CENTRAL POLLUTION CONTROL BOARD
PARIVESH BHAWAN, EAST ARJUN NAGAR
SHAHDARA, DELHI-110032

CORRIGENDUM

E-TENDER FOR SUPPLY, INSTALLATION AND COMMISSIONING OF SCIENTIFIC INSTRUMENTS (HPLC, GC-MS, $PM_{2.5}$ SAMPLERS, PM_{10} SAMPLERS AND STACK SAMPLING EQUIPMENT)

e-Tender No. C-47011/ICB/01-05/2018-19/Mat

e-Tender ID – 2018_CPCB_324734_1

Following the discussions and deliberations with the representatives of the prospective bidders in the pre-bid meeting, held on 18 Apr 2018 at 3.00 pm at Training Hall, Parivesh Bhawan, East Arjun Nagar, Shahdara, Delhi-110032, the Competent Authority, CPCB hereby agreed to carry out the amendments in the technical specifications as per Annexure-I attached. The amendments have also been carried out in the Revised Tender Document (attached) wherever applicable.

Sd/-
N. Sethuramalingam
Adm Officer (Material)

Annexure - I

Clarifications Sought By Prospective Bidders

M/s. Perkin Elmer, ICB – 04 (S/N 4) for GC-MS						
Sr. No.	**Vol/Section of the Tender**	**Page No. of Original Tender**	**Clause No.**	**Tender Specs.**	**Clarification/ Amendment required by the firm**	**Clarification by CPCB**
01	Annexure 9	Page 42	01	**Injector** Two sets, One for Manual injection and another with Auto sampler	Both should be for manual injection or both should be operate with auto-sampler	No Change. Specs will remain same.
02	Annexure 9	Page 43	03	**Injector** 3.9-Temperature Programme Ramp at least 3 ramps. 3.10-Ramp Rate Range up to 120^{o}C/min or more	Need to remove ramping requirement Need to remove ramp rate requirement	remove 3.8 to 3.12
03	Annexure 9	Page 44	04	**Injector – 2** Multimode Injector	Need to replace multimode inlet with temperature programmable split/splitless injector	Change: as temperature programmable split/split less injector
				4.9 – Temperature Programming Capability up to 7 ramps at up to 450^{o} C/min or above	Ramps as ked two time for this hence need to remove the same	Change: 4.9 – Temperature Programming Capability 2 ramps or more at up to 450^{o} C or above
				4.10-Temperature Programmer ramps at least 3	Programmable split/split less capillary injector must have Two-ramps temperature program or more	4.10 : removed
04	Annexure 9	Page 45	05	**Oven** 5.1-More than 13 liters. 5.5 Temperature Accuracy ± 1% of the entire range.	10 liters or more Need to remove	Change: 5.1- More than 10 liters. 5.5 - No Change
				5.6 Temperature Accuracy ± 0.1^{o}C.	Need to remove	5.6 - No Change
				5.15 Injector Compatibility	Need to replace multimode inlet	Change: 5.15 Injector

				Split/Split less injector and Multimode injector	with temperature programmable split/splitless injector	Compatibility Split/Split less temperature programmable injector
Sr. No.	**Vol/Section of the Tender**	**Page No. of Original Tender**	**Clause No.**	**Tender Specs.**	**Clarification/ Amendment required by the firm**	**Clarification by CPCB**
05	Annexure 9	Page 47	08	**Mass Spectrometer Detector** 8.4 – Mass Source- Should have EI, CI, Positive CI, Negative CI facility with automatic tuning and acquire both SIM and Scan data from single injection.	Addition of PCI Sensitivity in scan mode must 500:1 or more for 100 pg Benzophenone NCI Sensitivity in scan mode must 500:1 or more for 1 pg octafluoronapthalene (OFN)	Change: 8.4 – Mass Source- Should have EI facility with automatic tuning and acquire both SIM and Scan data from single injection.
				8.10 –Analyzer temperature range 150^{o}C to 200^{o}C	Analyzer should be heated/ non-heated quadrupole	8.10 - removed
				8.11-Mass Range 10 to 1000 AMU or more	Mass Range 10 to 1050 AMU or more	8.11 - No Change
06	Annexure 9	Page 49	12	**Auto Sampler** 12.1 Number of Sample Vials capable of accommodating 50 Vials or more	Auto Sampler must have 70 vials capacity or more.	Change: 12.1 Number of Sample Vials capable of accommodating 100 Vials or more
				12.3 – Injection Volume Seclectable between 1 and 10 microliter or more should be available.	Injection Volume Selectable between 1 and 5 microliter or more should be available.	12.3 - No Change
07	Annexure 9	Page 52	17	**Accessories** Methodology Package Software Comprehensive EPA methodology Package Software (CD ROM) for Environmental Application (VOCs, PAHs Carbonly etc.)	Need to remove the same	No Change

Change in Specification Other than queries raised by Bidders during Pre- bid Meeting on 18.4.17:					
1	Annexure 9	Page 42	1.0	Electron Capture Detector (ECD) with accessories	Not Required
2	Annexure 9	Page 43	2.11	Data Acquisition	Change: Data Acquisition from Mass Spectrometer
3	Annexure 9	46	5.11	Heat up time: Less than 2.0 min (50ºC or lower to 250ºC)	Removed
4	Annexure 9	47	7.3	Uncoated deactivated Silica Column (Guard Column): 5m x 0.25 mm	Removed
5	Annexure 9	47	8.6	EI/CI Source Change Over	Removed
6	Annexure 9	48	8.18	Mass Tuning Standard	Correction: PFTBA (FC-43) / BFB / DFTPP
7	Annexure 9	48	9.1	EI Scan	Change: 1pg of OFN at S/N of 800:1 RMS or more
8	Annexure 9	48	9.2	EI SIM Scan	Removed

M/s. Spinco Biotech Pvt. Ltd., ICB-01 (S/N 1) for HPLC System

Sr. No.	**Vol/Section of the Tender**	**Page No. of Original Tender**	**Clause No.**	**Tender Specs.**	**Clarification/ Amendment required by the firm**	**Clarification by CPCB**
08	Annexure 6	Page 28	02	S. No: 2.3, Pumping system Operating pressure range normal to 6000 psi pressure with user selectable upper and lower limits	Pressure Range:5800 psi	No change
09	Annexure 6	Page 29	02	S. No: 2.6, Cloumn Oven It should be block heating type oven with pre-heating of mobile phase for uniform temperature distribution and with a quick	Kindly remove the Preheater in column Oven.	Preheater in column Oven Removed

				feedback mechanism to maintain constant temperature level even when power source voltage fluctuates		
10	Annexure 6	Page 30	02	S. No: 2.9, Ultraviolet Detector (Diode Array Detector) Silt programme: Slit programme 1 to 16 nm continuous spectra band width (SBW) 5 nm or less	Slit Programme: 1.2 nm and 8 nm high sensitivity and high resolutions mode	Change: S.No: 2.9, Ultraviolet Detector Silt programme: Slit programme 1 to 16 nm continuous spectra band width (SBW) 5 nm or less
11	Annexure 6	Page 30-31	02	S.No: 2.9, Ultraviolet Detector (Diode Array Detector Noise: $\pm 0.25X10^{-5}$ AU Peak to Peak or less	Noise: $0.6X10^{-5}$ AU	Correction: Noise: $0.7X10^{-5}$ AU
12	Annexure 6	Page 12-13	05	Terms of Payment: 80% of the money will be released on submission of Shipping of documents. Remaining 20 % will be released after successful installation and commissioning of the instrument and submission of a performance bank guarantee for 10% of the order value from a nationalized bank, valid for 2 months beyond the period of expiry of the warranty	90% of the money will be released on submission of Shipping of documents. Remaining 10% will be released after successful installation. Performance bank guarantee for 10% of the order value from a nationalized bank, valid for 2 months beyond the period of one year from installation.	No Change

M/s. Agilent Technologies, ICB-01 (S/N 1) for HPLC System & GCMS System

Sr. No.	Vol/Section of the Tender	Page No. of Original Tender	Clause No.	Tender Specs.	Clarification/ Amendment required by the firm	Clarification by CPCB
13.	Annexure 6	28	2.3	Flow accuracy and stability of +/- .1% or better	Flow accuracy and stability of +/- 1% or better	Correction: Flow accuracy and stability of +/- 1% or better

	Annexure 6	28	2.3	Gradient Mixture System should be higher pressure gradient system coupling both pumps, user programmable through the computer data station	Gradient Mixer System should be higher pressure OR Low Pressure gradient system coupling pumps, user programmable through the computer data Station	Correction: Gradient Mixture System should be LOW pressure gradient system coupling pumps, user programmable through the computer data station
	Annexure 6	28	2.3	Digital display of operating parameters and pressure	It is not Available with Agilent Request you to remove.	Removed
	Annexure 6	28	2.3	Flow rate, gradient curve, stroke volume, upper and lower pressure limits and % A and % B of the solvents in gradient mode	This is feature Gradient Curve is of one particular make hence you are requested to please removed the gradient Curve.	Gradient Curve is removed
14.	Annexure 6	28	2.4	Sample injection volume should be variable between 0.1 µl to 100 µl (0.1 µl step). Injection volume of 1-2000 µl (0.1 µl step) should be available as on option	Sample injection volume should be variable between 0.1 µl to 100 µl (0.1 µl step). Injection volume of 1-1800 µl (0.1 µl step) should be available as on option	No Change
15.	Annexure 6	29	2.4	Sample viscosity range 0.2-50 cp	Sample viscosity range 0.2-5 cp	Correction: range 0.2-5.0
16.	Annexure 6	29	2.5	Membrane degassing unit for 5 flow lines	Membrane degassing unit for 4 flow lines	Change: Membrane degassing unit for 4 or more flow lines
17.	Annexure 6	30	2.8	Scanning Fluorescent Detector Accuracy of +/- 2 nm or better	Accuracy of +/- 2 nm or better	Change: Accuracy of +/- 3 nm or better
	Annexure 6	30	2.8	Flow cell 5 µl capacity	Flow cell </= 8 µl capacity	Change: Flow cell 5 µl or more capacity
18.	Annexure 6	30	2.9	**Ultraviolet Detector (Diode Array Detector** Noise 25.0 x 10^{-5} AU peak to peak or less	It should be noise < .7 x 10^{-5} AU peak to peak or less	Correction: .7 x 10^{-5} AU peak to peak or less

M/s. Mars Bioanalytical Pvt. Ltd., ICB – 02, PM 2.5 Sampler						
Sr. No.	**Vol/Section of the Tender**	**Page No. of Original Tender**	**Clause No.**	**Tender Specs.**	**Clarification/ Amendment required by the firm**	**Clarification by CPCB**
19.	Annexure 7	35		**Flow rate**		No Change
20.	Annexure 7	35		**Mass Flow Controller**		No Change
21.	Annexure 7	36		Additional add on features like capability to store 20 to 30 sample data is not requirement of USEP/FRM & must be deleted. Data Download to PC via RS232/USB feature is sufficient.		Annexure-VII page -35 remove at least 20-30 previous sampling data. Change to: Should have capability to store previous sampling data.
22.	Annexure 7	36		Data recording, Storage & display		No Change
23.	Annexure 7	36-37		Flow accuracy of 2% is the requirement of USEP/FRM, which must be achieved by sampler.		No Change
24.	Annexure 7	35		Similarly, fixing tabular form of data display requirement in a specified tabular format should not be part of Tender specs as different manufacturers use different output/display formats to show the sampler data info. This must be deleted.		No Change
25.	Annexure 7	36		Conclusion: we believe the main Tender specs; with simple feature data download via RS232 / USB is enough) are sufficient to ensure that CPCB would like to procure proven USEPA conforming sampler only. There is no need to Attachment –I & tabular data reporting format at all & must be deleted.		No Change

Revised e-TENDER
(International Competitive Bidding)

FOR

SUPPLY & INSTALLATION OF SCIENTIFIC INSTRUMENTS
(HPLC System, PM_{10}Sampler, $PM_{2.5}$Sampler, GC-MS, Isokinetic Stack Sampling Equipment)

Central Pollution Control Board
(Ministry of Environment Forests & Climate Change)
Parivesh Bhawan, East Arjun Nagar.
Delhi – 110032. India
Tel. Nos. 22308202, 43102030 – Extn.242, 243

Tender No.:47011/ICB/01-05/2018-19/Mat.

