mixed and are fully independent of each other.

### **Communications**

RS 232 and IEEE-488.2 HS interfaces supplied as standard.

SCPI protocol

### **Control inputs and outputs**

- 1 opto-isolated logic input for switch test or event trigger.
- 2 relay outputs.
- 24 V DC Output to energise external devices via logic outputs.

### **Power supply**

230V ± 10% , 50 Hz, Single Phase AC supply.

### **Temperature**

Operating : 5°C to 50°C

Calibrated : 23°C

Storage : -20°C to 60°C

### **Humidity**

Compliant with Def. Stan. 66-31 8.6 cat 3.

## **Vibration**

Compliant with Def Stan. 66-31 8.4 cat 3.

## **Shock**

Mechanical shock conforms to EN61010.

## **Conformity**

EN61010, EN50081-1, EN50082-1, 97/23/EC CE marked.

## **Installation**

Retractable feet shall be supplied for bench top use, alternatively an optional rack mounting kit for easy installation within a 19 inch rack system.

## **Pneumatic connections**

1/8 female (BSP) on Vent, Supply and Outlet connections. Reference connections M5 female (gauge versions only).

## SOLID PHASE EXTRACTION SYSTEM

1.0	Equipment	Composition
1.1	Vacuum Manifold (12 Port)	One Set
1.2	Glass Chamber with vacuum gauge and valve	One Set
1.3	Glass Chamber without vacuum gauge and valve	One Set
1.4	Lid	One Set
1.5	Adjustable Racks	One Set
1.6	Vacuum Pump	One Set
1.7	Cartridge Adapters	Six
1.8	Cover Gaskets, Stopcocks	One Set
1.9	SPE Cartridges	One Pack
1.1	Collection Vessel	Twelve
<b>2.0</b>	<b>Technical Specifications</b>	
2.1	Vacuum Manifold	12 Ports with vacuum controls for each port
2.2	Lid	CNC machined, solvent resistant, low extractable polypropylene,
		Lid must be autoclavable without warp,
		Female Leur inlets and Male Leur outlets of moulded polypropylene
2.3	Adjustable Racks	Capable of accommodating variety of sample collection vessels
2.4	Vacuum Pump	Oil free diaphragm type with required tubings for connection
2.5	Cartridge Adapters	Capable of adapting SPE Cartridges with the aid of Teflon tubings
2.6	SPE Cartridges	Florisil 500 mg suitable for Pesticides and PCBs analysis
2.7	Collection Vessel	10 ml Polypropylene Vessels

## SOLID PHASE EXTRACTION (SPE) ACCESSORIES

## A. Pushing by Syringe

1. 5.0 ml capacity Glass Syringe with Teflon tipped plunger and male luer lock outlet, Quantity – Two
2. 100 mg bed weight of C18 in Polypropylene Cartridges with female and male luer locks, Quantity – 25
3. 500 mg bed weight of C18 in Polypropylene Cartridges with female and male luer locks, Quantity – 25

4. 1000 mg bed weight of C18 in Polypropylene Cartridges with female and male luer locks, Quantity – 25
5. 1000 mg bed weight of Silica in Polypropylene Cartridges with female and male luer locks, Quantity – 25
6. 1000 mg bed weight of Florisil in Polypropylene Cartridges with female and male luer locks, Quantity – 50
7. 300 mg bed weight of Alumina (Basic) in Polypropylene Cartridges with female and male luer locks, Quantity – 25

#### B. Pushing by Syringe with Adapter

1. 200 mg bed weight of C18 in 4 ml Polypropylene Tubes with male luer lock outlet, Quantity – 50
2. 500 mg bed weight of C18 in 4 ml Polypropylene Tubes with male luer lock outlet, Quantity – 50
3. 1000 mg bed weight of C18 in 8 ml Polypropylene Tubes with male luer lock outlet, Quantity – 30
4. 1000 mg bed weight of Silica in 8 ml Polypropylene Tubes with male luer lock outlet, Quantity – 30
5. 1000 mg bed weight of Florisil in 8 ml Polypropylene Tubes with male luer lock outlet, Quantity – 30
6. 500 mg bed weight of Alumina (Basic) in 4 ml Polypropylene Tubes with male luer lock outlet, Quantity – 50
7. 4 ml empty Polypropylene Tubes with male luer lock outlet, Quantity – 100
8. 8 ml empty Polypropylene Tubes with male luer lock outlet, Quantity – 100
9. 20 µm loose Polyethylene Frits for 4 ml empty Polypropylene Tubes, Quantity – 100
10. 20 µm loose Polyethylene Frits for 8 ml empty Polypropylene Tubes, Quantity – 100
11. Inlet Caps for 4 ml Polypropylene Tubes, Quantity – 50
12. Inlet Caps for 8 ml Polypropylene Tubes, Quantity – 50
13. Outlet Caps for male luers, Quantity – 50
14. Syringe Adaptors for 4 ml and 8 ml empty Polypropylene Tubes, Quantity – 15
15. C18 (6% Carbon) Adsorbent, Quantity – 100 g
16. Silica Adsorbent, Quantity – 100 g
17. Florisil Adsorbent, Quantity – 200 g

