An ISO 9001
Company

Bharat Heavy Electricals Limited

(High Pressure Boiler Plant**)**
Tiruchirappalli – 620014, TAMIL NADU, INDIA
Purchase / PCPS

TITLE **FLUE GAS ANALYSER & ACCESSORIES – 6 Sets**	Phone: +91 431 2574104/2574072 Fax : +91 431 252 0233 / 0525 Email : james@bheltry.co.in

	Reference Number: Enquiry MM/PCPS/FLUE GAS ANALYSER	**Enquiry Date: 12.03.2012**	**Due date for submission of quotation: 11.04.2012**
You are requested to quote the Enquiry number date and due date in all your correspondences. This is only a request for quotation and not an order			

BHEL/Trichy is looking for ..... Supply of FLUE GAS **ANALYSER & ACCESSORIES**

ENCLOSURE :

1) ENQ Ref : MM/PCPS/FLUE GAS ANALYSER dated 12.03.2012

BHEL commercial terms & conditions with Price Bid formats and all annexure can be downloaded from BHEL web site http://www.bhel.com or from the Government tender website http://tenders.gov.in (public sector units) Bharat Heavy Electricals Limited) under enquiry reference "**MM/PCPS/FLUE GAS ANALYSER**"	
Tenders should reach us before 14:00 hours on the due date Technical bid will be opened at 14:30 hours on the due date Tenders would be opened in presence of the tenderers who have submitted their offers and who may like to be present.	Yours faithfully, For **Bharath Heavy Electricals Limited** Dy.Manager / Purchase/ PCPS

Enq ref : MM/PCPS/FLUE GAS ANALYSER dated 12.03.2012:

AA) SO2, NOX, CO ANALYSER AS PER FOLLOWING :

1) MOU SPECIFICATION NO MOU/TPFH/SO2,NOX,CO AND CO2 ANALYSER, REV 00(9 PAGES),
2) PROJECT DATA SHEET PCPS:CI:5750:SO2,NOX:PDS,REV 00(4 PAGES),
3) ANNEXURE-1 PCPS:CI:5750:ANA1 AND
4) TAPPING POINT DRAWING NO:4-97-400-82883,REV 02.

MATL. CODE : L575019742102001

QTY : 4 SETS

BB) MULTI GAS SO2, NOX & CO DILUTION TYPE FLUE GAS ANALYZER WITH SHELTER AS PER FOLLOWING:

1) GAS ANALYSERS AS PER MOU/TPFH/S02, NOx, CO, CO2 ANALYSER REV 00 (9 SHEETS),
2) PROJECT DATA SHEET MOU/TPFH/SO2, NOx, CO,/6011 REV 00 (3 SHEETS).
3) TAPPING DETAILS OF FLUE GAS ANALYSER DRG NO:4-97-400-82883 REV 02 (1 SHEET) FOR UTILITY BOILER APPLICATION.
4) ANNEXURE FBC&HRSG:CI:OPAL:GASANAL(5 SHEETS).
5) SPEC 6987-6-52-0088 (23 SHEETS)AND
6) SPECIFICATION FOR ANALYSER SHELTER 6987-6-52-0086(14 SHEETS),
7) HVAC SYSTEM SPEC 6987-00-YA-SP-6010 Rev 0(3 SHEETS)

MATL. CODE : L601119742105001

QTY : 2 SETS

S.James
Dy.Manager/Purchase/PCPS

BHEL/FBC&HRSG/Purchase

TERMS AND CONDITIONS (for ENQUIRY)

1 (a) QUOTATION: Each tender should be sent in double cover, inner cover should be sealed with tender's distinctive seal and superscribed with correct tender No. item of supply and due date of opening. The outer cover should only bear the address of this office and should not have any indication that a tender is within. Two or more quotation should not be sent in one cover but the quotation against each tender should be sent separately to avoid confusion. Tender should not be addressed to any individual's name but only by designation.

(b) Tenders should be free from CORRECTION AND ERASURES. Corrections if any, must be attested. All amounts shall be indicated both in words as well as in figures. Where there is difference between amount quoted in words and figures, amount quoted in words shall prevail.

© Price should be net F.O.R dispatching station inclusive of risk in transit and remain valid for 60 days from due date.

(d) If any Sales Tax is payable as extra to the quoted price it should be specifically stated in quotations along with CST & TNGST No. failing which the purchaser will not be liable for payment of Sales Tax. Our T N G S T No.3560005 Dt.01-04-1995, CST No.239383 Dt.11.06.1991.

(e) No revision of prices will be entertained after tenders are opened.

(f) Manufacturer's Name, Trade Mark or Patent No. if any should be specified. Illustrative leaflets giving technical particulars are required along with quotation wherever necessary.

(g) Product with I S I Certification marks will be preferred.

h) The Purchaser shall be under no obligation to accept the lowest or any other tender and shall be entitled to accept or reject any tender in part or full without assigning any reason whatsoever.

2. SAMPLES: Wherever possible ,sample should be submitted separately whether specifically requested or not so as to reach the Purchaser on or before the due date of the enquiry. They should be clearly marked with the enquiry No and the date on the outside cover to facilitate identification.

3. PACKING AND MARKING: The supplier shall arrange for securely protecting and packing the stores to avoid loss or damages during transit.

4 TERMS OF PAYMENT: Payment will be made within 30 days of satisfactory receipt of materials at site. Wherever required by the purchaser, the successful tenderer must send the operation & maintenance manuals, test certificate, drawings etc., for the materials ordered. These should be sent immediately after dispatch of the materials and a statement to that effect should be made in the invoice. Failure to comply with this provision will result in delay in payment of the bills. Goods dispatched either by V P P or by the document presented through bank will not be accepted unless agreed to by the Purchaser.

The duplicate copy of the invoice meant for the transporters should accompany the material as stipulated under C.E Rules 52A and 173C (or) 57GG. A Photostat copy of the above invoice for each delivery challen should be submitted along with the original bills routed through bank or submitted directly to BHEL Finance Department.

5 SECURITY DEPOSIT: For purchases over Rs.5,000/- the successful tenderer/s may be requested to furnish a Bank Guarantee. Security Deposit for an appropriate value as may be determined by BHEL.

6 LIQUIDATED DAMAGES/PENALTY AND INTEREST ON ADVANCES FOR DELAY IN DELIVERY:

If the supplier fails to deliver the raw material / equipment / components within the period in the contract the purchaser shall deduct Liquidated Damages a sum equivalent to 0.5% of the price for each week of delay up to a maximum of 15% of the price of the delayed/undelivered goods. In addition to the recovery of interest at normal cash credit rate plus 2% for the unadjusted portion of the advances. If the delay in delivery of a part contributes to delay in execution of total system. LD and interest on advances will be recovered on the total contract price/total advance paid.

7 RISK PURCHASE: Alternatively the purchaser at his option will be entitled to terminate the contract and to purchase elsewhere at the risk and cost of the seller either the whole of the goods or any part which the supplier has filed to delivery or dispatch within the time stipulated as aforesaid of if the same were not available, the best and the nearest available substitute therefore. The supplier shall be liable for any loss which the Purchaser may sustain by reason of such risk purchases in addition to penalty at the rate mentioned in clause 6 above.

8 PREFERENTIAL DELIVERY: It should be noted if a contract is placed on a higher tender as a result of this invitation to tender in preference to the lowest acceptable offer in consideration of the earlier delivery, the seller will be liable to pay to the purchaser the difference between the contract rate and that of the lowest acceptable tender on the basis of final price F O R destination, including all elements of freights, sales tax, duties and other incidental in case of complete supplies in terms of such contract within the date of delivery specified in the tender and incorporated in the contract.

9 MODVAT/CREDIT: If any Excise Duty is payable, the chapter head/sub-head reference and the rate of the duty should be quoted. If the tender is availing MODVAT credit for his input materials, the effect of proforma credit should be passed on to the purchaser. Tender under " MODVAT" shall be preferred.

10 GENERAL : The Purchaser reserves the right to split up the tender and place order for individual items with different tenders and also increase or decrease the quantity.