INDEX

1. Central Pollution Control Board, Delhi invites online Bids for supply, installation, commissioning, testing, demonstration and training of HPLC System, PM_{10}Sampler, $PM_{2.5}$Sampler, GC-MS, Isokinetic Stack Sampling Equipment as per specifications given in the Annexure VI to X attached to the Tender form. All offers should be made in English and should be written in both figures and words. Tender forms can be downloaded from the CPP Portal (http://eprocure.gov.in/eprocure/app) & CPCB's website http://www.cpcb.nic.in.

2. The bidders are requested to read the tender document carefully and ensure compliance with all specifications/instructions herein. Non-compliance with specifications/instructions in this document may disqualify the bidders from the tender exercise. The Chairman, Central Pollution Control Board reserves the right to select the item (in single or multiple units) or to reject any quotation wholly or partly without assigning any reason. Incomplete tenders, amendments and additions to tender after opening or late tenders are liable to be ignored and rejected.

CRITICAL DATE SHEET

Description	Date	Time
Published Date	06.04.2018	1200 Hours
Bid Document Download/Sale Start Date	06.04.2018	1200 Hours
Clarification Start Date	06.04.2018	1200 Hours
Clarification End Date	12.04.2018	1200 Hours
Pre Bid Meeting	18.04.2018	1500 Hours
Uploading of Minutes/Clarifications on CPP Portal	20.04.2018	1500 Hours
Bid Submission Start Date	21.04.2018	1500 Hours
Bid Submission End Date	18.05.2018	1500 Hours
Bid Opening Date	21.05.2018	1500 Hours

Preparation and submission of bids:

3. There are various search options built in the CPP Portal, to facilitate bidders to search active tenders by several parameters. These parameters could include Tender ID, organization name, location, date, value, etc. There is also an option of advanced search for tenders, wherein the bidders may combine a number of search parameters such as organization name, form of contract, location, date, other keywords etc. to search for a tender publishing on the CPP Portal.

4. Bidder should take into account any corrigendum published on the tender document before submitting their bids.

5. Please go through the tender advertisement and the tender document carefully to understand the documents required to be submitted as part of the bid. Please note the number of covers in which the bid documents have to be submitted, the number of documents – including the names and content of each of the document that need to be submitted. Any deviations from these may lead to rejection of the bid.

6. The Tender shall be submitted online onhttp://eprocure.gov.in/eprocure/app in two parts viz. Technical Bid and Financial Bid. In the Technical Bids, the bidders are required to upload all the documents in .pdf format. All quotation (both Technical and Financial should be submitted in the E-procurement portal).

7. Possession of a Valid Class II/III Digital Signature Certificate (DSC) in the form of smart card/e-token in the company's name is a prerequisite for registration and participating in the bid submission activities through http://eprocure.gov.in/eprocure/app. Digital Signature Certificates can beobtained from the authorized certifying agencies, details of which are available in the web site https://eprocure.gov.in/eprocure/app under the link “Information about DSC”.

8. Technical & Financial Bids should be submitted in PDF format.

9. In case of Financial bids, a standard BOQ format has been provided in PDF format. Bidders are required to download the BoQ PDF file and fill their financial offer on the same BOQ format. After filling the same, submit it online in PDF format, without changing the financial template format. If the BoQ format file is found to be modified by the bidder, the bid will be rejected.

10. The tender will be rejected straightway without assigning any reasons if the firm involves in any criminal cases, declared black-listed by any Govt./Semi govt. department/agencies etc.

11. All the firms participating in the Tender must attach a list of their owners/ partners etc. and a Certificate to the effect that the firm is neither blacklisted by any Govt. Department nor any Criminal Case is registered against the firm or its owner or partners anywhere in India be attached with technical bid.

12. Bidder, in advance, should get ready the bid documents to be submitted as indicated in the tender document / schedule and generally, they can be in PDF

formats. Bid documents may be scanned with 100 dpi with black and white option.

13. The bidder has to digitally sign and upload the required bid documents one by one as indicated in the tender document.

14. The uploaded tender documents become readable only after the tender opening by the authorized bid openers.

15. Kindly add scanned PDF of all relevant documents in a single PDF file like, compliance sheet, OEM/Principal Certificate etc.

16. Bidder should log into the site well in advance for bid submission so that he/she upload the bid in time i.e. on or before the bid submission time. Bidder will be responsible for any delay due to other issues.

17. Upon the successful and timely submission of bids, the portal will give a successful bid submission message & a bid summary will be displayed with the bid no. and the date & time of submission of the bid with all other relevant details.

18. The bidders who have earlier supplied the equipment to any of the Ministries/Department/Public Sector Undertaking/Scientific Institute of National Repute may only tender. The details of such institutions and the cost with name of equipment may also be supplied with the bids.

19. The technical and financial bids should be submitted online through portalhttp://eprocure.gov.in/eprocure/appin original. The financial bid shouldinclude the cost of main equipment/item and its accessories. If there is any separate cost for installation etc. that should be quoted separately.

20. Each bidder should mark the tender reference on the top of bids submitted online:

21. The printed literature and catalogue/brochure giving full technical details should be included with the technical bid to verify the specifications quoted in the tender. The bidders should submit copies of suitable documents in support of their reputation, credentials and past performance in .pdf format.

22. The rates should be quoted in figures (typed or printed) and cutting should be avoided. The final amount should be in figures as well as in words. If there are cuttings, they should be duly initialled, failing which the bids are liable to be rejected.

23. Any bids received after last date of Tender Submission shall not be considered.

24. Financial Bids of those bidders who are declared technically qualified will only be opened.

25. While sending rates, the firm shall give an undertaking to the effect that "the terms/conditions mentioned in the enquiry letter/Tender Notice against which the rates are being given are acceptable to the firm." in .pdf format. In case the firms do not give this undertaking, their rates will not be considered.

26. For an item, bids of either the principal manufacturer or the authorized agent will only be accepted. Bid of the bidder quoting on behalf of two manufacturers of same product will be rejected.

27. In this tender either the Indian Agent on behalf of the Principal/OEM or Principal/OEM itself can bid but both cannot bid simultaneously for the same item/product. If an agent submits bid on behalf of the Principal/OEM, the same agent shall not submit a bid on behalf of another Prinicpal/OEM in the same tender for the same item/product. The supplier/ authorized Indian agent/Authorised Representative should have minimum two years' continuous agency /partnership/joint venture/participation or collaboration with their principal foreign supplier/OEM. 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/authorized representative will be rejected.

28. **The bidder should provide a complete list of spares and consumables required for 10 (ten) years for trouble free operation and maintenance of the instrument and a certificate to be given by manufacturer that spare parts will be made available for ten years. A price list of such spare parts also be given**.

29. Annual maintenance contract: The bidder may quote the charges for annual maintenance contract after the warranty period for the instrument listed in annexure-IV of this tender document.

30. 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.

31. 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 or sufficient infrastructure facilities to provide after sales service during warranty period will not be considered.

32. The quantity shown against the item is approximate and may vary as per demand of the Institute at the time of placing order.

33. The tenders will be received online through portal http://eprocure.gov.in/eprocure/app.All tender documents received after thespecified date and time shall not be considered.

34. In the event of any dispute or difference(s) between the vendee Institute (Central Pollution Control Board) and the vendor(s) arising out of non-supply of material or supplies not found according to specifications or any other cause whatsoever relating to the supply or purchase order before or after the supply has been executed, determination, abandonment or breach of the contract shall be referred to a sole arbitrator appointed by the Chairman, CPCB. The decision of the sole arbitrator shall be final and binding on both the parties. It will not be an objection to any such appointment that the arbitrators are the government servant 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. The arbitrator shall give reasons for award. Subject as previously mentioned, the provisions of the Arbitration and Conciliation Act, 1996 or any statutory modification or re-enactment thereof and the rules made there under and for the time being inforce shall apply to the arbitration proceeding under this clause.

35. The place of arbitration and the language to be used in arbitral proceedings shall be decided by the arbitrator.

36. The courts in Delhi shall have exclusive jurisdiction to adjudicate the disputes.

37. All tenders in which any of the prescribed conditions is not fulfilled or any condition is put forth by the tenderer shall be summarily rejected.

38. The bidders or their authorized representatives may also be present during the opening of the Technical Bid, if they desire so, at their own expenses.

39. Note: Price bids of only those bidders will be opened whose technical bids are found qualified by the committee appointed for the purpose.

40. Clarifications:

    In case the bidders require any clarification regarding the tender document, they are requested to submit their queries on the e-mail i.e. ***sethuraman.cpcb@nic.in***. Answers of the queries will be uploaded online on e-procurement portal after pre-bid meeting.

41. A pre-bid meeting will be held as per date mentioned in this document. Only one authorized representative will be allowed to attend the meeting. They should also bring Letter-Head of the firm with an undertaking that any decision/negotiation taken by them would be accepted by firm.

42. Only two representatives will be allowed to attend the pre-bid meeting on behalf of tendering firm. The representatives, who are deputed to attend the meeting,

should be bearing an authority letter, whose specimen signatures should have attested by the firm's authorized signatory having seal of the firm.

43. The legible scanned copy of latest receipt/return in respect of Sales Tax/VAT/GSTdeposited with Sales Tax/VAT/GST department in the language of English/Hindi must be attached with technical bid. The latest deposit receipt/return of Sales Tax/VAT/GST should be of previous financial year showing therein that the tax is deposited up to 31/03/2017 or for the subsequent period in the current financial year.

44. Tender Cost:

    The bidder should submit a demand draft of Rs. 1000/-(Rupees One Thousand only) towards non-refundable tender fee, drawn in favour of "Central pollution Control Board". The bidder will upload the signed and scanned copy of proof for payment of Tender document cost on e-procurement portal.

45. **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 ENVELOPES FOR EACH ITEMS CONTAINING TECHNCIAL, PRICE BID & ITEMS WISE EMD; INCASE, BIDDERS DESIRES TO QUOTE MORE THAN ONE ITEM. **Those tenders do not comply the above instructions will not be considered.**

46. Earnest Money Deposit (EMD):

    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. EMD to be drawn in favour of "Central Pollution Control Board" payable at Delhi. The bidders should enclose a pre-receipted bill for the EMD to enable us to return the EMD of unsuccessful bidders. Failure to deposit Earnest Money will lead to rejection of tender. In the event of the awardee bidder backing out, EMD of that bidder will be forfeited.

47. EMD Exemption:

Central Pollution Control Board may accept bids without EMD from those bidders who are Micro and Small Enterprises (MSEs) as defined in MSE Procurement Policy issued by Department of Micro, Small and Medium Enterprises (MSME) or registered with the Central Purchase Organization, National Small Industries Corporation (NSIC) or the concern Ministry or Department as Manufacturer. To claim the exemption, the bidder must be offering goods manufactured by themselves. Exemption will not be granted in case the bidder is acting as an agent for some other vendor. 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).