#### C. Pulling by Filter Flask

1. Conical Borosilicate Glass Filtration Flask, Volume 1000 ml, Quantity – One
2. Compatible non reactive tubing for vacuum device
3. Compatible non reactive Adapter for SPE Tube/Cartridge

4.  
5.

#### 6. D. Pulling by Vacuum Manifold (12 Ports)

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. Vacuum Manifold (12 Ports) with requisite quantities of the following constituent accessories</li> <li>2. Glass Chamber with Vacuum Gauge and Valve</li> <li>3. Glass Chamber without Vacuum Gauge and Valve</li> <li>4. Vacuum Gauge and Valve</li> <li>5. Polypropylene Lid</li> <li>6. Stopcock Valves</li> <li>7. Collection Rack Plates</li> </ol> | <ol style="list-style-type: none"> <li>8. Support Posts for Collection Rack Plates</li> <li>9. Gaskets</li> <li>10. Retaining Clips</li> <li>11. Manifold Inlet Caps</li> <li>12. Lid Legs</li> <li>13. Teflon Needles</li> <li>14. Waste Container</li> <li>15. Female Luer Inlets</li> <li>16. Male Luer Inlet</li> </ol> |
|---|---|

### **E. Vacuum / Pressure Station**

One Vacuum / Pressure Pump, single stage, oil free, molded PTFE diaphragm, PTFE/Ryton<sup>®</sup> head, with Vacuum / Pressure Gauge, separate Regulators for vacuum and pressure and simple switching, vacuum capacity 20" Hg and pressure capacity 18 psig, free air capacity 0.5 cfm, 230 Volts/50 Hz AC operated.

## SPECTROPHOTOMETER UV- VISIBLE

Computer controlled spectrophotometer which can be used with, rectangular cells of upto atleast 10 mm thickness, and sipper flow through cell, having following specifications.

Optics type	:	Double beam
Wavelength range	:	should cover 190-1100 nm range
Wavelength readability	:	better than or equal to 0.2 nm
Wavelength accuracy	:	better than or equal to $\pm 0.5$ nm
Wavelength repeatability	:	better than or equal to $\pm 0.5$ nm
Spectrol band width	:	provisions should include atleast 2.0 nm SBW (slit band width).
Scan speed	:	should be wide range and should provide a maximum limit of atleast upto 800 nm/minute (variable).
Photometric range	:	should cover -0.500 ABS to + 3.0 ABS range
Photometric accuracy	:	better than or equal to 0.005 A at 1 A
Photometric noise	:	not more than 0.0005 A at 0 A
Photometric readout	:	should atleast provide ABS (four digit), % T and Concentration modes.
Stray light	:	less than 0.01%
Drift	:	less than 0.0004 ABS/hr after warm up.
Power Requirement	:	(230 $\pm$ 10) volts AC, 50 Hz $\pm$ 3% operated

**The system should provide facility for the storage of spectra/methods, multi wavelength mode, baseline correction, peak area and other statistical calculations. Software should be provided for water & environmental analysis (fixed programme alongwith user free programme).**

### Additional items to be supplied

- (01) Printer
- (02) Continuous flow based automatic sipper unit having sample return facility.
- (03) Operation and maintenance manual.
- (04) Analytical manual
- (05) Rectangular absorption cells of 10 mm and 20 mm path lengths (Six Nos. each)