Any other conditions which might have been quoted by the Seller and are in contravention to the terms prescribed in the order and which have not been specifically accepted in by Purchaser will not be applicable to the contract.

(TO BE STAMPED IN ACCORDANCE WITH STAMP ACT AND THE EXPIRY DATE OF BG MUST BE AFTER 60 DAYS FROM THE DATE OF COMPLETION OF WARRANTY PERIOD)

PERFORMANCE BANK GUARANTEE

In accordance of M/s. Bharat Heavy Electricals Limited (A Government of India undertaking, a company incorporated under the Companies Act 1956 having its Registered Office at "BHEL House", SIRI Fort, New Delhi 110 049) through its High Pressure Boiler Plant Division located at Tiruverumbur, Tiruchirapalli- 620 014 (hereinafter called 'the Company') having entered into a contract with …….hereinafter called ' the said contractor ' which term includes 'suppliers' for the purpose of this Bond and under the terms and conditions of the contract No……. Dt ……. Between BHEL, Trichy and as per the contract, the contractor / supplier is to furnish a performance Bank guarantee for Rs. ……. for the due performance of the equipment to be supplied under the above referred contract and for the fulfillment of all the terms and conditions of the contract, We ……..(indicate the name of the bank) (herein after referred to as the bank) at the request of …….. (Contractor(s)) do here by undertake to pay the company an amount not exceeding Rs…….against any loss or damage caused to or suffered or would be caused to or suffered by the company by reason of any breach by the said contractor (s) of any of the terms and conditions contained in the said agreement.

2. We ……..(indicate the name of the bank with full address), do hereby undertake to pay the amounts due and payable under this guarantee without any demur, merely on a demand from the Company stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by the Company by reason of breach by the said Contractor(s) of any of the terms and conditions contained in the said Agreement or by the reason of the contractor(s) 'failure to perform' the said agreement. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs._____.

3. We undertake to pay unconditionally to the Company any money so demanded notwithstanding any dispute(s) raised by the Contractor in any suit, or proceedings pending before any Court or Tribunal or Arbitration or before any other authority relating thereto our liability under this present being absolute and unequivocal. The payment under this guarantee would not wait till the disputes have been decided by any Court or Tribunal or in the arbitration proceedings or by any other authority. The payment so made by us under this Bond shall be a valid discharge of liability for payment thereunder and the Contractor(s) shall have no claim against us for making such payment.

4. We…….(indicate the name of Bank), further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Agreement and that it shall continue to be enforceable till all the dues of the Company under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till_____Office / Department/ Division of the Company certifies that the terms and conditions of the said Agreement have been fully and properly carried out by the said Contractor(s) and accordingly discharges this guarantee.

5. (I) Unless a demand or claim under this guarantee is made on us in writing on or before the _____we shall be discharged from all the liability under this guarantee thereafter. But where such claim or demand has been preferred by the Company with the Bank before the expiry of the said date, the claim shall be enforceable notwithstanding the fact that the said enforcement is effected after the said date.

(ii) For the purpose of this clause, any letter making demand on the Bank by M/s. BHEL dispatched by Registered Post with Ack.Due or by Telegram or by any Electronic media addressed to the above mentioned address of the Bank shall be deemed to be the claim / demand in writing referred to above irrespective of the fact as to whether and when the said letter reaches the Bank, as also any letter containing the said demand or claim is lodged with the bank personally.

6. We ……..(indicate the name of Bank), further agree with the company that the Company shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said agreement or to extend time of performance by the said Contractor (s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the Company against the said Contractor(s) and to forbear or enforce any of the terms and conditions relating to the said Agreement and we shall not be relieved from our liability by any reason of any such variation or extension being granted to the said Contractor(s) or for any forbearence, act or omission on the part of the company or any indulgence by the company to the said Contractor(s) or by any such matter or thing whatsoever which under the law relating would, but for this provision, have effect of not so relieving us.

7. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor(s).

8. It shall not be necessary for the company to proceed against the contractor before proceeding against the guarantor-bank and the guarantee herein contained shall be enforceable against them notwithstanding any security, which the company may have obtained or obtain from the Contractor shall, at the time when proceedings are taken against the guarantor hereunder be outstanding or unrealised.

9. Any claim or dispute arising under the terms of this document shall only be enforced or settled in the Courts at Tiruchirapalli.

10. The guarantor hereby declare that it has power to execute this guarantee and the executant has full powers to do so on its behalf under the proper authority granted to him/them by the guarantor

11. We ……(indicate the name of Bank) lastly undertake not to revoke this guarantee during its currency except with the previous consent of the company in writing.

In witness whereof we…….., (indicate the name of Bank) have hereunto setout Bank Seal the_____day _____month 200

LIST OF NATIONALISED BANKS

01.	**ALLAHABAD BANK**
02.	**ANDHRA BANK**
03.	**BANK OF INDIA**
04.	**BANK OF BARODA**
05.	**BANK OF MAHARASTRA**
06.	**BHARATH OVERSEAS BANK**
07.	**CANARA BANK**
08.	**CENTRAL BANK OF INDIA**
09.	**CORPORATION BANK**
10.	**DENA BANK**
11.	**INDIAN BANK**
12.	**INDIAN OVERSEAS BANK**
13.	**OREINTAL BANK OF COMERCE**
14.	**PUNJAB NATIONAL BANK**
15.	**PUNJAB AND SIND BANK**
16.	**STATE BANK OF INDIA**
17.	**STATE BANK OF TRAVANCORE**
18.	**STATE BANK OF MYSORE**
19.	**STATE BANK OF BIKANER & JAIPUR**
20.	**STATE BANK OF HYDERABAD**
21.	**STATE BANK OF PATIALA**
22.	**STATE BANK OF MAHARASTRA**
23.	**SYNDICATE BANK**
24.	**UCO BANK**
25.	**UNION BANK OF INDIA**
26.	**UNITED BANK OF INDIA**
27.	**VIJAYA BANK**

OTHER BANKS	
28	ABN AMRO BANK N.V.
29	CITI BANK N.A.
30	DEUTSCHE BANK AG
31	HDFC BANK LTD.
32	ICICI BANK LTD.
33	IDBI LTD.
34	STANDARD CHARTERED BANK
35	THE HONGKONG AND SHANGHAI BANKING CORPORATION LTD.

BHARAT HEAVY ELECTRICALS LIMITED
PCPS / PURCHASE

Ref: MM/PCPS/FLUE GAS ANALYER Dated 12.03.2012

SPECIAL CONDITIONS

1. This tender is for the supply as per the enclosed Enquiry and specification. The offered price shall be valid for 6 months from the date of quotation. The vendor shall have adequate experience in manufacturing of this item.

2. The tender is in TWO parts. One part consisting of Technical Bid with Commercial terms & conditions along with Quality plan for the supply in-line with our requirements and another part containing Price Bid. Techno-Commercial bid and Price Bids are to be submitted in separate sealed covers. In addition to technical and commercial conditions, vendors who are not registered vendors of BHEL, Trichy have to submit the filled in "Supplier Registration Forms" (available in www.bhel.com website) along with the technical bid. Based on this and other conditions, as well as capacity and capability and approval by customer vendor will be shortlisted. Both these covers are to be put in a single cover duly super scribing the Enquiry Number. The technical bid with commercial terms & conditions will be opened on the due date and based on the acceptance of techno-commercial bid and vendor evaluation, the price bid of the qualified vendors will be opened on a suitable date with due intimation.

   Following will be the criteria for short-listing the vendors
   - Evaluation of dully filled Supplier Registration Forms.
   - Availability of minimum manufacturing, handling, testing and measuring facilities as detailed in the Supplier Registration Form.
   - BHEL will have the right for spot assessment of the facilities.
   - Meeting our techno-commercial requirements of the enquiry.
   - Customer approval for the vendors before ordering.

   Accepting & entering in to Integrity Pact (IP).

3. BHEL reserves the right to Negotiate with the L1 vendor.

4. BHEL reserves the right to re-float the tender opened, if L1 price is not the lowest acceptable price to them inter-alia other reasons.