48. Pre – Qualification Criteria:

(i) Bidders should be the manufacturer / authorized dealer. Letter of Authorization from Original Equipment Manufacturer (OEM) on the same and specific to the tender should be enclosed.

(ii) The Bidders who have earlier supplied the equipment to any of the Ministries/Department/Public Sector Undertaking/Scientific Institute of National Repute may only tender. The details of such institutions and the cost with name of equipment may also be supplied with the bids.

(iii) An undertaking from the OEM is required stating that they would facilitate the bidder on a regular basis with technology/product updates and extend support for the warranty as well.

(iv) OEM should be internationally/nationally reputed manufacturer/branded company.

(v) Non-compliance of tender terms, non-submission of required documents, lack of clarity of the specifications, contradiction between bidder specification and supporting documents etc. may lead to rejection of the bid.

(vi) Furnishing of wrong/ambiguous information in the compliance statement may lead to rejection of bid and further black-listing of the bidder, if prima-facie it appears that the information in the compliance statement was given with a malafide/fraudulent intent.

49. Prices:

(i) For imported items, the bidder should quote the prices on CIF/CIP basis at destination site as per delivery schedule at Annexure IV. The bidders may also quote the prices on DDP basis upto the site of installation. Central Pollution Control Board is registered with DSIR, Govt. of India and is exempted from Custom / Excise Duty. Exemption Certificate to this effect will be issued by Central Pollution Control Board. The rates shall be firm and final. Nothing extra shall be paid on any account.

(ii) For the indigenous/Domestic goods, the rates should be quoted on FOR-destination basis only.

(iii) The foreign bidders should quote the price in foreign currencies. The price quoted should be on CIP/CIF basis. The Indian agent/their authorized representative may be ordered to arrange the custom clearance from the customs. The Board will provide the concessional custom duty exemption certificate and other required documents.

(iv) The incidental expenses towards sending the instruments to the designated locations mentioned in Annexure-IV such as arranging transport, insurance, labour, including charges to the custom clearing agent etc. to be borne by the supplier/their authorized Indian representative. The Indian agent/ their representatives should be responsible for the safety of the instruments during the transit from airports to the designated locations.

(v) The agency commission, if any, will be paid in Indian Rupees. The charges on account of agency commission should be mentioned clearly in the bid. Indian suppliers should quote the prices in Indian Rupees on FOR destination as per the installation points/locations mentioned at annexure-IV. The authorized Indian supplier should have minimum two years of continues partnership/joint venture /participation or collaboration with their principal foreign supplier.

(vi) 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.,IBAN No. & SWIFT Code.
d) Minimum delivery period.
e) Whether transhipment/partner shipment is required or not.
f) Agency commission, if any payable to the Indian Agent, their Complete address, telephone & fax number.

(vii) 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.

(viii) In case of imported equipment(s)/item(s), the agency commission, if any, payable in Indian rupees should be mentioned separately. IAC shall be paid after satisfactory installation & commissioning of the goods at the destination.

(ix) For imported equipment, the Letter of Credit will be opened for the amount excluding agency commission in Indian Rupees. The firm should clearly mention the address of foreign bank in the financial bid.
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's. 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 should be borne by the Supplier/their authorized Indian representatives.

(x) In case of indigenous item, the vendor should clearly mention the final FOR Destination specified in Annexure-I, as applicable in their bid.

50. Validity:

The bid should be valid for acceptance up to a period of 180 Days with effect from the last date for submission of bids on CPP Portal. The Bidders should be ready to extend the validity, if required without any additional financial implications.

51. Delivery:

The Equipment should be delivered and installed within the period as specified in the purchase order/LC and be ready for use within 24 weeks of the issue of purchase order unless otherwise prescribed. If the bidder fails to deliver and place any or all the Equipments or perform the service by the specified date, penalty at the rate of 1% per week of the total order value subject to the maximum of 10% of total order value will be deducted.

52. Central Pollution Control Board, in order to satisfy itself can order on the spot enquiry to verify the soundness & capability of the item and any other information given by the tendering firms.

53. The tendering firm will also submit an **undertaking** that the product offered by them is as per technical specifications of the tender.

54. Installation, Training & Demonstration:

Bidders need to provide adequate training to the nominated persons of Central Pollution Control Board at their cost. Central Pollution Control Board will not bear any training expenditure. The supplier is required to done the installation and demonstration of the equipment within one month of arrival of materials at the Central Pollution Control Board site of installation, otherwise the penalty clause will be the same as per the supply of material.

55. Warranty:

.

Bidders must give the comprehensive on-site warranty of at least three years from the date of successful installation of Equipment and also give the warranty declaration that "everything to be supplied by us hereunder shall be free from all defects and faults in material, workmanship and shall be of the highest quality and material of the type ordered, shall be in full conformity with the specification and shall be complete enough to carry out the experiments, as specified in the tender document.

56. Any deviation in the material, and the specifications from the accepted terms may liable to be rejected and the bidders need to supply all the goods in the specified form to the satisfaction/specifications specified in the order / contract and demonstrate at their own cost.

57. Performance Bank Guarantee: A performance bank guarantee from a scheduled bank in India for an amount equal to 10% of the price for duration of two months beyond the expiry of warranty period will be taken from the supplier or Indian agent.

58. Terms of Payment: Payment will generally be made only after delivery and satisfactory installation, testing, commissioning etc depending upon the availability/release of funds by the Govt. and the agencies/contractors shall have no claim in case of delayed payment and no interest will be paid for the delayed payment.

(i) In case of imported supplies, payment (excluding Indian agency commission, if any) will be made through irrecoverable Letter of Credit in two installments. 80 % of the money will be released on submission of shipping of documents. Remaining 20 % will be released after successful installation and commissiong of the instrument and submission of a performance bank

guarantee for 10% of the order value from a nationalized bank, valid for 2 months beyond the period of expiry of the warranty. All the bank charges within India will be borne by the Board and outside India will be borne by the Supplier.

(ii) In case of required item quoted in INR, 100% payment will be released on satisfactory supply, installation and commissioning of the item and submission of performance guarantee.

59. Tender expenses and documents: All costs incurred by the bidder in the preparation of the tender shall be at the entire expense of the bidder.

60. Tender Evaluation Criteria: The technical bids will be opened and evaluated by a duly constituted committee. After evaluation of the technical bid, the financial bid for only those offers which have qualified in the evaluation of technical bid will be opened. After examination of the technical bid and price bid, CPCB will have discretion to award the contract to more than one firm, if their L-1 rates are same.

61. CPCB reserves the right to relax any terms and conditions in the govt. interest with the approval of Competent Authority.

62. 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 majeur 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.

INJURY AND DAMAGE

63. 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 statue 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.

64. 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 the 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.

65. ROYALTY AND PATENTS

(i) 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 suppliershall 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.

(ii) 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 enjoinment, 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.

66. **Make in India** purchase preference will be given to eligible suppliers as per Govt of India instructions, on submission of certificate of 50% local content from statutory auditor or cost auditor or from a practising chartered accountant giving the percentage of local content.

67. Return of EMD:

(i) The earnest money of unsuccessful bidders will be returned to them without any interest after awarding the contract.

(ii) The earnest money of the successful bidder will be returned to them after supply of material and submission of Bank Guarantee, without any interest after supply of material.

68. Manual and documentation: All the manuals necessary for operating and servicing the equipment (including details of electronic circuits) will have to be provided along with the instrument.

69. This call of tenders does not bind the Central Pollution Control Board to place order. The Central Pollution Control Board reserves the right to cancel the tender at any stage (point of time) without assigning any reason.

70. Bidders should go through the tender terms, conditions and specifications carefully and fill in the attached compliance statement accurately and unambiguously. They should ensure that all the required documents are furnished along with the bid.

71. Integrity Pact : The bidder will enter into an Integrity Pact with CPCB as per Annexure-V given with this document. Bidders are advised to read the Integrity Pact carefully, fill in the required details, sign and affix the seal and submit alongwih the technical bid. The bids which does not contain the Integrity Pact will be summarily rejected.

72. NOTE :-

(A) THE SELF ATTESTED & STAMPED SCANNED COPIES OF FOLLOWING DOCUMENTS REQUIRED TO BE ATTACHED WITH TECHNICAL BID:-

1. The Demand draft of **Rs.1000/-** as Application Fee.
2. E.M.D. in favour of duly signed, scanned and attachedamounting as per schedule of requirements.
3. Certificate regarding registration with DGS&D/NSIC, if claim EMD exemption.
4. Tax Registration Certificate.
5. Copy of latest Tax deposit receipt.
6. Technical specifications alongwith literature/brochure of the quoted product.
7. Tender Acceptance Letter**.**
8. List of owners/partners/directors etc..
9. Certificate for non-blacklisting of firm and non-registration of criminal case..
10. Undertaking that the product offered by them is as per technical specifications of the tender.
11. Undertaking for comprehensive warranty/guarantee for the period.
12. Documents showing experience in supplies to Govt Organizations.
13. Duly signed Integrity Pact.

(B) All the original documents as well as the original payment instrument like Demand Draft/Bank Guarantee /Pay order or banker cheque of any scheduled bank against Tender Fee/EMD, samples as specified in this tender document have to be sent to the address of the Purchaser mentioned in Bid Data Sheet (BDS) by post/speed post/courier/by hand on or before bid Submission closing date & time. Beyond that the tender shall be summarily rejected without assigning any reason.

(C) PRICE BID :- The price schedule will be uploaded in pdf format provided with the tender document.

73. The offline financial bids will not be accepted. The option in the rates will not be entertained.

Sd/-
N. Sethuramalingam
Adm Officer (Material)

CHECKLIST FOR BID/TENDER SUBMISSION

(The following check-list must be filled in and submitted with the bid documents)

Pre-Qualification Bid

Sr No.	Particulars	Yes/No
1.	Have You attached Demand draft of **Rs.1000/-** as Application Fee?	
2.	Have You attached E.M.D. in favour of amounting as per requirements ?	
3.	Have You attached Certificate regarding registration with DGS&D/NSIC, if claim EMD exemption?	
4.	Have You attached GST Registration Certificate ?	
5.	Have You attached Copy of latest Sales GST deposit receipt?	
6.	Have You attached Technical specifications alongwith literature/brochure of the quoted product ?	
7.	Have You attached Tender Acceptance Letter ?	
8.	Have You attached List of owners/partners/directors etc?	
9.	Have You attached Certificate for non-blacklisting of firm and non-registration of criminal case?	
10.	Have You attached Undertaking that the product offered is as per technical specifications of the tender?	
11.	Have You attached Undertaking for comprehensive warranty/guarantee ?	
12.	Have you attached experience certificate for supplies to Govt Organisations (POs/Experience Certificates/Performance Certificates etc)	
13.	Have you attached Integrity Pact duly signed and stamped ?	
14.	Have you attached un-priced financial bid?	
Price Bid		
15.	Have you signed and attached the priced bid form on CPP POrtal? **Please note that the price bid will only be accepted online on CPP Portal. Sending the price bid with technical bid may lead to rejection of the bid.**	

BID FORM

ANNEXURE - I

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	Total Amount (CIP/CIF/FOR) (Inclusive of the cost of Training/Installation/Taxes etc to be mentioned) (Please indicate breakup)	Optional Total Amount DDP Basis (in Rs.) (Cost, Freight, Insurance, Custom clearance charges, cost of installation & training, GST etc) (Please indicate breakup)
1	**2**	**3**	**4**	**5**	**6**	7	**8**

NOTE:- Please give all terms and conditions like payment, delivery, warranty, AMC, Agency Commission, Country of Origin etc clearly. 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. All terms and conditions and any other information may also be given in this financial bid.