## SOLVENT(ACCELERATED) EXTRACTION SYSTEM

S. No.	Specifications	Requirement
<b>1.0</b>	<b>Instrument Composition</b>	
	Accelerated Solvent Extractor (ASE)	One set with requisite accessories.
	Sample Cells	One set for operation and another set as standby spare.
	Collection Bottles	One set for operation and another set as standby spare.
	Solvent Controller	One set with requisite accessories.
	Computer Control Software	One set installed as well as backup restoration CDs.
	Operation, Trouble shooting, maintenance manuals	One set of each. Electronic as well as Hard printed.
	Service Tools, spares & consumables.	One set of each.
<b>2.0</b>	<b>Technical Specification</b>	
2.1	ASE System Control	Computer controlled as well as Instrument Control Panel, Capability to control and monitor several system by single workstation, method transfer between similar ASE systems.
2.2	Computer Operating System Compatibility	Compatible to Windows XP or latest Operating System.
2.3	Method Compliance	Compliance with established methodologies of USEPA e.g. Method 3545A.
2.4	Method Storage	Method building from computer software as well as from control panel and multiple method storage.
2.5	Display	Easy to use icons for quick access to control functions, Display of extraction process as color graphics. Sensors and display of temperature, pressure and solvent vapors.
2.6	Automation	Automated sample extraction, filtration, automated unattended extraction of minimum 12 samples, automatic rinsing of system between sample extractions, programming for sample sequence automation.
2.7	Sample size	Sample cell volume up to 100 ml.
2.8	Number of samples	Minimum 12 number of sample cells.
2.9	Collection Bottle	250 ml capacity.
2.10	Rinsing between samples	Variable rinse volumes.
2.11	Temperature range	Ambient to 200 °C.
2.12	Operating pressure range	500 to 1500 psi.
<b>3.0</b>	<b>Solvent Controller</b>	

S. No.	Specifications	Requirement
3.1	Programmability	Solvent controller shall be controlled and programmable from the computer software.
3.2	Automation and solvent control	Unattended operation and automatic switching between different solvents.
3.3	Multiple solvent delivery and gradient	Solvent delivery from one or up to four solvent reservoirs with variable mixing ratios from 5% up to 95% of total volume.
3.4	Solvent bottle holding	Capacity to hold up to four reservoirs of up to 2 L of each solvent.
3.5	Waste solvent collection	Provision for collection of waste solvent.
<b>4.0</b>	<b>Computer</b>	Computer of reputed brand with latest configuration upgradable for next few years
4.1	CPU	Intel Core 2 Duo processor, 3.0 GHz, 800 MHz FSB, 1 GB RAM, 160 GB Hard Disk, 1.44 MB FDD, DVD read/CD write Drive, 15" LCD Flat Digital Monitor, compatible keyboard and mouse.
4.2	Removable Media Drive	USB (Front & Rear) for USB Storage and printers etc.
4.3	Networking	Networking ready for integrating several ASE systems for future expansion.
4.4	Printer	Small footprint Laser Printer suitable for the printing of method and sample process.
4.5	Operating System	Latest and upgradable operating system. Licensed preloaded media as well as CD.
4.6	Antivirus Software	Latest definition Antivirus Software with Licensed preloaded media as well as CD.
4.7	Office Assistance	Microsoft Office 2007 Standard, Licensed preloaded as well as CD.
13.0	<b>SPARES &amp; CONSUMABLES</b>	Spares and consumables sufficient for three years trouble free operation should be included in the offer and supplied with each system.
14.0	<b>OPERATION AND MAINTENANCE TRAINING</b>	The supplier has to impart on-site operation training at the time of installation to user scientists on application, routine maintenance and software training.
15.0	<b>GENERAL CONDITIONS OF SUPPLY</b>	<ol style="list-style-type: none"> <li>1. The instrument and all its sub units should operate on <math>230 \pm 10</math> volts 50 Hz power supply.</li> <li>2. All the operation and maintenance manuals, circuit diagrams, application notes and application softwares to be supplied should be in English language.</li> <li>3. The supplier / manufacturer should have Indian agent to provide after sales service.</li> <li>4. The main unit and all the sub units of the instrument should be serviced by the Indian representative of supplier.</li> <li>5. The bidder should furnish the information on past supplies and their satisfactory performance.</li> <li>6. Bidders shall invariably furnish documentary evidence (client's certificate – atleast two) in support of the satisfactory operation of the equipment as specified above.</li> </ol>

**STACK SAMPLING EQUIPMENT  
WITH  
VOLATILE ORGANIC SAMPLING TRAIN (VOST)**

Stack sampling system to carry out Isokinetic sampling in accordance with USEPA Method, CEN and ISO protocols for sampling of both particulate bound & gas phase dioxin-furan and other volatile organic compounds from emission sources.