5. The materials are to be dispatched to M/s. ONGC Petro additions Ltd, Dahej, Near Baruch, Vadodara Dist,, Gujarat, **in case of indigenous** vendors on FOR/Destination basis. **in case of foreign vendors on FOB/Nearest seaport basis.** Mode of packing & delivery shall be clearly specified in your quote.

6. Desired delivery within 16 weeks from the date of order. For the delayed delivery, LD is applicable at 0.5% per week, subject to a max. of 15% on undelivered portion.

7. Offers will be evaluated on FOR / OPAL Site cost basis only. Necessary loading factor for internal freight & insurance will be added from sea port to OPAL site in case of foreign vendors.

8. 100% payment will be effected on receipt and acceptance of materials at site in case of indigenous vendors. 100% payment on collection basis thro' bank will be effected for foreign vendors. PBG should be submitted as per proforma attached for 10% value of the order along with dispatch / negotiation documents.

9. Applicable commercial terms & conditions shall be clearly spelt out in the offer.

10. Quotes should be submitted only by the principals. Orders will be placed only on the principals. Ordering on Indian agent will not be done. Qualified L1 vendor will be considered for ordering.

11. Full details can be downloaded from BHEL's website http://www.bhel.com (Tender Notifications page > NIT_xxxxx) or from the Govt. Tenders website http://tenders.gov.in (Public Sector Units > Bharat Heavy Electricals Limited page against Ref. No. NIT_xxxxx) or CPP portals. Interested parties may submit their offers to the following address, **along with vendor registration requirement in BHEL format hosted in BHEL web site**.

    SR. MANAGER / PURCHASE / PCPS, 4TH FLOOR, BLDG.79, Bharat Heavy Electricals Ltd.,
    HIGH PRESSURE BOILER PLANT, TIRUCHIRAPPALLI - 620 014, TAMILNADU, INDIA.
    Ph: (0431) 2574104 / 2574163, FAX: 2520233
    E-mail : james@bheltry.co.in, nsmani@bheltry.co.in

Dy. Manager/Purchase/PCPS

BHARAT HEAVY ELECTRICALS LIMITED
FBC & HRSG / PURCHASE
TIRUCIRAPPALLI - 620 014 , TAMILNADU

445 – 407 (Rev.01)

INSTRUCTIONS TO TENDERERS (INDIGENOUS)

01.a Tenderers shall quote their price on **Ex-Works / FOR Despatching point** basis. Materials will be transported by road through BHEL / TRICHY approved transport carriers to respective destinations indicated in the tender.

b Split-up prices must be furnished by the tenderer for the basic Instrument / Equipment and for all accessories quoted.

02. Offer must include Spares required for:
a) Commissioning of the equipment.
b) **2** years trouble free operation.

03. If the tender specification calls for various alternatives, all such alternatives are to be quoted by the tenderers.

04. Data sheet as called for in the enquiry shall be filled by the tenderer in full and submitted along with the quotations.. **Offers with incomplete information in data sheet are liable for rejection**.

05. Offers shall be accompanied by copies of drawings, catalogues, illustrated leaflets as called for in the tender specification.

06. In case of tenders invited in two parts, vendors shall furnish **Un-priced Complete Bill Of Materials in the technical bids** for our evaluation. Technical bids alone will be opened on the tender due date.

07. Manufacturer's quality plan must be sent along with the offer. The Vendor shall submit along with the offer the list of components made in house and the list of bought out components, the source, the quality requirements for the same. A copy of the product catalogue with all the relevant information shall also accompany the offer. In case **BHEL Standard Quality plan** is applicable, vendor to confirm for their **compliance**.

08. Each and every point of BHEL specification / data sheet must be either confirmed or commented upon without fail either in typed form or in neatly hand written form bringing out clearly the deviations (if any) taken by the tenderers. However, the tenderers must make all efforts to adhere to BHEL specifications in toto. Offers received without such point to point confirmations / comments shall be considered incomplete and liable for rejection.

09. Status f tender submission shall invariably be informed to BHEL either over **E-Mail / Fax atleast two days in advance of due date**, failing which **no extention of due date is entertained.**

10. **No advance will be made along with order**. Our payment terms will be **100% within 45 days after receipt and acceptance of materials at our works / site.** Please note that finalisation of tender is not only on the price factor but also on your accepting our terms of payment.

11. The equipment shall be guaranteed for a period of **12 / 18** months from the date of putting the equipment in use or **18 / 24** months from the date of despatch whichever is earlier.

12. Vendor to confirm for providing **Bank Guarantee for 10% order value** (as per BHEL format) valid for a period mentioned in the point No.11 .

13. Please quote DGS&D rates if the equipment is covered under the current rate contract. A copy of current rate contract shall also be enclosed with the offer.

14. The purchase also reserves the right to allow to the Public Enterprises price preference facilities as admissible under Government policy.

15. The rate of excise duty prevalent on the date of quotation shall be clearly indicated in the offer itself for incorporation in the Purchase Order. It will be payable at the quoted rates subject to completion of delivery within the stipulated dates. However revision due to statutory variations will be applicable.

16. In case of an order, **3 sets of hard copies** of detailed dimensional drawings, O&M insturctions & manuals and **2 sets of soft copies in CD** will have to be furnished by the supplier **at no extra cost**.

17. If the component requires approval of the prospective supplier's drawing before manufacture, such drawings must be furnished within two weeks from the date of Letter of Intent unless contracted otherwise. Drawings to be submitted for approval must be complete in all respects without necessitating submission of revised drawings for approval.

18 **"Original Invoice for Buyer"** should be submitted along with the advance copy of documents to, The Manager / Purchase / IPP, Bldg.No.79, BHEL, Trichy-14 for each of the despatch made, for processing payment.

19. Detailed offer should reach us before the due date indicated in the tender. Telegraphic offers will normally be not accepted and will be treated as incomplete.

20. Offers must reach us latest **before 2.30 P.M.** on the date of opening of tender viz:

21. The materials are to be despatched to :

BHEL / FBC & HRSG / Purchase

TERMS & CONDITIONS *(FOR IMPORT ENQUIRY)*

I OFFER:

Offer in English Language and in Triplicate in a sealed cover super scribing the Enquiry Number and the due date shall be submitted (addressed) to:

The Manager/Purchase/FBC&HRSG
Building No.79
Bharat Heavy Electricals Limited
High Pressure Boiler Plant
TIRUCHIRAPALLI – 620 014
Tamil Nadu, India

Offer should be firm for net FOB Nearest Sea Port and C&F Chennai Port price indicating the shipping specifications and the earliest delivery in respect of offers from overseas suppliers. Offer from indigenous sources shall be firm for F.O.R TIRUCHIRAPALI.

II DOCUMENTS:

(i) offer should be accompanied by detailed technical literature, Catalogue and detailed dimensional drawing in English and In Triplicate or otherwise, the offer will not be considered.

(ii) In case Overseas suppliers route their offer through their accredited selling agents, a letter of authority should be furnished mentioning the name and address of their selling agents who are authorized to bid, negotiate and concluded a contract on their behalf.

III AGENCY COMMISSION:

(i) In respect of the offer from Overseas suppliers, agency commission, if any, payable to their agents in India, shall invariably be shown separately in the pro forma invoice and this will be paid by us IN INDIA in Indian Rupees, on satisfactory completion of the contract.

(ii) If overseas principal has any tie up with any third party in respect of Agency Commission it should be declared while submitting the offers.

(iii) Copies of current Agency Agreement / Authorization Letter in respect of Agency Commission shall be furnished along with offer, if not made available earlier.

(iv) For calculation of Rupees equivalent of Agency Commission, exchange rate as prevailing on the date of order will be taken.

IV SPARES:

The tender should quote separately for spares that are required for two years trouble free operations. The spares offer should accompany the offer of main equipment otherwise the quotation will be overlooked.

V VALIDITY:

The offers for main equipment and spares shall be kept open for acceptance for 120 days (one hundred and twenty days) from the date of opening of the tender.