Signature with date & stamp of the bidder

Annexure – II

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 successful installation of the following:

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

(Please add additional pages, if required).The above supply, installation & commissioning 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 also undertake that in case of our failure to deliver the item on specified time, appropriate penalty can be levied on us.

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.....2018**Signature of authorized Person, Name with Stamp & full Address.**

ANNEXURE -III

SCHEDULE OF EARNEST MONEY

S. No.	Item Code	Instrument / Equipment	Quantity Requirement	EMD (Rs.)
1.	**ICB-01**	HPLC System	01	1,00,000/- (Rs. One Lakh Only)
2.	**ICB-02**	$PM_{2.5}$Sampler	10	2,00,000/- (Rs. Two Lakh Only)
3.	**ICB-03**	PM_{10}Sampler	12	50,000/- (Rs. Fifty Thousand Only)
4.	**ICB-04**	GC-MS	01	1,00,000/- (Rs. One Lakh Only)
5.	**ICB-05**	Isokinetic Stack Sampling Equipment	01	15,000/- (Rs. Fifteen Thousand Only)

Annexure-IV

Locations of Delivery and Installation of the Instruments / Equipments

S. No.	Item Code	Instrument / Equipment	Quantity Requirement	Locations
1.	**ICB-01**	HPLC System	01	CPCB Head Office, Delhi
2.	**ICB-02**	$PM_{2.5}$Sampler	10	CPCB Head Office, Delhi
3.	**ICB-03**	PM_{10}Sampler	12	CPCB Head Office, Delhi
4.	**ICB-04**	GC-MS	01	CPCB Head Office, Delhi
5.	**ICB-05**	Isokinetic Stack Sampling Equipment	01	CPCB Head Office, Delhi

ANNEXURE- V

INTEGRITY PACT

General

This Contract Agreement (hereinafter called the Integrity Pact) is made on …….day of the month of ……2018, between, CPCB, An autonomous body acting through Shri A. Sudhakar, Member Secretary, CPCB hereinafter called the "BUYER", which expression shall mean and include, unless the context otherwise requires, his successors in office and assigns of the First Part and M/s…… represented by Shri……..……., Chief Executive Officer (hereinafter called the "BIDDER / SELLER" which expression shall mean and include, unless the context otherwise requires, his successors and permitted assigns) of the Second Part.

WHEREAS the BUYER proposes to procure (Name of the Stores/Equipment/Item) and the BIDDER/Seller is willing to offer/has offered the stores and

WHEREAS the BIDDER is a private company/public company/Government undertaking/partnership/registered export agency, constituted in accordance with the relevant law in the matter and the BUYER CPCB work under the ageis of Environment & Forests, performing its functions as per the provisions of Water Act 1974, Air Act ,1981 and EPA Act, 1986.

NOW, THEREFORE,

To avoid all forms of corruption by following a system that is fair, transparent and free from any influence/prejudiced dealings prior to, during and subsequent to the currency of the contract to be entered into with a view to :-

Enabling the BUYER to obtain the desired said stores/equipment at a competitive price in conformity with the defined specifications by avoiding the high cost and the distortionary impact of corruption on public procurement, and

Enabling BIDDERs to abstain from bribing or indulging in any corrupt practice in order to secure the contract by providing assurance to them that their competitors will also abstain from bribing and other corrupt practices and the BUYER will commit to prevent corruption, in any form, by its officials by following transparent procedures.

The parties hereto hereby agree to enter into this Integrity Pact and agree as follows:

Commitments of the BUYER

1.1 The BUYER undertakes that no official of the BUYER, connected directly or indirectly with the contract, will demand, take a promise for or accept, directly or through intermediaries, any bribe, consideration, gift, reward, favour or any material or immaterial benefit or any other advantage from the BIDDER, either for themselves or for any person, organization or third party related to the contract in exchange for an advantage in the bidding process, bid evaluation, contracting or implementation process related to the contract.

1.2 The BUYER will, during the pre-contract stage, treat all BIDDERs alike, and will provide to all BIDDERs the same information and will not provide any such information to any particular BIDDER which could afford an advantage to that particular BIDDER in comparison to other BIDDERs.

1.3 All the officials of the BUYER will report to the appropriate Government office any attempted or completed breaches of the above commitments as well as any substantial suspicion of such a breach.

1.4. In case any such preceding misconduct on the park of such official(s) is reported by the BIDDER to the BUYER with full and verifiable facts and the same is prima facie found to be correct by the BUYER, necessary disciplinary proceedings, or any other action as deemed fit, including criminal proceedings may be initiated by the BUYER and such a person shall be debarred from further dealings related to the contract process. In such a case while an inquiry is being conducted by the BUYER the proceedings under the contract would not be stalled.

Commitments of BIDDERs

2. The BIDDER commits itself to take all measures necessary to prevent corrupt practices, unfair means and illegal activities during any stage of its bid or during any pre-contract stage in order to secure the contract or in furtherance to secure it and in particular commit itself to the following:-

2.1 The BIDDER will not offer, directly or through intermediaries, any bribe, gift, consideration, reward, favour, any material or immaterial benefit or other advantage, commission, fees, brokerage or inducement to any official of the BUYER, connected directly or indirectly with the bidding process, or to any person, organization or third party related to the contract in exchange for any advantage in the bidding, evaluation, contracting and implementation of the contract.

2.2 The BIDDER further undertakes that it has not given, offered or promised to give, directly or indirectly any bribe, gift, consideration, reward, favour, any material or immaterial benefit or other advantage, commission, fees, brokerage or inducement to any official of the BUYER or otherwise in procuring the Contract or forbearing to do or having done any act in relation to the obtaining or execution of the contract or any other contract with the Government for showing or forbearing to show favour or disfavour to any person in relation to the contract or any other contract with the Government.

2.3* BIDDERs shall disclose the name and address of agents and representatives and Indian BIDDERs shall disclose their foreign principals or associates.

2.4* BIDDERs shall disclose the payments to be made by them to agents/brokers or any other intermediary, in connection with this bid/contract.

2.5* The BIDDER further confirms and declares to the BUYER that the BIDDER is the original manufacture/integrator/authorized government sponsored export entity of the defence stores and has not engaged any individual or firm or company whether Indian or foreign to intercede, facilitate or in any way to recommend to the BUYER or any of its

functionaries, whether officially or unofficially to the award of the contract to the BIDDER, nor has any amount been paid, promised or intended to be paid to any such individual, firm or company in respect of any such intercession, facilitation or recommendation.

2.6 The BIDDER, either while presenting the bid or during pre-contract negotiations or before signing the contract, shall disclose any payments he has made, is committed to or intends to make to officials of the BUYER or their family members, agents, brokers or any other intermediaries in connection with the contract and the details of services agreed upon for such payments.

2.7 The BIDDER will not collude with other parties interested in the contract to impair the transparency, fairness and progress of the bidding process, bid evaluation, contracting and implementation of the contract.

2.8 The BIDDER will not accept any advantage in exchange for any corrupt practice, unfair means and illegal activities.

2.9 The BIDDER shall not use improperly, for purposes of competition or personal gain, or pass on to others, any information provided by the BUYER as part of the business relationship, regarding plans, technical proposals and business details, including information contained in any electronic data carrier. The BIDDER also undertakes to exercise due and adequate care lest any such information is divulged.

2.10 The BIDDER commits to refrain from giving any complaint directly or through any other manner without supporting it with full and verifiable facts.

2.11 The BIDDER shall not instigate or cause to instigate any third person to commit any of the actions mentioned above.

2.12 If the BIDDER or any employee of the BIDDER or any person action on behalf of the BIDDER, either directly or indirectly, is a relative of any of the officers of the BUYER, or alternatively, if any relative of an officer of the BUYER has financial interest/stake in the BIDDER's firm, the same shall be disclosed by the BIDDER at the time of filling of tender.

2.13 The BIDDER shall not lend to or borrow any money from or enter into any monetary dealings or transactions, directly or indirectly, with any employee of the BUYER.

3. Previous Transgression

3.1 The BIDDER declares that no previous transgression occurred in the last three years immediately before signing of this Integrity Pact, with any other company in any country in respect of any corrupt practices envisaged hereunder or with any Public Sector Enterprise in India or any Government Department in India that could justify BIDDER's exclusion from the tender process.

3.2 The BIDDER agrees that if it makes incorrect statement on this subject, BIDDER can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

4. Sanctions for Violations

4.1 Any breach of the aforesaid provisions by the BIDDER or any one employed by it or acting on its behalf (whether with or without the knowledge of the BIDDER) shall entitle the BUYER to take all or any one of the following actions, wherever required:-

(i) To immediately call off the pre-contract negotiations without assigning any reason or giving any compensation to the BIDDER. However, the proceedings with the other BIDDER (s) would continue.

(ii) The Earnest Money Deposit (in pre-contract stage) and/or Security Deposit/Performance Bond (after the contract is signed) shall stand forfeited either fully or partially, as decided by the BUYER and the BUYER shall not be required to assign any reason therefore.

(iii) To immediately cancel the contract, if already signed, without giving any compensation to the BIDDER.

(iv) To recover all sums already paid by the BUYER, and in case of an Indian BIDDER with interest thereon at 2% higher than the prevailing Prime Lending Rate of State Bank of India, while in case of a BIDDER from a country other than India
with interest thereon at 2% higher than the LIBOR. If any outstanding payment is due to the BIDDER from the BUYER in connection with any other contract for any other stores, such outstanding payment could also be utilized to recover the aforesaid sum and interest.

(v) To encash the advance bank guarantee and performance bond/warranty bond, if furnished by the BIDDER, in order to recover the payments, already made by the BUYER, along with interest.

(vi) To cancel all or any other Contracts with the BIDDER. The BIDDER shall be liable to pay compensation for any loss or damage to the BUYER resulting from such cancellation/rescission and the BUYER shall be entitled to deduct the amount so payable from the money (s) due to the BIDDER.

(vii) To debar the BIDDER from participating in future bidding processes of the Government of India for a minimum period of five years, which may be further extended at the discretion of the BUYER.

(viii) To recover all sums paid in violation of this Pact by BIDDER (s) to any middleman or agent or broker with a view to securing the contract.

(ix) In cases where irrevocable Letters of Credit have been received in respect of any contract signed by the BUYER with the BIDDER, the same shall not be opened.

(x) Forfeiture of Performance Bond in case of a decision by the BUYER to forfeit the same without assigning any reason for imposing sanction for violation of this Pact.

4.2 The BUYER will be entitled to take all or any of the actions mentioned at para 6.1 (i) to (x) of this Pact also on the Commission by the BIDDER or any one employed by it or acting on its behalf (whether with or without the knowledge of the BIDDER), of an offence as defined in Chapter IX of the Indian Penal code, 1860 or Prevention of Corruption Act, 1988 or any other statute enacted for prevention of corruption.

4.3 The decision of the BUYER to the effect that a breach of the provisions of this Pact has been committed by the BIDDER shall be final and conclusive on the BIDDER. However, the BIDDER can approach the Independent Monitor (s) appointed for the purposes of this Pact.

5. **Fall Clause**

5.1 The BIDDER undertakes that it has not supplied/is not supplying similar product/systems or subsystems at a price lower than that offered in the present bid in respect of any other Ministry/Department of the Government of India or
PSU and if it is found at any stage that similar product/systems or sub systems was supplied by the BIDDER to any other Ministry/Department of the Government of India or a PSU at a lower price, then that very price, with due allowance for elapsed time, will be applicable to the present case and the difference in the cost would be refunded by the BIDDER to the BUYER, if the contract has already been concluded.