**ITEM DESCRIPTION**

**1. ISOKINETIC SAMPLING KIT (1)**

Manual Stack Train for Isokinetic sampling of Particulate matter and gaseous phase in source emissions conforming to USEPA Methods (5, 23 & 29), ISO (9096 & 12141) and CEN (13284-1 & 1911) protocols,  
220VAC/50Hz Power with European style electrical plugs, Data display in Metric Units,  
Aluminum Housing, Lightweight Polycarbonate Meter Box Console & Pump Case,  
Lightweight heated filter box & impinge ice bath,  
High wattage output heaters for probe & heated filter box,  
Full range of probes, options & accessories,  
Accessories including dioxin kits, additional glassware, sample recovery equipment,  
Laptop for velocity profile logging and Isokinetic sampling calculations,  
Stainless Steel Latches and Handle, Fully Removable Front and Rear Access Doors, Stainless Steel Valves and Quick Connects, Modular Electrical and Plumbing Panels, Individual Fuse Circuitry Located on Easily Accessible Fuse Panel.  
Individual programmable Digital Temperature Controllers for Probe and Filter Oven. Temperature Readout for Thermocouple with Selector Switch, Temperature Range from -100°C to 1,350°C,  
Auxiliary Thermocouple Jack for Handheld Temperature Readout.  
Provision for ambient temperature, barometric pressure measurement  
Provision for measurement and compensation of pressure drop during sampling to maintain isokineticity  
Switch Controls for Power supply, Suction Pump, Timer,  
Elapsed Digital Timer with reset facility.  
Leak free Quick connections for gas, pressure and vacuum lines with easy leak check facility.  
Lockable transport case with soft foam.

**1.1 Dry Gas Meter (1)**

Direct reading type, Metric Unit display, 10 Liters per Revolutions, 0.1 Liter Resolution, Calibrated to  $1.0 \pm 0.05$  liter, Deviation from average less than 2 %.

**1.2 Manometer (1)**

Dual inclined manometer, 254 mm Vertical Scale, 25.4 mm Incline scale, 0.1 mm Incline Resolution, Protective Shutoff Valves for Transport.

**1.3 Vacuum Pump Assembly (1)**

Fully Enclosed Rotary Vane Vacuum Pump, Leak Free Vacuum Pump, minimum 0.25 HP, Equipped with 2 m Vacuum Hoses and Nonreversible Stainless Steel Quick Connects. Transport case with soft foam inner lining and locking arrangement.  
220VAC  $\pm$  10V , 50Hz.

**1.4 Long Umbilical Cable with Quick Connects (1)**

Heated sampling lines including umbilical between the impinger train and meter box, 30 meter long (flexible construction with expandable abrasion resistant low friction over braid jacket), complete set of graphite ferrules for use with probe, liner and nozzle unions and adapters, One High Vacuum Sample Line (300 psi) with appropriate Quick Connect Couplings,

Three Pressure Lines, Two for Pitots with appropriate Quick Connect Couplings and One for Orsat Line with appropriate Quick Connect Coupling,  
Type K Thermocouple Lines  
One 5-conductor electrical cable with 4-pin Amphenol connector or equivalent,  
One full length stranded nylon strain relief cable.

**1.5 Short Umbilical Cable with Quick Connects (1)**

10 meter long (flexible construction with expandable abrasion resistant low friction over braid jacket),  
One High Vacuum Sample Line (300 psi) with appropriate Quick Connect Couplings,  
Three Pressure Lines, Two for Pitots with appropriate Quick Connect Couplings and One for Orsat Line with appropriate Quick Connect Coupling,  
Type K Thermocouple Lines  
One 5-conductor electrical cable with 4-pin Amphenol connector or equivalent,  
One full length stranded nylon strain relief cable.

**1.6 Set of Sampling Nozzles (1)**

Stainless Steel Nozzle Set, includes 5/8" Stainless Steel nuts and ferrules, Nozzles of 7 Sizes from #4 (1/8") to #16 (1/2") with compatible assemblies to be fitted to sampling probes, packed in a Foam Lined Case, additional Glass nozzles set for Dioxin sampling (EPA 23).

**1.7 Short Sample Probe / S Type Pitot tube / Thermocouple Assembly (1)**

Stainless Steel (Grade 316) welded construction - 1 meter effective length (1),  
Stainless steel Type S Pitot Tube (manufactured according to the design specifications and dimensional requirements stated in USEPA Method for Dioxin-Furan) with Pitot calibration certificate,  
K-type thermocouple assembly attached,  
Probe length 1 meter made of SS with inner glass liner,  
Pyrex glass liner with #28 ball with O-ring,  
Removable probe liner heater compatible with 220VAC/50Hz Power,

**1.8 Long Sample Probe / S Type Pitot Tube / Thermocouple / Filter Box / Thimble Holder Assembly (1)**

3 meter long Probe consisting of a liner tube (Pyrex glass with #28 ball with O-ring), type K thermocouple and 3 meter long S type Pitot tubes (manufactured according to the design specifications and dimensional requirements stated in USEPA Method for Dioxin-Furan) housed in a smooth stainless steel sheath,  
Provision for data storage and transfer to computer for viewing in tabular or graphical form,  
Heated Filter box / Thimble holder capable to be heated up to 130 °C, the heated sampling oven that fits on the rear of the probe and is connected to the impinge train by an umbilical, the oven should be capable to accommodate up to 4" filter holders and allowing the cold box to be set on the floor,  
Filter holders (for 25 mm, 37 mm and 47 mm filter media) shall be complete with filter support and compression fittings with graphite seals,  
Complete kit for sampling dioxins consisting of glass filter housing with PTFE filter support, condensing coil with resin trap,  
Removable probe liner heater built into the sheath compatible with 220VAC ± 10V, 50Hz Power.