VI TEST CERTIFICATES, OPERATING AND MAINTENANCE MANUALS:

The tender shall clearly mention in their offer that the Test certificate and Operating and Maintenance Manuals etc., as called for in the Technical specification in the required number of copies will be provided at no extra cost. If any amount is payable as extra, the same shall be indicated separately in the offer.

VII TERMS OF PAYMENT :

In the event of an order the Purchase will arrange for an Irrevocable Letter of Credit against presentation of documents. Under no circumstances confirmed and irrevocable letter of credit will be established by the Purchase.

VIII GENERAL:

(i) Preference will be given to suitable indigenous or ex-stock imported offers failing which imported offers from incoming consignment against the indigenous supplies " stock and sale licence" will be accepted. If stock and sale licence is not available with the indigenous suppliers, the same shall be indicated in their offer.

(ii) Bank Guarantee: The supplier in the event of an order should furnish a Bank Guarantee from an approved Bank at no extra cost in a pro forma which will be supplied to the Supplier, along with the order, for an amount equipment to 10% of the value of the contract. The Bank Guarantee should remain in full force and effect during the period that would be taken for successful completion of the contract and shall continue to be enforceable till 12 months from the date of receipt of consignment at Purchaser's site or 18 months from the date of last shipment at the Port of delivery whichever is earlier.

XI LD/PENALTY AND INTEREST ON ADVANCES FOR DELAY IN DELIERY:

" If the supplier fails to deliver the equipment / components within the period specified in the contract the Purchaser shall deduct Liquidated Damages a sum equivalent to 0.5% of the price for each week of delay up to maximum 15% of the price of the delayed / undelivered goods, in addition to the recovery of interest at normal cash credit rate plus 2% for the unadjusted portion of the advances. If the delay in delivery of a part contributes to delay in execution of total system, LD and interest on advances will be recovered on the total contract price / total advance paid"

QUOTATION DATA SHEET

THE TENDERS SHALL FURNISH THE PARTICULARS CALLED FOR IN THE QUOTATION DATA SHEET ENCLOSED AND SUBMIT THE FILLED IN DATA SHEET ALONG WITH THE QUOTATION WITHOUT FAIL OFFERS WITH INCOMPLETE INFORMATION IN DATA SHEET ARE LIABLE FOR REJECTION. IN CASE OF DISCREPENCY, INFORMATION CONTAINED IN THIS DATA SHEET SHALL BE CONSIDERED FOR EVALUATION.

PLEASE STRIKE OUT WHICHEVER IS NOT APPLICABLE:

PROJECT: ENQ.NO & DATE :

DUE DATE :

01	VALIDITY	UPTO
02	DELIVERY PERIOD	. . . . . MONTHS / WEEKS
03	DELIVERY PLACE	
	(a) EX-WORKS PLACE	
	(b) FOR / DESPATCHING POINT	
04	EXCISE DUTY	. . . . . % / NOT APPLICABLE
05	TAX	. . . . . % / NOT APPLICABLE
	(a) C S T	. . . . . % / NOT APPLICABLE
	(b) LOCAL TAXES (SUPPLY WITHIN THE STATE)	. . . . . % / NOT APPLICABLE
06	OCTROI CHARGES	. . . . . % / NOT APPLICABLE
07	PACKING CHARGES	. . . . . % / NOT APPLICABLE
08	FORWARDING CHARGES	. . . . . % / NOT APPLICABLE
09	FREIGHT CHARGES	. . . . . % / NOT APPLICABLE
10	INSURANCE CHARGES	. . . . . % / NOT APPLICABLE
11	TESTING / IBR CHARGES (LUMPSUM)	. . . . . % / NOT APPLICABLE
12	COMMISSIONING CHARGES (LUMPSUM)	. . . . . % / NOT APPLICABLE
13	PAYMENT TERMS	
14	ACCEPTANCE FOR PROVIDING BANK GUARANTEE AS PER BHEL PROFORMA	YES / NO / APPLICABLE
15	DIMENSIONAL DRGS / DATA SHHETS	ENCLOSED / NOT APPLICABLE
16	ANY OTHER ADDITIONAL FACTORS	
17	LD CLAUSE @ 0.5% PER WEEK MAXIMUM 15% FOR THE DELAYED DESPATCHING	
18	GUARANTEE PERIOD SHALL BE 18 / 24 MONTHS	

WE CONFIRM THAT THE STATUTORY LEVIES, DUTIES, TAXES ETC FURNISHED ABOVE ARE BASED ON THE LATEST GOVT NOTIFICATION. WE ALSO CONFIRM THAT WE HAVE GONE THROUGH ALL THE CONDITIONS OF THE ENQUIRY AND OUR OFFER IS ACCORDINGLY SUBMITTED

SIGNATURE WITH SEAL

JOB
STANDARD SPECIFICATION FOR STACK ANALYSERS

Rev. No	Date	Purpose	Prepared by	Checked by	Approved by
0	31/8/09	Issued as Job Standard Specification	VE	AA	RG

Abbreviations:

AARH	Arithmetic Average Root Height
CRCA	Cold Rolled Cold Annealed
DC	Direct Current
DCS	Distributed Control System
HVAC	Heating Ventilation and Air conditioning
LCD	Liquid Crystal Display
LED	Light Emitting Diodes
MAWP	Maximum Allowable Working Pressure
MOC	Material of Construction
NPT	National Pipe Thread
RAM	Random Access Memory
RTU	Remote Transmission Unit
SS	Stainless Steel

CONTENTS

1.0 GENERAL

1.1 Scope

1.1.1 This specification, together with the data sheets, covers the requirements for the complete design, materials, nameplate marking, inspection, testing and shipping of Stack gas analysers.

1.1.2 The related standards referred to herein and mentioned below shall be of the latest editions prior to the date of the purchaser's enquiry:

ANSI/ASME	American National Standards Institute/ American Society of Mechanical Engineers.
	B 1.20.1 Pipe Threads. General Purpose (Inch)
	B 16.5 Steel Pipe Flanges and Flanged Fittings. NPS ½ through NPS 24.
	B 16.20 Metallic Gaskets for Pipe Fittings, Ring Joints, Spiral wound and Gasketed.
API	American Petroleum Institute
	Manual on Installation of Refining Instruments and Control System
	RP 551 Process Measurement Instrumentation
	RP 552 Transmission System
	RP 554 Process Instrumentation and Control
	RP 555 Process Analysers
ASTM 693	Standard Practice for cleaning methods and cleanliness levels for material and equipment used in oxygen-enriched environment.
EN 50020	Electrical Apparatus for potentially explosive atmospheres-Intrinsic safety 'i'
EN 10204	Inspection Documents for Metallic Products.
IEC-60079	Electrical Apparatus for Explosive Gas Atmosphere.
IEC-60529	Degree of Protection Provided by Enclosures. (IP Code)
IEC-61000-4	Electromagnetic Compatibility for Industrial Process Measurement and Control Equipment.
IEC-61285	Industrial Process Control Safety of Analyzer Houses
IEEE	515.
IS-13947	Specification for Low Voltage Switchgear and Control gears.
IS-2148	Electrical Apparatus for Explosive Gas Atmosphere-Flameproof enclosures 'd'.
NFPA 496	National Fire Protection Association

1.1.3 In the event of any conflict between this standard specification, job specification/data sheets, statutory regulations, related standards, codes etc., the following order of priority shall govern:

a) Statutory Regulations

b) Data Sheets

c) Standard Specification

d) Codes and Standards

1.1.4 In addition to meeting the purchaser's specification in totality, contractor's extent of responsibility shall include the following:

a) Purchaser's data sheet indicates the type of analyser and the minimum sample conditioning system requirements. Contractor shall be responsible for the selection of proper analyser and design of the sample conditioning system to analyse the component of interest within the stated performance requirements.

b) Carry out complete application engineering of the stack gas analyser so as to achieve the desired analysis within stated performance requirements.

c) Provide all hardware and software, as necessary, to meet the functional requirements specified in the purchaser's specifications.

d) Provide complete data to purchaser for successfully proving serial communication with purchaser's host system i.e. DCS when specified in the job specification.

e) Purchaser's data sheets indicate the minimum requirements of material of construction for the analyser and its sample conditioning system. Alternate superior material of construction shall also be acceptable provided contractor assumes complete responsibility for the parts of the analyser system which have the alternate material of construction for their compatability with the analysis stream and surrounding atmosphere as specified in purchaser's data sheet.