6. **Independent Monitors**

6.1 The BUYER has appointed Independent Monitors (hereinafter referred to as Monitors) for this Pact in consultation with the Central Vigilance Commission (Sh Sunil Krishan, C/o Member Secretary, Central Pollution Control Board, Parivesh Bhawan, East Arjun Nagar, Delhi-110032, Phone-+91-120-4286713, email : iem.cpcb@gmail.com).

6.2 The task of the Monitors shall be to review independently and objectively, whether and to what extent the parties comply with the obligations under this Pact.

6.3 The Monitors shall not be subject to instructions by the representatives of the parties and perform their functions neutrally and independently.

6.4 Both the parties accept that the Monitors have the right to access all the documents relating to the project/procurement, including minutes of meetings.

6.5 As soon as the Monitor notices, or has reason to believe, a violation of this Pact, he will so inform the Authority designated by the BUYER.

6.6 The BIDDER(s) accepts that the Monitor has the right to access without restriction to all Project documentation of the BUYER including that provided by the BIDDER. The BIDDER will also grant the Monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his project documentation. The same is applicable to Subcontractors. The Monitor shall be under contractual obligation to treat the information and documents of the BIDDER/Subcontractor(s) with confidentiality.

6.7 The BUYER will provide to the Monitor sufficient information about all meetings among the parties related to the Project provided such meetings could have an impact on the contractual relations between the parties. The parties will offer to the Monitor the option to participate in such meetings.

6.8 The Monitor will submit a written report to the designated Authority of BUYER/Secretary in the Department/ within 8 to 10 weeks from the date of reference or intimation to him by the BUYER / BIDDER and, should the occasion arise, submit proposals for correcting problematic situations.

7. **Facilitation of Investigation**

In case of any allegation of violation of any provisions of this Pact or payment of Commission, the BUYER or its agencies shall be entitled to examine all the documents including the Books of Accounts of the BIDDER and the BIDDER shall provide necessary information and documents in English and shall extend all possible help for the purpose of such examination.

8. **Law and Place of Jurisdiction**

This Pact is subject to Indian Law. The place of performance and jurisdiction is the seat/place of the BUYER.

9. **Other Legal Actions**

The actions stipulated in this Integrity Pact are without prejudice to any other legal action that may follow in accordance with the provisions of the extant law in force relating to any civil or criminal proceedings.

10. **Validity**

10.1 The validity of this Integrity Pact shall be from date of its signing and extend upto 5 years or the complete execution of the contract to the satisfaction of both the BUYER and the BIDDER/Seller, including warranty period, whichever is later. In case BIDDER is unsuccessful, this Integrity Pact shall expire after six months from the date of the signing of the contract.

10.2 Should one or several provisions of this Pact turn out to be invalid; the remainder of this Pact shal remain valid. In this case, the parties will strive to come to an agreement to their original intentions.

11. The parties hereby sign the Integrity Pact at ……on……..

BUYER	BIDDER
Name of the Officer. Designation Deptt./MINISTRY/PSU	CHIEF EXECUTIVE OFFICER
Witness	Witness
1…… 2……	1…… 2……

Annexure-VI

Central Pollution Control Board, Delhi

TECHNICAL SPECIFICATIONS OF HIGH PERFORMANCE LIQUID CHROMATOGRAPH (HPLC)

S. No.	**Specifications**	**Requirement**
1.0	**INSTRUMENT COMPOSITION**	
	High Pressure Liquid Chromatograph	One set
	Scanning Fluorescent Detector	One set
	Ultraviolet Detector	One set
2.0	**TECHNICAL SPECIFICATIONS**	
2.1	**System Type**	Computer Controlled, Modular type High Pressure Liquid Chromatograph (HPLC) System
2.2	**Operation Requirements**	- Dual piston pumping system - Gradient mixer should provide gradient mode upto two or more solvents and also usable in isocratic mode - Gradient Mixer and Central Processor Unit controlled through Computer Software via a interface through PC

S. No.	Specifications	Requirement
2.3	**Pumping System**	
	Gradient System	Quaternary gradient system permitting the mobile phase to be composed of two or more solvents under computer control
	Flow Mode	Constant flow modes, with inbuilt facility for degassing of the solvents
	Flow Range	0.001 to 10 ml/min
	Flow Accuracy	Flow accuracy and stability of ± ~~0.1~~ 1% or better
	Flow Precision	Flow precision of ± 0.1% RSD or better.
	Pressure/Flow compensation	Automatic compressibility correction and automatic compensation for changes in operating pressure to ensure accurate flow rates
	Solvent Mixture composite	Solvents mixtures composition should range from 0 to 100% in 0.1% increments.
	Operating Pressure range	Operating pressure range normal to 6000 psi pressure with user selectable upper and lower limits
	Gradient Mixture range	Gradient Mixer System should be ~~higher~~ Low pressure gradient system coupling both pumps, user programmable through the computer data station
	~~***Display***~~	~~Digital display of operating parameters and pressure~~
	Operating parameter	Flow rate, ~~gradient curve~~, stroke volume, upper and lower pressure limits and %A and %B of the solvents in gradient mode
	Battery backed storage	Battery backed storage facility for upto atleast 8 methods including time programming. Automatic start up and shut down methods. Editing of the stored methods should be possible during a run.

S. No.	Specifications	Requirement
2.4	**Auto Sample Injector**	Auto sampler should be able to do Full volume injection and variable injection without any sample loss • Sample injection volume should be variable between 0.1 µl to 100 µl [0.1 µl step]. Injection volume of 1-2000 µl [1 µl step] should be available as an option • Number of samples to be processed automatically, random access up to 100 • It must perform customized, continuous analyses according to the conditions specified for each sample, including pre-treatment, injection and analysis conditions. Priority samples may be inserted in the queue during automated run • Flow line rinse capability both before and after sampling should be possible • Needle wash must be standard • Needle aspiration speed should be variable • Carry over must be within 0.01 % • The injection reproducibility should be less than 0.3% RSD • Injection volume accuracy ±1% • Number of reagent addition should be up to 3 with mixing capability • Injection Cycle time: 50s for draw speed 200µl/min, ejection speed 200µl/min, injection volume 5µl • Sample viscosity range 0.2- ~~50~~ 5.0 cp Operating Pressure: 35MPa max . • It must have a leak sensor, automatic rack and vial recognition as safety feature
2.5	**Degasser**	Membrane degassing unit for ~~5~~ 4 or more flow lines • Degassing capacity to less than 1.5 ppm of Oxygen remaining at 1 ml/min • It must have a leak sensor as safety feature • Any Error status should be transferrable to the operating software
2.6	**Column Oven**	It should be block heating type oven ~~with pre-heating of mobile phase for uniform temperature distribution and~~ with a quick feedback mechanism to maintain constant temperature level even when power source voltage fluctuates

S. No.	Specifications	Requirement
		• The temperature range should be 4oC to 60oC • Temperature control precision should be ±0.1oC • It should accommodate upto 3 columns of 30 cm length and post column reaction coils. • The oven should have temperature limit device and temperature fuse and a solvent leak sensor • It should come standard with one certified ODS column (4.6 mm ID X 250 mm with guard column) • Column management device should be available as an option. • Warm up / cool down time: 5min from ambient to 40ºC/ 10 min from 40-20ºC
2.7	**Columns**	2 Nos. Columns of length and diameter • 250mm x 4.6 mm ID x 5 µm, C18 for carbonyls • 25cm x 4.6 mm ID x 5 µm, C18 for PAHs
2.8	**Scanning Fluorescent Detector**	Programmable detector
	Excitation range	Extraction range of 230 – 700 nm
	Emission range	Emission range of 230 – 900 nm
	Wave length repeatability	Wavelength repeatability of ± 1 nm or better
	Accuracy	Accuracy of ± ~~2~~ 3 nm or better
	Flow cell	Flow cell 5 µl *or more* capacity
2.9	**Ultraviolet Detector ~~(Diode Array Detector)~~**	Light source, D2 Tungsten lamp
	Wave length range	190-800 nm wavelength range
	Adjustment	Adjustable in 1 nm or smaller increments
	Bandwidth	4nm or less
	Silt programme	Slit programme 1 to 16 nm continuous spectra band width (SBW) 5 nm or less

S. No.	Specifications	Requirement
	Accuracy	Accuracy ± 1 nm or better
	Noise	Noise ± ~~.25.0~~ 0.7 x 10^{-5} AU peak to peak or less
	Drift	Drift 1 x 10^{-3} AU per hour or less
	Flow cell volume	Flow cell volume capacity should be anywhere between 8-15 µl
3.0	**COMPUTER DATA STATION**	Should have basic programming facility for method development and simulation concerning analysis of PAH, phenols, pesticides, Herbicides, 2-4-D & its derivatives, phthalate esters, poly-acrylic and carbonyl compounds in environmental samples
3.1	**Application Software**	Capable of providing accurate and reproducible Integration, reintegration/report and multilevel calibration, software for diode array should appear.
		Recording of run detail (e.g. pressure, time profile, pump condition etc.)
		Reporting of elution profile with comparison of stored standard profile
		Reporting of data with elution profile
		Baseline correction, area calculation, data subtraction and report formats.
		Provision for statistical analysis and representation of data in all possible graphical format, trouble shooting
3.2	**Computer System**	
	Make	Reputed brand such as HP/Dell/Lenovo
	Processor	Intel Core i7-2600 Processor, 3.4GHz or above, 8 M Cache or latest available configuration compatible with the instrument
	RAM	4 GB DDR – III RAM 1066 MHz (upgradable to 8GB)
	HDD	1 TB (7200 RPM) SATA or higher available capacity
	Monitor	24” Full HD LED Monitor
	Optical drive	Ultra Slim-tray Super Multi DVD burner
	Key board	Cordless 104 Key

S. No.	Specifications	Requirement
	Mouse	Cordless Optical mouse
	WiFi	Onboard / card installed
	Graphics	Integrated Graphics
	Printer	HP OfficeJet Pro 7000 or equivalent
3.3	**Softwares**	Windows 10 Professional 64bits with Recovery DVD – English- Licensed
		MS Office 2016 Standard with media, manual and Licensed CD
		Antivirus with latest version along with Licensed CD- with three-year subscription
4.0	**ADDITIONAL ITEMS**	
	External Hard Disk	2 TB capacity
	Application Notes	Application Notes (CD-ROM) for HPLC Analysis of organo-chlorine pesticides, herbicide, 2-4-D and its derivatives, PAH'S, Phenols, Phthalate Esters, Poly-acrylic acid and carbonyl compounds.
	Operation & Maintenance Manual	Operation & Maintenance Manual
	Dust cover	Dust cover
	Spares and consumables	Spares and consumables for two years of operation for each of the following sub-system: • Pumping system: Seals etc. • Replaceable parts of Detectors after certain usage – including D2 lamp (02 nos.); Halogen lamp (2 nos.); check valves (2 sets); seal for injectors (5 nos.)
	Analytical manual	Analytical manual alongwith application notes for the analysis of PAH compounds, pesticides and phenols.
	Service manual	Service manual
	Starting kit	Starting kit with one set of required tools for each system/unit

S. No.	Specifications	Requirement
	Spare Parts catalogue	Spare Parts catalogue
	Trouble shooting charts	Trouble shooting charts
	Methodology package software	Comprehensive EPA methodology package software (CD-ROM) for environmental application
	Micro syringe	Micro syringe (two each) of 2 µl, 5 µl, 10 µl, 25 µl capacity
	Sample filtration cartridges	Sample filtration cartridges for reverse phase analysis (150 cartridge), normal phase analysis (150 cartridge)
	Membrane Filters	Millipore membrane filter for organic and inorganic solvents with dia as per filter holder size alongwith pre filter.
	Sample Vials for Auto Sampler	5000 nos. with cap and septa
5.0	**OPERATION & MAINTENANCE TRAINING COMPONENT**	Two weeks training to two laboratory officials on operation, maintenance and trouble shooting aspect of the instrument at manufacturers facility/application laboratory.
6.0	**GENERAL CONDITIONS OF SUPPLY**	1. The instrument and all its sub units should operate on 230 ± 10 volts 50 Hz power supply. 2. All the operation and maintenance manuals, circuit diagrams, application notes and application softwares to be supplied should be in English language. 3. The supplier / manufacturer should have Indian agent to provide after sales service. 4. The main unit and all the sub units of the instrument should be serviced by the Indian representative of supplier. 5. The Bidder should be a manufacturer/authorized representative of a manufacturer, who must have designed, manufactured, tested and supplied two numbers of such equipment similar to the type specified in the past five years, which shall be in successful operation for atleast 2 years as on the date of bid

S. No.	Specifications	Requirement
		opening. 6. The bidder should furnish the information on past supplies and their satisfactory performance. 7. Bidders shall invariably furnish documentary evidence (client's certificate – atleast two) in support of the satisfactory operation of the equipment as specified above. 8. Notwithstanding anything stated above the purchaser reserves the right to assess the capability and capacity of the bidder to perform the contract, should the circumstances warrant such an assessment in the overall interest of the purchaser. 9. Comprehensive warranty with spares for 3 years from the date of installation of the instrument should be covered. 10. 80% amount of the bill will be released at the time of shipment. The balance 20% will be released after satisfactory commissioning of the instrument. This amount will be released and bank guarantee of equivalent amount has to be provided by the supplier till end of warrantee period.