**1.9 Liners, Ball Joint with O-Ring, Glassware Sets and Transport Cases (4 Sets)**

Glass/Quartz liners fitted inside the Probe with O-ring sealed ball joints, the heater shall be built into the probe sheath, O-rings shall be made of PTFE (or equivalent for Dioxin sampling) pre-packed in complete sets,  
Unions and Ball & Socket adapters (made of PTFE) to be used to connect up to probe liners, nozzles or umbilicals, to be supplied with O-ring seals,  
Four complete trains of glassware (for conducting isokinetic sampling in accordance with EPA Method 5) including nozzles, liners, filter assemblies, U-tubes, resin traps, condensers, Impinger bottles with stems, associated connecting glassware and impinger clamps,

Four sets of supplementary glassware accessories required for sampling in accordance with EPA Method 23 or Environment Canada Method RM2,  
Ball joints with high-tension spring and knurled locking nut to secure the ball and cup (available in sets of twelve), Sockets Connections, Leak-Free Seal with or without O-Rings, Lockable transport cases with soft foam to accommodate glassware for shipping.

#### **1.10 Cold Boxes for Impingers (2)**

Insulated and water proof Impinger box hold 6 to 8 impingers,  
Adaptor facilities for XAD-2 and PUF cartridges in sampling train.

#### **1.11 Umbilical Adaptors (2)**

Stainless steel (Grade 316) construction equipped with #28 sockets, compatible thermocouple,  
appropriate male quick-connect and support arm that inserts in the impinger box slide bracket.

#### **1.12 Cleaning and Recovery Kit (1)**

The kit including Glass Funnel, Polypropylene Funnel, All Teflon ½" probe brush, ¼" in Teflon Probe brush Extension with 3/8" coupler – 4 meter length, two 1-Liter Polypropylene Wash Bottles, two 500 mL PTFE Wash Bottle, 1 Nylon Nozzle Brush Set (½", 3/16", 5/16" sizes), Teflon-coated Tweezers, Portable balance (weighing range 1-2000g with 0.5 g resolution).

#### **1.13 Flow & nozzle diameter Calibration Kit (1)**

1 Set of critical orifices for routine dry gas meter/orifice calibration,  
1 set of calipers for measuring nozzle diameters.

### **2. MODIFIED METHOD 5 (MM5) SOURCE SAMPLER (1)**

For Method 23 determination of dioxins and furans (D/Fs) and Method 0010 determination of semi-volatile organic compounds, sampling train with addition of a water-cooled glass condenser and an XAD adsorbent module followed by a knockout impinger (featuring a horizontal condenser and shortened knockout impinger, Borosilicate glass or quartz nozzles and probe liners, PTFE O-rings, heated flexible sample lines.

Kit components:

1. Impinger Box (1),
2. Horizontal Condenser, ungrounded (1),
3. Knockout impinger, ungrounded (1),
4. XAD Trap, #28 Ball & Socket joints, ungrounded (3),
5. Glass Cap #28 Socket, ungrounded, to seal XAD Trap (3),
6. Glass Plug #28 Ball, ungrounded, to seal XAD Trap (3),
7. Keck Clip #29 Plastic Ball Joint Clamp (6),
8. XAD Thermocouple Assembly (1),
9. Latex Tubing, 7/16 OD, 5/16 ID, natural color (4 ft).

### **3. VOLATILE ORGANIC SAMPLING TRAIN (VOST) SYSTEM (2)**

36 inch Heated Probe Assembly, 220V,  
36 inch Pyrex Liner (8mm) with Glass Cup,  
Submersible Coolant Pump, 220V,  
Impinger Box / Insulated Coolant Reservoir,  
Lockable transport cases with soft foam to accommodate glassware for shipping,  
VOST Glassware Set consisting of the following,

1. VOST Charcoal Trap, #15 Threads and Glass Frit,
2. VOST Coil Condenser, 2" Diameter, #15 Threads and Water Jacket Hose Barbs,
3. VOST Water Trap, 40ml with #15 Threads, 45° Offset Exit,
4. VOST Absorption Cartridge, 1/4" Ends,
5. 3-way, 2-way valves and other suitable tubing and seals.