1.2 Bids

1.2.1 Contractor's quotation shall be strictly as per the bidding instruction to contractor attached with the material requisition.

1.2.2 Whenever a detailed technical offer is required, contractor's quotation shall include the following:

a) Compliance to the specifications.

b) A detailed specification sheet for each analyser, which shall provide information regarding type, materials of construction, performance specification and accessories of analyser. The material specification and units of measurement for various parts in vendor's specification sheets shall be to the same standards as those indicated in purchaser's data sheets.

c) A detailed drawing showing various components of sample conditioning system and their piping/tubing hook-up arrangement including sample return, vent, utilities connection and requirement of heat tracing (i.e electrical or steam tracing), as necessary.

d) Sample transportation time calculations for the specified distance between sample point and analyser indicating sample flow rate and the recommended size of the sampling tube.

e) Calibration gas cylinder calculations considering six months of continuous operation with once a week calibration. The calculation sheet shall indicate the rate of gas consumption and specification of gases including composition, concentration, accuracy and shelf life of calibration blend.

f) Proven references for each offered model of analyser inline with clause 1.2.3 of this specification.

g) A copy of approval for intrinsically safe/flameproof enclosure, whenever specified, from local statutory authority, as applicable, such as Chief Controller of Explosives (CCE), Nagpur or Director general of Mines Safety (DGMS) in India, along with:

   i) Test certificate from recognised house CMRI/ERTL etc. for flameproof enclosure as per relevant Indian Standard for all Indian manufactured equipments.

   ii) Certificate of conformity from agencies like CSA, BASEEFA, PTB, LCIE, FM, UL etc. for compliance to ATEX directives or other equivalent standards for all equipments manufactured outside India.

h) Utility requirements and their consumption i.e. instrument air, cooling water, steam etc. along with their process conditions like flow, pressure and temperature.

i) Power consumption for each analyser and its accessories.

j) HVAC requirements i.e. heat load, humidity particulate/chemical filtration etc.

k) Deviations on technical requirements shall not be entertained. In case contractor has any valid technical reason, they must include a list of deviations tag number wise, summing up all the deviations from the purchaser's data sheets and other technical specifications along with the technical reasons for each of these deviations.

l) Catalogues giving detailed technical specifications, model decoding details and other related information for each type of analyser and accessories covered in the bid.

1.2.3 All items, as offered, shall be field proven and should have been operating satisfactorily individually for a period of minimum 4000 hours on the bid due date for the analysis as specified in the purchaser's data sheet. Items with proto-type design or items not meeting provenness criteria specified above shall not be offered.

1.2.4 All documentation submitted by the contractor including their quotation, catalogues, drawings, installation, operation and maintenance manuals, etc shall be in English language only.

1.2.5 Contractor shall also quote for the following: -

a) Complete calibration kit consisting of calibration gas cylinders, pressure regulators, gauges, cylinder gas piping manifolds and driers, (as required) etc. as a minimum, for each analyser. In case of dual range analyser, separate calibration standards shall be provided for each range. For the purpose of calculating requirement of zero and span calibration samples/gases, consider calibration time of 30 minutes every week for each analyser for a period of six (6) months of continuous operation.

b) Consumable spares for the duration of six months with list of items as per manufacturer recommendations for each analyser system, unless otherwise specified in job specification.

c) Start up and commissioning spare parts for each analyser/analyser system as per manufacturer recommendations. However this list of spare parts must include 5% or minimum one of each type of following spare parts:

- Solenoid valve
- Pressure regulator
- Filters
- Temperature controller
- IR/UV Source (lamp)
- Peristaltic pump
- Set of fuses
- Set of o-rings
- Tubing and tube fittings (sizes smaller than 6 mm or ¼").

Additional spare parts, if required, during start-up and commissioning, even though not listed in the list of start-up and commissioning spares mentioned above, shall be supplied by the contractor without any implication.

d) Any special instrument or tool needed for testing, calibration and maintenance of the analyser such as spanner set (for tubes smaller than 6 mm or ¼"), non-magnetic tools, bubble rotameter etc.

e) Training at vendor works and at site as specified in job specifications.

f) Two years operational and maintenance spares for each analyser and its accessories as per vendor recommendations, which shall include spare parts like electronic modules, temperature controller, power supply module, flow meter, solenoid valve, pressure regulator, local indicator, tubes, fan assembly, sample cell, detector assembly, UV/IR source/lamps, set of o-rings, set of fuses etc.

1.3 Drawing and Data

1.3.1 Detailed drawing, data, catalogues and manuals required from the contractor are indicated by the purchaser in the vendor data requirement sheets attached with the enquiry. The required

number of reproducible, prints, and soft copies shall be despatched to the address mentioned, adhering to the time limits indicated.

1.3.2 Final documentation consisting of design data, installation, operation and maintenance manual etc., submitted by the contractor after placement of purchase order shall include the following, as a minimum;

a) Specification sheet for each analyser and its accessories.

b) Certified drawings for each analyser and its accessories, tag number wise, which shall provide the following information:

i) Overall dimensions in millimetres.

ii) Sampling system details identifying each component with make and model number, process connection, utility connection, calibration sample/gas connection, heat tracing requirements, sample vent and fast loop details etc. The flow, pressure and temperature at interface and other appropriate location must be shown in the sampling system drawing.

iii) Detailed interconnection drawing of each analyser identifying each component with terminal number, cable type, cable size and cable entry details. The interface details shall be clearly identified in the drawing.

iv) Grounding details.

v) Power supply distribution details.

c) Programming/configuration data for each analyser, as applicable.

d) Serial interface specification including its configurational data (addresses) for host communication.

e) Power consumptions and utility requirements.

f) Calibration curves and calibration data for each analyser.

g) Zero and span calibration gas specification including composition, shelf life time and accuracy.

h) Copy of type test certificates.

i) Copy of the test certificates of all the tests indicated in clause 4.0 of this specification.

j) Installation procedure for each analyser and their accessories.

k) Calibration and maintenance procedures including replacement of its parts/internals wherever applicable.

1.4 Definitions

1.4.1 The following definitions shall apply for analysers and their accessories:

a) Transportation time

Transportation time is the time interval between a step change in the process fluid composition in the process line and the initial analyser response (excluding analyser response time).

b) Response Time

The time interval between the initial response of the analyser and the time required for the analyser output to reach a value of 90% of the final output value for a step change in sample quality.

d) Time Constant

The analyser response to reach a value of 63% of the final output value for a step change in sample quality is called the analyser time constant.

d) Repeatability

Repeatability of a measurement is the band of values within which an analyser repeats its measurement when the same sample is applied to it. The short termed repeatability is generally determined by multiple readings of a sample during calibration and is usually true random error over short period of time if external influences like pressure and temperature etc remain constant.

It is also defined as the difference between two successive analyser results that would be exceeded in the long run in only one (1) case in twenty (20) when a single analyser system is operated on a flowing sample of uniform quality.

e) Sensitivity

The sensitivity of an analyser is a measure of an analyser's ability to detect a least change in concentration of a measured component that is not masked by the background noise.

f) Accuracy

Accuracy of a measurement is the measure of how close the measured value is to the true value of the sample. For all type of analysers, accuracy is primarily a function of the accuracy of the standards used for calibration.

f) Analyser Rack

An open analyser mounting structure with/without canopy used for mounting analysers, sample handling system and their accessories individually or together in combination.

h) Analyser Cabinet

Small housing in which analysers are installed individually or grouped together. Maintenance is performed from outside the cabinet with door (s) open.