Annexure-VII

TECHNICAL SPECIFICATIONS OF $PM_{2.5}$ SAMPLER
Conforming to USEPA Manual Reference / Equivalent Method

Sampler	:	Manual filter based sampler, conforming to USEPA Manual Reference / Equivalent Method
Flow rate	:	Fixed, 1m^3/hour (16.7 lpm) controlled by Mass Flow Controller. The performance criteria shall be restricted to the requirement at par with FRM
Elapsed time indicator	:	Up to 99.99 hours
Vacuum pump	:	Suitable pump for providing the designed flow rate, brushless motor, Pulse dampers has to be in-built if any pulsating pump is provided.
Flow recorder	:	Memory based recording, downloadable to computer through suitable port and data cable with manual display on screen. All the data should be retrievable through RS 232 and or USB. Should have capability to store ~~at least 20 - 30~~ previous sampling data in memory.
Dry gas meter (Volume totalizer)	:	Calibrated volume totalizer capable to display instantaneous volume passed.
Volumetric Flow rate compensation	:	Ambient temperature and pressure sensors to control volumetric flow rate
Power requirement	:	230 $\pm$ 10 VAC, $\pm$ 10, 50 Hz 0.5 Amp. max.
Size Selective inlets	:	Opposed jet impaction for PM_{10} cut and Very Sharp Cut Cyclone / WINS impactor for $PM_{2.5}$ Cut off. The Sampler Should have facility to use as PM_{10} Sampler with WINS bypass down tube.
Height of the Inlet	:	The height of the inlet should be in between 1.8 - 2 m from the ground and the sampler should stand alone firmly at erected position
Calibration Unit (Optional)	:	Calibration unit to calibrate the flow rate of the instrument

Additional supply	:	Manufacturer's standard operation kit including all required items, fittings for start up / regular operation of instrument including leak check. Operation and maintenance manual for each unit. Spares and consumables for three year operation. PTFE membrane filter with PMP (poly methyl pentene) support ring (2 µm, 47 mm) = 10 packets (pack of 50 Nos.).

The sampler design and performance criteria including data storage and display shall be conforming to the specification listed at Attachment - I. **The supplier shall provide the Designation number listed in the latest list of USEPA Reference and Equivalent method.**

Attachment - I

The Sampler Design Criteria

1. The Sampler shall be designed as per specification of USEPA reference samplers approved as Federal Reference Method (FRM) as mentioned in appendix L of 40 CFR part 50 along with relevant data logging and retrieval system. The system shall be designed in accordance with the drawings and the deviations must be stated wile bidding.
2. The Material of Construction for the components shall be strictly anodised aluminium only
3. The connectors shall be push fit type with engraved grove for gaskets at male parts. Screw system for joints should be avoided.
4. The tolerances specified for PM_{10} impactor L14 of appendix L of 40 CFR part 50, $PM_{2.5}$ Impactor and L21 of appendix L of 40 CFR part 50 shall be strictly applicable.
5. Filter loading mechanism and filter holder assembly shall be designed in user friendly way and sufficient space must be provided to ensure proper handling of filter.

Data recording, Storage and display requirement and Performance criteria of the Sampler

a. The volumetric flow control should be based on mass flow and instantaneous readings of barometric pressure, temperature and RH shall be integrated to calculate air mass and finally translated to Volume, which is supposed to be controlled by MFC. Simpler Mass Flow sensor based equipment is strictly barred.
b. The software should have the capability to collect the flow data every 5 seconds or less and compare the sample data for deviation of more than 5% of set value (16.7 LPM) for more than 6 consecutive readings. If the deviation more than 5% is observed the data should be flagged.
c. The software should have the capability to compare the flow sample data for deviation of more than 10% of set value for more than 12 consecutive readings of 5 second's data. If the deviation more than 10% is observed the data should be flagged and instrument shall give an error message

d. The software should have the capability for averaging the data acquired during last elapsed 5 minutes and compare the sample data for deviation more than 5% of set value (16.67 LPM). If the deviation more than 5% is observed the data should be flagged.
e. Flag should be provided for malfunctioning of Barometric pressure and Temperature sensors (both Ambient and Filter).
f. Average flow should be derived by the cumulative volume data (collected by integration of flow data at desired intervals) divided by the elapsed time
g. At the end of sampling, coefficient of variation in sample flow rate should be calculated and if the % CV is found more than 4% a flag shall be provided.
h. Pressure drop across the filter shall be monitored during sampling and whenever it reaches above 200 mm of Hg the sampler shall stop automatically with a flagged data.

The detail performance criteria for data storage, recording and display shall be at par with following Table:

The Data recording, Storage and display requirement of the Sampler

Operational specification	Availability				Format	
	Anytime	End of Period	Visual Display	Data Output	Digital Reading	Units
Flow Rate, 30 Seconds maximum Interval (5 second's data points is minimum requirement)	Must	NA	Must	5 min Av.	XX.X	L/min
Flow rate, average for the sample period	NA	On PC and or USB	At the end of sampling	Yes	XX.X	L/min
Flow rate, Coefficient of variation (CV), for the sample period	NA	On PC and or USB	At the end of sampling	Calculated on 30 seconds average data interval	XX.X	%
Flow rate, 5 minutes average out of specification (16.7 LPM)	NA	On PC and or USB	At the end of sampling	Moving averages of 30 seconds average data interval	On / Off	
Sample volume, Total	Must	On PC and or USB	Any Time		XXXXX.X	Liters
Temperature, ambient, 30 seconds interval	Must	On PC and or USB	Yes		XX.X	ºC
Temperature, ambient Min., Max., Average for sampling period	NA	On PC and or USB	At the end of sampling	For whole sampling period	XX.X	ºC
Barometric Pressure, ambient, 30 seconds interval	Must	On PC and or USB	Yes	_	XXX	mm Hg
Barometric Pressure, ambient Min., Max., Average for sampling period	NA	On PC and or USB	At the end of sampling	For whole sampling period	XXX	mm Hg
Filter Temperature, 30 seconds interval	Must	On PC and or USB	Yes	_	XX.X	ºC
Filter Temperature, differential 30 minutes interval out of specification	NA	On PC and or USB	At the end of sampling	For whole sampling period	On / Off	ºC
Filter Temperature, maximum differential from ambient, date, time of occurrence	NA	On PC and or USB	At the end of sampling	For whole sampling period	XX.X yy/mm/dd HH.MM	º C Y / M / D Hour : Min.
Date and Time	Must	On PC and or USB	At the end of sampling	For whole sampling period	yy/mm/dd HH.MM	Y / M / D Hour : Min.
Sampling Start and Stop Time Setting	Must	On PC and or USB	At the end	For whole sampling	yy/mm/dd	Y / M / D

			of sampling	period	HH. MM	Hour : Min.
Elapsed Sample Time	Must	On PC and or USB	At the end of sampling	For whole sampling period	HH. MM	Hour : Min.
Elapsed Sample Time out of specification	NA	On PC and or USB	At the end of sampling	For whole sampling period	On / Off	Hour : Min.
Power interruption > 1 minute, Start time of first 10		On PC and or USB	At the end of sampling	For whole sampling period	1 - Hr. Min. 2 - Hr. Min. And so on	Hour : Min.
User entered information such as sampler and site identification	Desirable feature			Recorded as entered	As entered	

Annexure-VIII

TECHNICAL SPECIFICATIONS OF PM_{10} HIGH VOLUME SAMPLER

Flow Rate	:	0.8 to 1.4 cubic meters per minute free flow with flow stabilization by constant flow control device
Suction pump/Blower	:	Brush less motor capable of giving flow up to 1.6 cubic meters per minute.
Size Selective Inlet and Particle Size	:	Cyclonic flow or impaction inlet (as per USEPA design) for cut off particle greater than 10 µm. Particles of 10 microns and below collected on filter media.
Filter holder	:	Designed to accept any standard glass fiber filter of 20.3 cm x 25.4 cm.
Height of the Inlet	:	The height of the inlet should be in between 1.5 – 1.8 m from the ground and the sampler should stand alone firmly at erected position
Sampling time	:	24 hours
Time Totaliser	:	0 to 9999.99 hours. Time-totaliser circuit detects blower stoppage due to any reason.
Automatic Sampling	:	24 hour programmable timer to automatically shut-off the system after pre-set time intervals.
Power Supply	:	230 ± 10 V AC; 50 Hz ± 3%

Gaseous Sampling Attachment

Flow Rate	:	0 - 2 LPM (Least count 0.05 LPM)
Flow Control	:	Four inlet and one outlet manifold with built in needle valves with locking facility for flow control of each inlet for running all types of impingers viz. Fritted, Midget and Muenke
Sampling Train	:	4 Nos. of 50 ml Borosilicate glass midget impingers kept in ice tray

Flow calibration unit (Optional)

Top Loading Orifice Calibration unit	:	Top Loading Orifice Calibration unit with resistance plates, U-tube manometer and barometer (as per USEPA design) to fit on the filter support plate of the sampler

TOP LOADING ORIFICE CALIBRATION UNIT FOR HIGH VOLUME SAMPLER

Orifice

The high volume sampler calibration orifice should consists of a 3.175 cm (1.25 in) diameter hole in the end cap of 7.62 cm (3 in) diameter by 20.3 cm (8 in) long hollow metal cylinder A small tap on the side of the cylinder (5 cm from the top) is provided to measure the pressure drop across the orifice.

Filter support Plate(s)

Filter support plate(s) with suitable gaskets for High Volume Sampler (including respirable dust samplers (RDS) or PM_{10} samplers of any make) to hold the orifice.

Resistance Plates

Five nos. multi-hole resistance plates (5, 7, 10, 13 and 18 holes) and suitable gaskets for leak free joints. (The 18-hole metal plate simulates the resistance of a clean glass-fibre filter while other plates represent a filter with increasingly heavy dust loading.)

Manometer

A calibrated pressure gauge or water manometer spanning 0 to 15 inches of water (0-4 kPa) to determine the pressure drop across the orifice

Barometer

Digital barometer to measure the barometric pressure at the time of calibration in hPa and/or mm Hg.