The kit shall be supplied with requisite spares and consumables for three-year operation.

**SPARES AND CONSUMABLES**

<b>S. No.</b>	<b>Quantity</b>	<b>Item Description</b>
<b>Isokinetic Stack Sampling Equipment</b>		
1.	1	Set of 7 Glass Nozzles - Sizes 4,6,8,10,12,14&16, Includes Case & Three 5/8" Glass Filled PFA Ferrules
2.	1	4 ft Glass Lined (Method 5) Probe Assembly, 220V
3.	1	Horizontal Modified Method 5 Accessories Kit, includes: Impinger Box, Model 150 (1) Horizontal Condenser, Unground (1) Knock out Impinger, Unground (1) Submersible Coolant Pump, 120V (1) XAD Trap, #28 Ball & Socket Joints, Unground (4) Glass Cap #28 Socket, Unground, to Seal XAD Trap (4) Glass Plug #28 Ball, Unground, to Seal XAD Trap (4) Knock out Impinger, Unground (6) XAD Thermocouple Assembly (1) Ft of Latex Tubing, 7/16 OD, 5/16 ID, Natural Colour (4) TFE Encapsulated O-ring for GA-4T TFE Encapsulated Silicone O-Rings for Grooved #28 Ball, DOZEN Teflon® Encapsulated O-ring for Impinger Stem Joint Bottom Groove, DOZEN Teflon® Encapsulated O-ring for Impinger Stem Joint Top Groove, DOZEN
<b>Clean up &amp; Recovery Kit</b>		
1.	1	TFE Probe Brush Tip (TFE Barrel AND TFE Bristles), 5/8 inch Bristle Diameter
2.	1	Nozzle Brush Set (sizes 3, 5, & 8) in Carrying Tube
<b>VOST Sampling System</b>		
1.	1	SuperVOST Glassware Set includes: 3-Way Valve w/ TFE Valve Body, #15 Threads Inlet & Purge, 8mm Outlet (1) VOST Charcoal Trap #15 Threads and Glass Frit (1) SuperVOST Coil Condenser, 2" dia., #15 Thds, Water Jacket Hose Barbs (2) SuperVOST Water Trap, 40ml with #15 Threads, 45° Offset Exit (1) VOST Adsorption Cartridge, 1/4 inch Ends (1) PTFE Straight Union, 1/4 inch (1) TFE Seal Ring, 8mm Hole Diameter (2) TFE Seal Ring, 6mm Hole Diameter (7) Bored Cap, #15 Threads (10) Seal Ring for 1/4 inch Tubing, 6mm Hole Diameter (1) TFE Tubing, 1/4 inch, Formed, (5 ft. total, 2 pieces) (5) Surgical Tubing, 3/8 inch, (2 ft.) (3)
2.	1	36 inch Pyrex Liner (8mm) with Glass Cup (No Ball Joint) (3)

## TOTAL KJELDAHL NITROGEN ANALYSER (TKN Analyzer)

The analyzer should be a automatic/semi-automatic system consisting of a digestion unit, a scrubber unit, and a distillation unit.

### 1. Digestion unit

- Automated with integrated programmable control
- Should have electrically heated ( $230 \pm 10$  Volts, 50 Hz AC) metal blocks. It should be capable of providing a temperature range from ambient -  $440^{\circ}\text{C}$  With 1% repeatability .Should have inbuilt temperature controller with digital display alongwith manual temperature adjustment. Heating time 35 to 45 minutes
- Should have the capacity to accommodate atleast six /eight numbers of digestion tubes each of atleast 200ml capacity
- Should have leak proof integrated condensers (fumes carriers) made up of glass, fixed on a movable panel alongwith adopter for outlet to the scrubber unit.

### 2. Scrubber unit

- Should be an oil free centrifugal suction type, with manual vacuum adjustment facility.
- Corrosion and impact resistant, provided with condensate and acid fumes collection vessels.
- Should operate on  $230 \pm 10$  Volts, 50 Hz, AC power supply

### 3. Distillation unit

Automatic distillation procedure, including sample dilution, alkali and receiver addition, distillation and tube draining. ISO, EPA validation certificate.

- Should be made-up of standard quality borosilicate glass.
- Should possess a steam generator made-up of borosilicate glass alongwith heater and have 3 step manual control facility i.e. standby, water inlet and distillation.
- Should have inbuilt diaphragm pump alongwith push button for alkali dispensing with manual volume adjustment.
- Should have ventilation value.
- Should have timer for 5 - 15 minutes with audio signal.
- Steam inlet tube should be of PTFE.
- Unit should have quick clamping device for digestion tube with adaptor.
- Should operate on  $230 \pm 10$  Volts, 50 Hz, AC power supply.
- Complete unit should provided with one set of digestion tubes alongwith the servicing, operating and maintenance manuals.