2.0 DESIGN AND CONSTRUCTION

2.1 Analyser Requirements

2.1.1 The type of analyser and its measuring principle is specified in the purchaser's data sheet. Accessories and equipments as required to make online analysis complete are also specified in the data sheet. In general, the scope shall include the following:

a) Sample probe and sampling system, as applicable.

b) Analyser complete with all hardware and software consisting of detector, transmitter and associated equipments.

c) Fast loop and Sample return system, as applicable

d) Calibration and maintenance equipment.

e) Gas cylinders for zero and span calibration.

Unless otherwise specified the scope shall also include supply of all interconnecting tubing, piping, fittings, heat tracing equipment etc., excluding sample return piping from analyser battery limit to sample return header.

In-situ analysers when specified may not include sampling system.

2.1.2 Analysers and its related equipments directly connected to process line and In-situ analysers shall be capable of withstanding line pressure/vacuum and temperature conditions specified in the purchaser's data sheet.

2.1.3 The analyser design and design of sample handling system shall be such that components or any sub-assembly that requires removal, shall be possible without any need to disassemble any other component. Such components shall include items like stream selector valves, (when applicable) filters, pressure regulators, flow-indicator, detector, electronic modules etc.

2.1.4 Analyser shall be microprocessor based with state-of-the-art technology and shall be capable of being configured from analyser front panel locally using built-in keyboard. When specified, it shall also be possible to configure the analyser from remote through a separate terminal.

2.1.4.1 The programmer/ controller shall be microprocessor based and shall be furnished with all the equipments necessary to properly control the analysis cycle, the automatic zero adjustment circuit, the calibration of the analyser and programmer systems and the transition of data to CDSU or DCS and any require peripheral equipment.

2.1.4.2 Visual readout using a digital indicator shall be provided to identify each component being analysed and each step in the program as well as displaying the latest readings.

2.1.4.3 Peak peaker and long term memory circuit boards shall be provided for each component of the interest.

2.1.4.4 All program data tables shall be capable of field modification with out user knowledge of higher level programming. A key lock switch or field alterable password shall be provided to limit access to system software by unauthorized personnel.

2.1.5 The configuration related data of the analyser including set range shall be stored in a non-volatile memory such that this data remains unaffected by power fluctuations or power off

condition. In case manufacturer's standard product stores configuration data in battery backed RAM, analyser shall have facility to provide battery drain alarm as diagnostic maintenance message.

2.1.6 The span of the analyser shall be field adjustable from the analyser front without opening the analyser enclosure. In case, separate device is required to make such a change, the same shall be included by contractor in their scope of supply.

2.1.7 Analyser shall run diagnostic subroutines on continuous basis and shall be able to provide diagnostic alarms related to analyser optics, detector and electronics, as and when any failure/malfunction is detected.

2.1.8 Analyser shall have an integral output meter with digital readout in engineering units.

2.1.9 All interconnecting wiring shall be colour coded/numbered and terminal blocks be clearly identified.

2.1.10 The analyser shall be capable of providing the following outputs:

a) Isolated 4-20 mA DC current output for each analysed component. Smart or field bus output shall be provided when specifically indicated in the purchaser's data sheet.

b) RS485 serial output with MODBUS (RTU) protocol, whenever serial output is specifically indicated in the purchaser's data sheet. The serial output signal shall contain analyser data of component of interest and diagnostic alarms, as a minimum.

c) SPDT contact outputs for various diagnostic alarms (as applicable) such as:

i) High or low set point alarm as measurement

ii) analyser failure

iii) low sample flow

iv) temperature control failure

Any other alarm contact, either specifically indicated in purchaser's data sheet or available as standard with the analyser, shall also be provided.

Unless specified otherwise, all contacts shall be normally closed type (contact open in alarm) and shall be rated for 110V AC 5 Amperes.

2.1.11 Statutory Regulatory Compliance

The design of analysers shall be incompliance to EPA, TUV or any other recognised regulations applicable in the countey of sign. These analysers shall also meet the regulations of local pollution control boundary regulatory authorities applicable at the place of installation.

2.1.12 The design of analyser system shall be in compliance with the electromagnetic compatibility requirements as per IEC-61000-4-X.

2.1.13 Material of Construction

2.1.13.1 Unless otherwise specified, the material of construction of all components wetted by the sample shall be SS316, as a minimum. Contractor must ensure the compatibility of material of each component with the process fluid.

2.1.13.2 Material of all soft parts like diaphragms and o-rings shall be of Teflon. Other manufacturer standard materials can also be acceptable provided these are compatible with the specified process conditions.

2.1.13.3 The material of construction of all non-wetted parts shall be as per manufacturer's standard. However non-metallic materials for casings, enclosures and instrument covers shall be avoided.

2.1.14 Power Supply

2.1.14.1 Unless indicated otherwise, the analyser including the sample handling system shall operate at 110V 50Hz power supply.

2.1.14.2 The analyser performance shall be within the specified limits when the supply voltage varies by ± 10% of specified value and supply frequency varies by ±3 Hz of specified value.

2.1.14.3 Electrical tracing when specified, shall operate at 230V 50 Hz supply. 230V 50Hz power supply shall also be used for analyser cabinet/panel lighting and air conditioning unit, when specified.

2.1.15 End Connection

2.1.15.1 Unless otherwise specified, the following shall govern;

a) Threaded connections shall be NPT to ANSI/ASME B 1.20.1.

b) Flanged connection shall be as per ANSI/ASME B16.5.

c) Flange face finish shall be serrated concentric to clauses 6.4.4.1, 6.4.4.2, and 6.4.4.3 of ANSI/ASME B 16.5. The face finish shall be as follows:

125 AARH : 125 to 250 AARH

63 AARH : 32 to 63 AARH

d) Ring type joint flanges shall have octagonal grooves as per ANSI/ASTM B16.20.

2.1.15.2 End connection of sizes 6 mm or below shall be suitably protected against damage.

2.1.15.3 All end connections shall be clearly identified by attaching labels or stainless steel plate of suitable size.

2.1.16 Enclosure Type

2.1.16.1 Analyser enclosure and related accessories shall be suitable for the electrical area classification indicated in purchaser's data sheets. Unless otherwise specified, the enclosures shall comply to the following standards:

Weather proof housing : IP 55 as per IEC-60529 / IS-13947

Flame proof housing : Flame proof Ex (d) as per IEC-60079 / IS-2148

Purged Enclosure : NFPA 496

Flameproof and purged equipment shall also be made weatherproof.

2.1.16.2 In addition to meeting weatherproof requirements specified in clause 2.1.15.1 of this specification, intrinsically safe analysers shall meet the requirements specified in EN 50020 and shall be certified for the area classification specified in the purchaser's data sheet.

2.1.16.3 Analyser where air/nitrogen purge is provided, purge shall be as per NFPA 496 Type X. Analyser power shall cut off in case of purge failure. Purge failure alarm shall be provided for purchaser use.

2.1.16.4 Separate cable entries shall be available in the analyser/enclosure for power and signal cable. Unless otherwise specified, following shall apply:

a) Cable entry and terminal size for power cable shall be ¾" NPT(F) cable entry other than ¾" NPT (F) shall be provided when specified.

b) Cable entry for Serial cable/signal cables (Signal output) shall be ½" NPT (F).

d) Cable entry for multi-pair signal cables (Multiple output) shall be 1½" NPT (F).

Reducer fitting may be provided when the analyzer standard cable enters are different than those specified.

2.1.16.5 All enclosure entries including sample, utilities, cables etc. shall be clearly identified by attaching label or stainless steel plate of suitable size.

2.2 Sample Handling System

2.2.1 The sample handling system shall consist of primary sample conditioning near sample take off point, sample transportation line, secondary sample conditioning near the analyser, sample return, sample/analyser vent and sample drain/recovering system, as applicable.

The primary sample-conditioning unit shall be a fabricated assembly and shall be mounted on a stainless steel plate suitable for surface mounting.

Secondary sample conditioning shall also be a fabricated assembly and shall be either mounted on a stainless steel plate or within an enclosed cabinet/box with a viewing window.

2.2.2 Stream sampling shall be continuous and analyser shall be located as near as possible to the sample take-off point. Where the analyser is located away from the sample take-off point, contractor shall design the sample fast loop (bypass loop) as part of sampling system. Design shall ensure that the sample drawn is true representative of the stream to be analysed.