Annexure-IX

CENTRAL POLLUTION CONTROL BOARD, DELHI
TECHNICAL SPECIFICATIONS OF GAS CHROMATOGRAPH MASS SPECTROPHOTOMETER (GC-MS)

Equipment Name: Gas Chromatograph Mass Spectrophotometer (GC-MS)		
S. No.	**Specifications**	**Requirement**
1.0	**INSTRUMENT COMPOSITION**	
	Gas Chromatograph with accessories	One Set
	Injectors	Two Sets, one for manual injections and another with Auto sampler
	Mass Spectrometer with accessories	One Set
	Capillary columns with accessories	One Set of each specified columns
	Software for Automatic control of the system, Data Acquisition and processing	One Set
	Vacuum Pump for MS with accessories	One Set
	~~Electron Capture Detector (ECD) with accessories~~	~~One Set~~
	Auto Sampler	One Set
2.0	**TECHNICAL SPECIFICATIONS**	
2.1	**Gas Chromatograph**	Fully Computer controlled with Injectors, Oven, Detector, EPC and related electronics
2.2	Make	Basic unit as well as other major components of the same manufacturer
2.3	Display	Alphanumeric digital display in at least four lines

S. No.	Specifications	Requirement
2.4	Parameters setting & control	Through Application Software as well as through Keyboard of the Instrument
2.5	Injector/Detector mounting	2 Injectors
2.6	Capillary Column Mounting	Capable to hold two capillary columns of different diameter (100 µm to 530 µm)
2.7	Heated Zones	At least five Heated Zones including two Injectors, Oven, Detector and Auxiliary
2.8	Purge system	Gas Saver and Septum Purge System
2.9	Memory protection	Memory protection during Power Failure
2.10	Diagnostics & self testing	Built in Diagnostics and Comprehensive Self-Testing
2.11	Data Acquisition	~~Simultaneous from two signal channels i.e. Mass Spectrometer and ECD~~ Data Acquisition from Mass Spectrometer
3.0	**INJECTOR-1**	Split/splitless Injector (for Manual Injection)
3.1	Constituents	Modular Injector with Heater, Temperature and Pressure Sensors
3.2	Modes of Injections	Splitless and Split Injections
3.3	Column compatibility	100 to 530 mm ID Capillary Columns
3.4	Provisions for	Overheat Protection , Septum Purge and Gas Saver
3.5	User Settings	User adjustable setting of Split Ratio, Purge Flow and Purge Time
3.6	Temperature Range	50°C to 400°C

S. No.	Specifications	Requirement
3.7	Temperature Increments	Minimum 1°C in the entire operating range
~~3.8~~	~~Temperature programming capability~~	~~Injector temperature programming~~
~~3.9~~	~~Temperature Programme Ramps~~	~~At least 3~~
~~3.10~~	~~Temperature Ramp Rate Range~~	~~Up to 120°C/min or more~~
~~3.11~~	~~Pressure programming capability~~	~~Yes~~
~~3.12~~	~~Number of Pressure Programme Ramps~~	~~At least 3~~
3.13	EPC Pressure Range	0 to 100 psi
3.14	Operation Modes	Constant Pressure, Ramped Pressure, Constant Flow and Ramped Flow
3.15	Total Flow setting range	N_2: 0.1 to 100 ml/min, He: 0.1 to 100 ml/min, H_2: 0.1 to 1000 ml/min
3.16	Maintenance	Quick and easy maintenance provisions
4.0	**INJECTOR-2**	~~Multimode Injector~~ Temperature Programmable Split/Split Less Injector (for use with Autosampler) – Located at back position
4.1	Constituents	Modular Injector with Heater, Temperature and Pressure Sensors
4.2	Inlet Options	Split/splitless, temperature programmable, Large Volume Injection and Cool on column injections
4.3	Modes of Injections	Hot or cold split/splitless, Pulsed split/splitless, Solvent vent and Direct
4.4	Column compatibility	50 to 320 mm ID Capillary Columns

S. No.	Specifications	Requirement
4.5	Provisions for	Overheat Protection , Septum Purge and Gas Saver
4.6	User Settings	User adjustable setting of Split Ratio, Purge Flow and Purge Time
S. No.	Specifications	Requirement
4.7	Temperature Range	50°C to 450°C
4.8	Temperature Increments	Minimum 1°C in the entire operating range
4.9	Temperature programming capability	~~Up to 7 ramps at up to 450 °C/min or above.~~ 2 ramps or more at up to 450^{o} C or above
~~4.10~~	~~Temperature Programme Ramps~~	~~At least 3~~
4.11	Temperature Ramp Rate Range	From 0.1 to 120°C/min
4.12	Pressure programming capability	Yes
4.13	EPC Pressure Range	0 to 100 psi
4.14	Operation Modes	Constant Pressure, Ramped Pressure, Constant Flow and Ramped Flow
4.15	Total Flow setting range	N_2: 0.1 to 100 ml/min, He: 0.1 to 100 ml/min, H_2: 0.1 to 1000 ml/min
4.16	Maintenance	Quick and easy maintenance provisions
5.0	**OVEN**	
5.1	Volume	More than ~~13~~ 10 Litres; should have provision to accommodate minimum two nos. Capillary columns or more at a time.
5.2	Column Compatibility	Capillary (0.10 / 0.20 / 0.32 / 0.53 mm ID)
5.3	Temperature Range	50°C to 450°C or more
5.4	Temperature Increments	Minimum 1°C
5.5	Temperature Accuracy	± 1% for the entire range
5.6	Temperature Stability	± 0.1°C

5.7	Column Overheat Protection	User defined setting
5.8	Oven Safety Features	Oven power must turn off automatically when the lid / door is opened automatic carrier gas shut off it inlet pressure drops significantly.
5.9	Temperature Programming	Minimum six Ramps and seven Plateaus
5.10	Programming Rate Range	0.1 to 120 °C/min
~~5.11~~	~~Heat Up Time~~	~~Less than 2.0 min (50°C or lower to 250°C)~~
5.12	Cool Down Time	Less than 4.0 min (450°C to 50°C)
5.13	Resetting of Program	Automatic by user defined sequence
5.14	Maximum Run Time	Minimum 650 minutes
5.15	Injector Compatibility	Split / Splitless ~~Injector and Multimode~~ temperature programmable injector
5.16	Detector Compatibility	Mass Spectrometer (MS)
6.0	**ELECTRONIC PNEUMATICS CONTROL (EPC) SYSTEM**	
6.1	Type	Dual column, dual flow
6.2	Control of inlet pressure, flow rate of the carrier gas and split ratio	Through the Application Software
6.3	Parameters Display	On-screen digital display
6.4	Pressure and flow programming	Time programmable between the run
6.5	Dean's pressure switch	For bifurcating the column eluents to two different columns
7.0	**CAPILLARY COLUMNS**	Low Bleed Capillary Columns with following Dimensions
7.1	HP-5MS or equivalent	60 m x 0.25 mm x 0.25 µm

S. No.	Specifications	Requirement
7.2	HP- ULTRA – 2 or Equivalent	25m x 0.20 mm x 0.33 µm
~~7.3~~	~~Uncoated deactivated Silica Column (Guar Colum)~~	~~5m x 0.25 mm~~
8.0	**MASS SPECTROMETER (DETECTOR)**	
8.1	Control	Provisions for automatic Start and Shut Down through Application Software. Parameters should be set and controlled through the Software
8.2	GC Interface	Short heated Interface
8.3	Interface Temperature range	100°C to 350°C
8.4	Mass Source	Should have EI, ~~CI, Positive CI, Negative CI~~ facility with automatic tuning and acquire both SIM and scan data from single injection.
8.5	Electron Source	Easy access heated inert Filament
~~8.6~~	~~EI / CI Source Change-over~~	~~Easy & Quick changeover by user~~
8.7	Source Temperature Range	125°C to 300°C
8.8	Analyser Type	Transmission Quadrupole with pre-filter
8.9	Noise Reduction	Heated Quadrupole Pre-filter / Entrance lens / any other proven means for noise reduction.
~~8.10~~	~~Analyser Temperature Range~~	~~150°C to 200°C~~
8.11	Mass Range	10 to 1000 amu or more
8.12	Mass Stability	Less than ± 0.1 amu accuracy over 48 hours
8.13	Ionisation Modes	Electron Ionisation, Positive / Negative Chemical Ionisation
8.14	Electron Ionisation Voltage	10 – 100 eV
8.15	Vacuum Pump	200 L/sec or better highly efficient Turbo-Molecular Pump

S. No.	Specifications	Requirement
8.16	Pump Down Time	For air / water < 3 minutes
		For qualitative stability < 15 minutes
		For qualitative stability < 90 minutes
8.17	Detector	Electron Multiplier or Photo Multiplier
8.18	Mass Tuning Standard	PFTBA (FC-43)/BFB/DFTPP
8.19	Resolution	1 amu or better
8.20	Scan Rate	Fully variable 10000 amu / sec or more
8.21	Scan Step Size	0.1 amu or less
8.22	Acquisition Rate	50 Full Scans or better / sec depending on mass range
8.23	Linear Dynamic Range	Concentration 10^5
		Electronic 10^6 – 10^7 dependent on acquisition rate
8.24	Number of SIM Groups / Run	Minimum 30 Groups
8.25	Number of lons/Group	Minimum 30 lons
9.0	**SENSITIVITY (DETECTION LIMITS)**	
9.1	EI Scan	1 pg of OFN at S/N of ~~600~~ 800:1 RMS
~~9.2~~	~~EI SIM Scan~~	~~100 fg of OFN at S/N of 25:1 RMS~~
10.0	**MASS SPECTRAL LIBRARIES**	
10.1	NIST Mass Spectral Library	Version Year 2011 or latest preloaded on Data Station and Licensed backup CD Compatible with operation software.
10.2	NIST Chemical Structures Database	Latest version available on date of quotation preloaded on Data Station and backup Licensed CD compatible with operation software.
11.0	**ADDITIONAL CAPABILITIES**	
11.1	Acquisition	Simultaneous Full Scan as well as SIM Acquisition

S. No.	Specifications	Requirement
11.2	Applying constant flow rate	To the MS regardless of column flow rate (use of any column at any flow rate)
11.3	Column replacement	Without cooling and venting the MS
11.4	Injector Maintenance	Without cooling and venting the MS / Back flushing
12.0	**AUTOSAMPLER**	
12.1	Number of Sample Vials	Capable of accommodating ~~50~~ 100 Vials or more
12.2	Syringe capacity	Capable of accommodating up to six different syringe capacity
12.3	Injection volume	Selectable between 1 and 10 microlitre or more should be available
12.4	Washing solvent	Up to four different washing solvents in 4 ml Vials
12.5	Programming	Sequence and repetition programmable from workstation software
13.0	**OPERATING CONDITIONS**	
13.1	Power Supply	230 ± 10 Volts; 50 ± 1 Hz AC Power supply
13.2	Operating Temperature	15°C to 30°C
14.3	Relative Humidity	40 to 80 %, non-condensing
14.0	**DATA STATION**	
	Application Software	Multitasking software with programming facility
	Capabilities	Accurate and Reproducible Integration

S. No.	Specifications	Requirement
		Reintegration / Replot
		Baseline Correction
		Multilevel Calibration
		Background Subtraction
		Library Search
		Quantitative Search
		Customizable Report Formats
	Software control	The whole system including GC – MS and Injectors
	Parameters control	Flow, Temperature, Pressure and Vacuum System
	System Auto Tuning	Through Tuning Standards
	Analytical Quality Control	Calibration check samples
		Spike recoveries
		Calibration verification and
		QC limits
15.0	**COMPUTER SYSTEM**	
	Make	Reputed brand such as HP/Dell/Lenovo
	Processor	Intel Core i7 -2600 Processor (3.4 GHz or above, 8 MB cache or latest available configuration compatible with the instrument
	RAM	4 GB DDR-III RAM 1066 MHz (upgradeable to 8 GB)

S. No.	Specifications	Requirement
	HDD	1 TB (7200 RPM) SATA or higher available capacity
	Monitor	24” Full HD LED Monitor
	Optical drive	Ultra Slim-tray Super Multi DVD burner
	Key Board	Cordless 104 Key
	Mouse	Cordless Optical mouse
	WiFi	Onboard/card installed
	Graphics	Integrated Graphics
	Printer	HP Office Jet Pro 7000 or equivalent
	Softwares	Windows 10 Professional 64 bits with Recovery DVD – English – Licensed
		MS Office 2016 Standard with media, manual and Licensed CD
		Antivirus with latest version along with Licensed CD – with three- year subscription
16.0	**SPARES & CONSUMABLES**	Spares and consumables for three years of operation
	Column Nut	05 Nos.
	Washer	05 Nos.
	Graphite / vespel ferrules different sizes	20 Nos.
	Inlet Septa (self sealing for injectors)	200 Nos.
	O ring	01 No.