### 4. Accessories

- 2 set of digestion tubes.
- Digestion tube stand
- Spillage tray for the condensers
- Tube removing device

### 5. Spares

- Spares and accessories for its 2 years of continuous use.

**VACUUM PUMP-OIL SEALED MECHANICAL (5 TO 21 M<sup>3</sup>/H)**

The pump should be Two Stage Rotary Vane type and operated at 230V 50 Hz Single Phase AC supply

Nominal Pumping Speed 50 Hz	:	9.7m <sup>3</sup> /h
Pneurop Pumping speed 50 Hz	:	8.5 m <sup>3</sup> /h
Ultimate partial pressure	:	10 <sup>-4</sup> mbar
Ultimate total pressure closed gas ballast	:	2.10 <sup>-3</sup> mbar
Ultimate total pressure open gas ballast	:	10 <sup>-2</sup> mbar
Water vapour capacity	:	125 g/h
Water vapour pressure 50 Hz	:	20 mbar
Weight	:	Approx. 20-30 kg
Max. nominal power rating 50 Hz	:	0.5 kW
Min ambient temperature	:	10 <sup>0</sup> C
Max. ambient temperature	:	45 <sup>0</sup> C
Oil capacity	:	1.0 L
Inlet flange	:	DN 25 ISO-KF
Exhaust flange	:	DN 25 ISO-KF

**Oil Filter**

The pump should be equipped with oil filter/ oil mist eliminator

**Maintenance Kit**

It should include maintenance kit consists of lip seals, shaft sleeves, valves, shaft seals, 'O' rings, vanes, springs and plugs etc for complete overhauling of the vacuum pump.

**Oil**

Type	:	<i>Paraffin based mineral oil</i>
Vapor Pressure	:	1.3.10 <sup>-6</sup> mbar at 54 °C
Viscosity	:	118 cst at 40 <sup>0</sup> C
		12.5 cst at 100 <sup>0</sup> C
Density	:	0.886
Flash Point	:	260 <sup>0</sup> C

## WEATHER STATION

The weather station should be rugged to withstand Indian tropical climate. The system should comply preferably with national /international standards.

### (A) WIND SPEED

The anemometer to provide a low starting threshold, wide dynamic response and high accuracy over a wide range of wind speed.

Operating Range	:	0 – 60 m/s
Accuracy	:	0.3 m/s
Starting Threshold	:	0.3 m/s
Survival speed	:	85 m/s up to half hour (without damage)
Temperature Operating Range	:	- 5 °C to 60 °C

### (B) WIND DIRECTION

The sensor to provide low starting threshold, fast response and accuracy over a wide operating range.

Operating Range	:	0 to 360
Accuracy	:	1.5°
Starting threshold	:	<0.5 m/s at 10° amplitude
Survival speed	:	85 m/s upto half hour (without damage)
Temperature Operating Range	:	- 5 °C to 60 °C

### (C) RELATIVE HUMIDITY \*\*\*

Measuring Range	:	0 to 100% RH
Accuracy	:	± 2% (5 – 95% RH)
Response Time	:	One minute
Linearity	:	Better than ± 2%
Temperature Operating Range	:	- 5 °C to 60 °C

### (D) AMBIENT TEMPERATURE \*\*\*

Calibrated Temperature Range	:	- 5 °C to 60 °C
Accuracy	:	0.2°C
Response	:	30 seconds
Linearity	:	± 0.1 °C

\*\*\* Humidity and temperature sensors to be supplied with weather and thermal radiation shield

### **(E) GLOBAL RADIATION**

The detector should be able to measure short wave radiations both direct solar radiation and diffused radiation.

Measuring range	:	0-1400 W/ m <sup>2</sup>
Sensitivity	:	4-6 micro v/w/ m <sup>2</sup>
Non Linearity	:	+ <sub>-</sub> 0.6%<1000 W m <sup>2</sup>
Temperature Operating Range	:	- 5 °C to 60 °C
Response time		1/e 4s;99%24sa

### **(F) BAROMETRIC PRESSURE**

Operating Range	:	800 hPa to 1050 hPa
Temperature Operating Range	:	- 5 °C to 60 °C
Accuracy		+ <sub>-</sub> 1.5%

### **(G) RAIN FALL**

Operating Range	:	0-100mm
Temperature Operating Range	:	- 5 °C to 60 °C
Resolution		0.5mm
Material		All main component in Stainless steel

### **(H) Precipitation**

**The precipitation sensor should be rugged nearly maintenance free (optional)**

Particle size	:	0.16 to 8 mm
Particle velocity	:	0.2 to 20m/s
Minimum intensity		0.005mm/h drizzle
Maximum intensity		250mm/h
Temperature Operating Range	:	- 5 °C to. 60 °C

### **(H) MAST FOR MOUNTING SENSORS AND DATA LOGGER**

Suitable mast of 10 metres adjustable at 3 metres, 4 metres and 5 metres is to be supplied with mechanical fittings, hydraulics complete as required or by any other means. The mast should be easy to lift upward and downward with complete arrangements for mounting of all the sensors and data logger ..