2.2.3 In general, sampling systems shall be designed and constructed in accordance with API-RP-555. The design of sample handling system shall consider the following factors, as a minimum:

a) The pressure/vacuum-temperature conditions required for the analyser.

b) Interfering components in the process sample.

c) Normal and abnormal sample compositions.

d) Fouling sample conditions e.g. polymer formation or presence of solids etc.

e) Transportation time requirements.

f) Utilities available and their process conditions.

2.2.4 Unless otherwise specified, material of all components wetted by sample shall be suitable for the process fluid and sample process conditions specified in the purchaser's data sheet. The material of construction for all wetted parts shall be, 316 SS, as a minimum.

2.2.5 Sampling system shall include all elements as necessitated by the process conditions indicated in the purchaser's data sheets, to make the sample suitable for the analysis. This shall include but not limited to filters (coarse and fine), pressure regulators, relief valves, flow indicators, flow controllers, temperature indicators, scrubbers, heaters, coolers, dryers, sample pumps, aspirators etc.

Each sampling system element shall be capable of being removed without disassembling the entire system.

2.2.6 Sample probe shall be provided by the contractor to obtain representative sample from the stack. The sample probe shall be inserted in the stack through an isolation valve (ball or gate valve), which shall be part of contractor's scope of supply. The probe design shall ensure the following:

a) On-line removal and insertion of the probe with non-fly-off design.

b) Unless otherwise specified, end connection for installation in the line shall be 4" flanged with type and rating as specified in purchaser's data sheet. The line isolation valve shall also be of the same size and rating as probe end connection.

c) The probe diameter shall be such that it can be easily inserted or removed through the line isolation valve when in fully open condition.

d) The length of the probe shall be selected considering its insertion upto the middle third of the stack. For the purpose of calculating probe length, consider nozzle length as 200 mm.

2.2.7 Sampling system shall include a sample block valve on all process sample line. The block valve shall be provided meeting the following requirements:

a) The block valve shall be located immediately after the sample probe.

b) Where purchaser's data sheet do not indicate the requirement of sample probe, the block valve shall be provided in the sample line as a part of primary sample conditioning unit.

c) The size of the sample block valve shall be as per the sample line size while the rating shall be as specified in the purchaser's data sheet.

2.2.8 The size of the sample tubing shall be decided by the contractor considering:

a) The distance between sample take off and analyser specified in purchaser's data sheet.

e) The specified sample transportation time.

f) Pressure at the sample take off point.

Where no transportation time is specified in the purchaser's data sheets, contractor shall consider the sample transportation time as 60 seconds.

2.2..9 Where sample is required to be transported in hot condition, sample shall be drawn using pre-fabricated heated tubes. The heated medium shall be either steam or electric power as specified in purchaser's data sheet.

Heating shall be controlled such that the sample temperature is maintained typically around+20C above the sample dew point.

2.2.10 When fast loop is specified or recommended by vendor/ manufacturer, contractor shall provide flow meter for sample bypass flow. Sample return line to process shall be provided with isolation valve and check valve. Contractor shall ensure that return pressure of the sample shall be higher than the pressure of the process return point specified in purchaser's data sheet.

2.2.11 Sampling system shall include provision for connecting calibration sample/gases in auto or in manual configuration as specified in purchaser's data sheet. When no specific requirement is indicated, the provision shall be made for manual configuration only.

2.2.12 Whenever auto-calibration requirement is specified in the purchaser's data sheet, it shall be possible to initiate auto calibration cycle at preset time interval defined by user either manually via the analyser keyboard or remotely through an external contact.

The sample handling system shall be designed to include all hardware and/or software to meet this requirement. The analysed component concentration output shall remain at the last good measured value during auto calibration cycle.

2.2.13 Unless specified otherwise, analysers with common take off shall have separate sample handling system for each analyser.

2.2.14 Filters shall always be provided in dual configuration. It shall be possible to replace the filter without upsetting the operation of the analyser.

2.2.15 Unless specified otherwise, sample lines used for carrying samples for more than one analyser shall be provided with sample pumps in dual configuration. It shall be possible to remove or insert the pump without upsetting the sampling system.

2.2.16 A suitable restriction orifice shall be provided in each sample line to limit the sample flow exceeding thrice the normal flow in the event of tube rupture or opening of tube down the line.

2.2.17 Sample Extraction Techniques:

Sample extraction shall be any one of the following unless otherwise specified in the Data sheet.

2.2.17.1 Dilution Technique.

a) Instrument air shall be provide by the purchaser and the specification shall be as specified else where. Contractor shall consider the minimum pressure condition for the system design.

b) Contractor scope shall include all items/elements like dilution probe, pneumatic control module, instrument air pressure/flow controller, pressure gauge, etc. as

necessary for proper system design. Additional dew point suppression of instrument air (Beyond that is specified) shall be taken care of by contractor.

c) Contractor shall select the dilution ratio depending upon their system design. Calculations for the same shall be furnished by contractor.

d) For dilution type technique, contractor must select the range of analysers based on the dilution ratio selected.

e) Contractor shall be fully responsible to select the dilution probe with critical orifice. The material of orifice shall be 'QUARTZ' as a minimum.. contractor's scope shall include supply of one spare orifice along with each sample probe clearly marking the dilution Ratio.

2.2.17.2 Hot Extraction Technique.

Contractor shall select heated sample lines (Prefabricated tubes with tracer and insulation) with electrical tracing operating at 415V AC, 3 phase, 50 Hz. The temperature of the sample line shall be controlled at a temperature so as to avoid condensation in the sample lines. The temperature control unit shall also form part of contractor's scope of supply. The sample lines shall be prefabricated tubes with electrical traces fully insulated with overall sheath of low smoke grade PVC. All such tubes should have undergone services life performance test as per IEEE 515. The electrical tracing line with temperature controller shall be suitable for the specified area classification.

2.2.18 The sample handling system shall be designed to ,

Avoid plugging of sample probe and sample line even in case of;

- Failure of electrical tracing
- Failure of instrument air
- Excessive solid particles during start up or process upset condition.

Contractor shall clearly study each of these scenario and provide automatic sample shut off and blow back facility in line with the requirements of the specified application.

2.2.19 The routing of sample transfer lines shall be done in such a way that the total length between the sampling point and the analyser sample conditioning system is minimum. Short radius bends shall be avoided to avoid excessive pressure drop.

2.2.20 Where sample pumps are used , moisture sensor shall be provided in sample handling system to cut off pumps in case of high moisture level.

2.2.21 Analyser rack and cabinet

a) Whenever specified in the purchaser's data sheet, the analyser shall be supplied in pre-assembled, pre-tubed and pre-wired condition complete with sample handling system. The primary sample-conditioning unit i.e. conditioning at sample tap-off point, shall be supplied separately.

b) When open rack mounted installation is specified in purchaser's data sheet, the analyser and sample handling system shall be supplied installed in an open rack

with canopy to protect the analyser from direct sunlight and rain. The open rack shall be fabricated using channels/pipes of suitable size. The material of construction shall be stainless steel. The canopy shall also be fabricated out of SS plate of 1.2 mm thick.

c) Whenever closed cubical mounted installation is specifically indicated in the purchaser's data sheets, analyser and sample handling system shall be supplied pre-installed in freestanding closed analyser cabinet. The analyser cabinet shall be suitable for outdoor installation and shall be provided with a key lock.

Cabinet shall be fabricated out of 2.0mm SS sheet reinforced with angles of suitable sizes. Fittings and hinges shall be of stainless steel. Anchor bolts required for installation of cabinet shall also be supplied by contractor.

A power isolation switch with suitable circuit breaker or fuse shall be provided for the incoming power supply.

All items including analyser installed within the cabinet shall be suitable for the maximum possible temperature likely to be attained within the cabinet (i.e. with all items fully powered-on within the cabinet) and area classification specified in the purchaser's data sheet.