S. No.	Specifications	Requirement
	Copper tubing with connectors	50 mtrs
	Micro syringes for manual injection	Micro syringe (two each) of 2 ul, 5 ul, 10 ul, 25 ul capacity
	Copper tube cutter	1 No.
	Auto sampler vials (2 ml)	2000 Nos.
	Auto sampler septa and caps	5000 Nos.
	Auto sampler spare syringes	1.0 µl – 5 Nos.
		5.0 µl – 5 Nos. - additional
17.0	**ACCESSORIES** .	
	Analytical Manual	Analytical manual along with application notes for the analysis of VOCs, PAH and carbonyl compounds.
	Service manual	Service manual
	Starting kit	Starting kit with one set of required tools for each system/unit
	Spare Parts catalogue	Spare Parts catalogue
	Trouble shooting charts	Trouble shooting charts
	Methodology package software	Comprehensive EPA methodology package software (CD-ROM) for environmental application (VOCs, PAHs, carbonyl, etc.)

S. No.	Specifications	Requirement
	Gas purification Panel	Complete with gas purification traps • Moisture trap-silica gel-molecular sieve 50:50 – length 10 inch – 2 nos. • Hydrocabon trap – Activated charcoal filter for hydrocarbon removal – length 10 inch – 02 nos. • Oxygen trap – High capacity oxy trap – capacity more than 125 CC – length 10 inch – 02 nos.
	Gas Cylinders	High Pressure Stainless Steel cylinder filled with high purity 99.99% analytical gases (as mentioned ahead) having gas capacity $7m^3$ (water capacity 47 l). Cylinder should ISI marked confirming to IS 7285 flat bottom fitted with valve as per IS:3224 complete with neck ring and cap painted as specified under Gas Cylinder Rule 1981. • Gas cylinder should be supplied with hydraulic test certificate and explosive certificate from Chief Controller of Explosives, Nagpur. Helium – One No.
	Gas Cylinders Trolley	One No. Gas cylinders Trolley for transporting gas cylinder from transport vehicle to gas room/Laboratory Stainless steel trolley heavy-duty construction with rugged polypropylene straps, stainless steel cinch buckles with – 8 inch wheel made up of high strength polymer material for safe, easy and convenient transfer of single gas cylinder up to 12” in diameter.

S. No.	Specifications	Requirement
18.0	**OPERATION & MAINTENANCE TAINTING COMPONENT**	Two weeks training to two laboratory officials on operation, maintenance and troubleshooting aspect of the instrument at manufacturer's facility/application laboratory.
19.0	**WARRANTY**	Comprehensive warranty with spare for three years from the date of installation of the instrument should be covered. The AMC charges to be mentioned for next two years after warranty is over.
20.0	**GENERAL CONDITIONS OF SUPPLY**	1. The instrument and all its sub units should operate on 230±10 volts 50 Hz power supply. 2. All the operation and maintenance manuals, circuit diagrams, application notes and application softwares to be supplied should be in English language. 3. The supplier/manufacturer should have Indian agent to provide after sales service. 4. The main unit and all the sub units of the instrument should be serviced by the Indian representative of supplier. 5. The Bidder should be a manufacture/authorized representative of a manufacturer, who must have designed, manufactured, tested and supplied two numbers of such equipment similar to the type specified in the past five years, which shall be in successful operation for atleast 2 years as on the date of bid opening.

S. No.	Specifications	Requirement
		6. The bidder should furnish the information on past supplies and their satisfactory performance. 7. Bidders shall invariably furnish documentary evidence (client's certificate atleast two) in support of the satisfactory operation of the equipment as specified above. 8. Notwithstanding anything stated above the purchaser reserves the right to assess the capability and capacity of the bidder to perform the contract, should the circumstances warrant such an assessment in the overall interest of the purchaser.

Annexure – X

Equipment Specifications for Isokinetic Stack Sampling Equipment for CPCB

ITEM	DESCRIPTION
1.	(1) ISOKINETIC SOURCE SAMPLING CONTROL PANEL • Calibrated Direct Reading Metric Unit Dry Gas Meter, 10 Liter per Revolution, 0.1 Liter Resolution. Calibrated to 1.0 ± 0.05, Deviation from average less than 2% • Dual inclined Manometer, 254mm Vertical Scale, 25.4 mm lncline, 0.1mm Incline Resolution, Positive Brass Shutoff Valves for transport • Individual Programmable, Digital Solid-State Temperature Controllers for Probe and Filter Over Circuits • LED Temperature Readout for K-Type Thermocouple with 7- Station Selector Switch, - 105^{O}C to 1,372 ^{O}C to Range • Auxiliary Thermocouple Jack for Handheld Temperature Readout • Power, Pump, Timer, Null Solenoids and Orsat Pump Switch Controls • Individually Fused Circuitry Located on Easily Accessible Fuse Panel • 4-pin military style amphenol power distribution connector meets AN-3057-6 specifications • Resettable Elapsed Digital Timer • Modular Electrical and Plumbing Panels • Fully Removable Front and Rear Access Doors • Lightweight portable • 220VAC/50Hz Power • Stainless Steel Valves and Quick Connects • Complete Orsat option Assemble: Orsat Pump, Rotameter, Valve and Quick Connects • Leak free Quick connections for gas, pressure and vacuum lines • Lockable transport case with soft foam

ITEM	DESCRIPTION
2.	(1) VACUUM PUMP ASSEMBLY • Fully Enclosed Rotary Vane Vacuum Pump or equivalent • Leak Free Vacuum Pump, 1/4HP, 88LPM @ 2.5 cm Hg, 57 LPM @ 38 cm Hg, 66 cm Hg Maximum Vacuum • Equipped with 2m Vacuum Hoses and Nonreversible stainless Steel Quick Connects to Eliminate the Possibility of Cross Connection • 220VAC/50Hz • Lockable transport case with soft foam
3.	(1) LONG UMBILICAL CABLE WITH QUICK CONNECTS • 30 meter in length • 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 • (5) Type (K) Thermocouple Lines • One 5-conductor electrical cable with 4-pin amphenol connector or equivalent • One full length stranded nylon strain relief cable
4.	(1) (2) SHORT UMBILICAL CABLE WITH QUICK CONNECTS • 10 meter in length +/- 3 meters • Flexible Construction with Expandable Abrasion Resistant Low Friction Overbraid 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.

ITEM	DESCRIPTION
	• (5) Type (K) Thermocouple Lines • One 5-conductor electrical cable with 4-pin amphenol connector or equivalent • One full length stranded nylon strain relief cable
5.	(1) SET OF ISOKINETIC SAMPLING NOZZLES • 7 Sizes from #4 (1/8”) to #16 (1/2”) packed in a Foam Lined Case • One set each of Stainless Steel and Glass Nozzle Set, includes 5/8” Stainless Steel nuts and ferrules (both steel and Teflon)
6.	(1) SHORT SAMPLE PROBE/S-TYPE PITOT TUBE/THERMOCOUPLE ASSEMBLE • (1) 316 Stainless Steel welded construction – 1 meter effective length • Stainless steel type S Pitot Tube manufactured according to the design specifications and dimensional requirements stated in USEPA Method 2 • K-type thermocouple assembly attached • Orsat sample tube attached • Pyrex glass liner with #28 ball with O-ring • Removable probe liner heater compatible with 220VAC/50Hz Power • Heated probe shall be able to attain maximum temperature of 200^{o}C
7.	(1) LONG SAMPLE PROBE/S – TYPE PITOT TUBE/THERMOCOUPLE ASSEMBLY • (1) 316 Stainless Steel welded construction – 2 meter effective length • Stainless steel type S Pitot Tube manufactured according to the design specifications and dimensional requirements stated in USEPA Method 2 • K-type thermocouple assembly attached • Orsat sample tube attached • Pyrex glass liner with #28 ball with O-ring • Removable probe liner heater compatible with 220VAC/50Hz Power

ITEM	DESCRIPTION
8.	(1) HEATED BOX ASSEMBLY • One set modular heated box assembly to hold the filter outside the stack. • Proper heating system capable to heat the box up to 200^{o}C • Fitted with temp. sensor to continuously monitor the temperature.
9.	(4 SETS) BALL JOINT WITH O-RING GLASSWARE SETS AND TRANSPORT CASES • Four complete trains of glassware including filter assemblies, impinge bottles with stems, associated connecting glassware and impinge clamps for conducting isokinetic sampling in accordance with EPA Method 5 • Glassware is Heavy Wall Borosilicate Glass with Precision Ground with #28 ball with O-ring and Sockets Connections, Leak-Free Seal with or without O-Rings Lockable transport cases with soft foam to accommodate glassware for Shipping
10.	(2) COLD BOXES FOR IMPINGERS • Impinge box is insulated and water proof and hold 6 to 8 impingers • Has stout handle with centering loop and mounting locations for the aluminium slide block on opposing sides for the impinge inlet strain relief and impinger outlet adapter
11.	2) Umbilical adaptors • 316 Stainless steel construction equipped with #28 socket, compatible thermocouple, appropriate male quick–connect and support arm that inserts in the impinge box slide bracket
12.	4) SUSPENSION RAIL SYSTEMS • Suspension Rail systems constructed of 16 gauge galvanized steel and 3 meters in length to support the modular sampler case and other trains with adjustable hangers to allow safe alignment and maneuvering of the probe into the port • Includes a dual roller trolley for each rail, snap hooks for quick set-up and dismantling

ITEM	DESCRIPTION
13.	2) Cleanup and recovery kit The kit includes; • Glass Funnel • Polypropylene Funnel • All Teflon ½" probe brush • ¼" in Teflon probe brush Extension with 3/8" coupler – 4 meter lengh • 2 1- Liter Polypropylene Wash Bottles • 2500 Ml TFE Wash Bottle • 1 Nylon Nozzle Brush Set: ½", 3/16", 5/16"size • Teflon – coated tweezers • Portable balance, 1-2000g with 0.5g resolution • Programmed calculator for field calculation.
14.	(1) Equipment Calibration kit • 1 set of critical orifices for routine dry gas meter/orifice calibration • 1 set of callipers for measuring nozzle diameters.

Note: All the necessary accessories in accordance with the methods 5, 23A 26A, and 29 have to be supplied (as example submersible pump for cooling in method 23).

All the components like manometer, Pitot tube, DGM, Thermocouple, Nozzels etc, should be supplied with calibration certificate traceable with National/International agency.

A digital calibrated Anneroid barometer (with certificate) should be supplied along with the kit.