### **(I) SPECIFICATIONS OF DATA LOGGER**

Data logger with at least 10 analogues, 5 digital input. 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 and 1 hr. Communication between data logger and computer using standard multi drop RS 232/485 Connector/ USB Port. Should be programmable (without PC) by using keyboard on data logger with 2 line 16 character alpha numeric display . It Should be programmable by a remote PC with window based software. The data logger should have internal battery with charger. The data logger should support PSTN line or GSM modem for data transfer.

### **(J) SOFTWARE FOR DATA ANALYSIS**

Window XP compatible For analysis like averaging for different timings including daily and monthly averages, plotting diurnal variation and daily variation, making wind roses etc. the

software preferably should support Barren Hassen protocol & briefuss GMBH environment data acqution software through RS 232 port/USB 2.0 support.

**STANDERED ASECESSORIES:**

- MAGNETIC COMPASS OF GOOD QUALITY
- TOOL KIT FOR SERVICING OF SYSTEM
- OPERATION/ SEVICING MANNUAL IN DETAILS

**(K) SPECIFICATIONS OF COMPUTER (MINIMUM CONFIGURATION)**

- |     |  |   |  |
|-----|--|---|--|
| 01. | Core due   | : | Intel core dual Processor 3.0GHz Original mother board   |
| 02. | RAM  | : | 2MB DDR RAM Upgradable upto 4.0GB  |
| 03. | Hard disk  | : | 320 GB   |
| 04. | FDD  | : | 1.44 MB 3.5"   |
| 06. | Monitor  | : | 19" LCD / TFT Monitor  |
| 07. | Port   | : | 4 bays (2 external & 2 internal) 2 serial, 1 parallel & 3 VSB with LAN 1PS, 2 mouse port.          |
| 08. | Keyboard   | : | Latest multi media keyboard (Microsoft)  |
| 09. | Mouse  | : | Optical Scroll Mouse (Microsoft) + Pad   |
| 10. | Software   | : | Windows XP Professional (latest version) with media, documentation and certificate of authenticity |
| 11  | Anti Virus   | : | Norton / McAfee or equivalent (latest version) with continuous upgradation                         |
| 12. | CD Writer  | : | Combo drive, Internal, latest model  |
| 13. | Network Card   | : | Network card with remote booting facility  |
| 14. | Energy star compliance, screen blinking, hard disk and system idle mode in power ON, set up password, power supply surge protected |   |  |

**(L) SPECIFICATION OF LASER PRINTER**

- |     |                          |   |  |
|-----|--------------------------|---|--|
| 01. | Speed (pages per minute) | : | Around 12 pages                          |
| 02. | Resolution               | : | 1200 x 1200 dpi                          |
| 03. | RAM                      | : | 8 MB expandable to 32 MB                 |
| 04. | Main Tray Capacity       | : | Around 250 sheets                        |
| 05. | Interface                | : | Parallel & USB                           |
| 06. | Operating System         | : | Windows 95, 98, 2000, XP                 |
| 07. | Power supply             | : | 230V AC, $\pm 10$ V AC, 50 Hz, $\pm 3\%$ |

### **CHECK LIST FOR THE BIDDER**

1. Bid on original Tender form only.
2. Separate EMD against each item.
3. Earnest money or necessary documentary proof for exemption of earnest money with the part 1 of the bid.
4. Price bid must be Part II of the bid in the form provided at Annexure II of the tender document.
5. The Basic Price, Taxes, Packing, Forwarding, Handling, Transportation Insurance, Installation charges etc. must be quoted clearly. Do not use vague terms like "As Actual, Approximately etc".
6. Do not use the terms As per Specification of Tender Documents' in respect of instruments. There should be proper write up of production quoted for supported with printed leaflets literature.
7. In case the bidders desirous to quote more than one item, separate envelope should be submitted (technical & price bid) for individual item superscribing item code number and name.
8. With technical bid, the bidder should provide a copy of the price bid format (giving details of the items, accessories, spares etc. ) without specifying the price other than one mentioned in annexure-II of this tender document.