Heating/cooling of analyser cabinet shall be provided either when purchaser's data sheet specify the requirement of heating and/or cooling or recommended by the analyser manufacturer or found necessary by the manufacturer to meet following requirements:

i) The temperature induced measurement error exceeds ± 1% of full scale in the worst temperature conditions.

ii) The maximum allowable ambient temperature condition of any component within the cabinet exceeds its limits.

Whenever cooling is specified or found necessary, contractor may select one of the following cooling methodology, unless specifically indicated otherwise:

a) Cabinet mounted air conditioner certified for the specified area classification.

b) Vortex cooler with compressed air system and air dryer of suitable size and capacity. No separate instrument air shall be provided by purchaser for vortex cooler.

c) Power supply cable entry and terminal size shall be as defined during detail engineering by purchaser.

d) The maximum height of rack/cabinet shall be limited to 2100 mm. Cabinet shall be suitable for side and bottom cable entry.

2.3 CARBON MONOXIDE, CARBON DIOXIDE ANALYSERS

2.3.1 Unless specified otherwise the CO/CO2 analysers shall be of Infra Red type

2.3.2 IR/UV analyser shall preferably be non-dispersive type.

2.3.3 Analyser cell length shall be selected as per specified analyser component range. In case of dual range analysers, the selected cell length shall be suitable for both the ranges.

2.3.4 The analyser cell material and window material shall be suitable for the specified service. Unless otherwise specified or required otherwise by pressure-temperature conditions, the o-ring material shall be Teflon.

2.3.5 The analyser design shall be such that it is insensitive to source fluctuations or cell window degradation/partial cloudiness.

2.3.6 The analyser shall have built-in indicator with digital display.

2.3.7 Unless otherwise specified, analyser shall meet the following performance requirements:

Repeatability	:	± 1% of full scale or better
Zero drift	:	± 1% full span/week.
Speed of response	:	less than 90 seconds for 90% of final reading.
Linearity	:	± 1% of full scale or better.

2.4 SOx ANALYSER

2.4.1 Unless specified otherwise the analyser measurement principle shall be based on UV Fluorescence. The UV source lamp shall be highly energising, monochromatic with minimum source life of 5 years.

2.4.2 Analyser cell length shall be selected as per specified analyser component range. In case of dual range analysers, the selected cell length shall be suitable for both the ranges. The analyser cell material and window material shall be suitable for the specified service.

2.4.3 Unless otherwise specified or required otherwise by pressure-temperature conditions, the o-ring material shall be Teflon.

2.4.4 The analyser design shall be such that it is insensitive to source fluctuations or cell window degradation/partial cloudiness.

2.4.5 Special filters shall be offered to minimise the interference of background components, which are of least interest in process stream.

2.4.6 Where IR type analysers are specified, the same shall meet the specification as per clause 2.3 above.

2.4.7 Unless otherwise specified, analysers shall meet the following performance requirements:

Zero/span Drift	:	± 1% of full span/week
Repeatability	:	± 0.5% full scale or better.
Response time overall	:	less than 90 seconds for 90% of final reading.
Linearity	:	± 1% of full scale or better.

2.4.8 Analyzer for incinerator stack for sulphur plant (SRU)

The analyzer system design and analyzer selected for incinerator stack are suitable for the sample containing high sulphur contents. The sample handling system shall be designed for such eventuality which is likely to occur during start up or under plant upset condition.

Any one of the following techniques shall be considered meeting other requirements:

a) Dilution technique with sample handling system designed considering the worst conditions of sulphur.

b) Hot extraction technique with heated analysers.

2.5 Nitrogen Oxide Analysers

2.5.1 Unless otherwise specified the Nox analyser measurement principle shall be Chemiluminescence type.

2.5.2 The analyser shall be complete with ozonator, mode selection chamber for NO, NO-NO2, reaction chamber and detection unit.

2.5.3 Special filters shall be offered to minimise the interference of background components, which are of least interest in process stream.

2.5.4 The analyser shall have built in indicator with digital display for measurement & instrument opacity parameters indications.

2.5.5 Unless otherwise specified the analyser shall meet the following performance requirements.

Zero/span Drift	:	± 1% of full span/week
Repeatability	:	± 0.5% full scale or better.
Response time overall	:	less than 90 seconds for 90% of final reading.
Linearity	:	± 1% of full scale or better.

2.6 HC Analyser

2.6.1 Unless specified otherwise the analyser measurement principle shall be based on the Flame Ionisation Detection (FID) for HC Analysers.

2.6.2 Probe length shall be provided such that 30% insertion in heater stack and shall be calculated based on the nozzle projection and shall be based on the Stack ID given.

2.6.3 Probe & Filter material shall be selected to suit the stack process condition.

2.6.4 Unless otherwise specified the analyser shall meet the following performance requirements.

Zero/span Drift	:	± 1% of full span/week
Repeatability	:	± 1% full scale or better.
Response time overall	:	less than 30 seconds.

2.7.2 Linearity :± 1% of full scale or better.

2.7 Central Data storage Unit (CDSU)

2.7.1 The central data storage unit (CDSU) shall be provided for complete analysis of data and diagnostic alarm data of all analysers and diagnostic & alarm information of shelter/ analyser room equipments

2.7.2 Unless specified otherwise a dedicated CDSU shall be provided for each stack and shall be have the following basic configurations.

2.7.2.1 Processor/Hard ware for data acquisition and communication including network switches, fibre optic cables etc.

2.7.2.2 Shelter analyser console located at each shelter.

2.7.2.3 Common stack analyser system console located at control room.

2.7.3 CDSU Data Acquisition System.

2.7.3.1 The Data acquisition & Communication Hard Ware of CDSU shall be located in shelter.

2.7.3.2 Each stack Analyser shall be connected to the CDSU through serial link in multi drop configuration. The serial link shall be MODBUS RTU protocol. Necessary hardware required at analyser side for protocol conversion shall be provided by vendor.

2.7.3.3 In addition to the analyser serial link, the above shall also accept all alarms from shelter equipments/items such as Detector alarms, power failure alarm, purge failure alarm etc.

2.7.3.4 Any alarm inputs from analyser sample handling system and calibration commands etc. shall also be provided at CDSU.

2.7.3.5 The CDSU data acquisition system shall be connected to shelter analyser and common stack analyser system console at control room.

2.7.3.6 The CDSU system cabinet shall be free standing cabinet and shall be located at each shelter. The construction shall be similar to analyser cabinets as per clause with minimum dimension of 600W X 600D X 2100H.

2.7.4 Shelter Analyser Console:

2.7.4.1 Shelter Analyser console located at each analyser shelter shall be provided for complete analyser measurement and diagnostic data and other shelter measurement data for monitoring, calibration and maintenance.

2.7.5 Common Stack Analyser console

2.7.5.1 The common stack analyser system console at control room shall store the complete analysis data of analysers and present this in a predefined format. The console shall be common for one or more stack analyser system in the plant and shall receive data from each CDSU data acquisition subsystem at shelter/Analyser room. The data from each shelter/ analyser room shall be provided independently and no multi dropping at field shall be considered.

2.7.5.2 The console shall be provided with stack analyser system software and shall have the following features.

a) Display of all analysis data stack wise, component wise and exception wise.

b) Alarm display & printing.

c) Report generation as per statutory requirements such as USEPA, TUV etc.

d) Freely formatted report generation.

e) Report generation as per local pollution control board requirements

f) Data storage and data compaction facilities.

g) System alarms, display & printing.

h) Predictive maintenance packages, if any.

i) Hourly shiftily, daily, weekly, monthly reports shelter wise.

j) Command for auto calibration for each analyser.

k) System shall store the analysis data and reports upto 1 year period.

2.7.5.3 The report generation as per statutory requirements shall have the following reports as minimum.

a) Data of each analyser with sample interval of 1 sec., 1 minute.

b) Performance report, period as defined by statutory regulation authority. 30 days, quarterly, biannual, and annual as minimum.

c) Magnitude of excess emission for each analyser.

d) Specific identification of periods of excess emissions , start up, shut down or other periods, cause of malfunction and corrective action.

e) Report of malfunctions or operative maintenance of each analyser along with period.

f) Summary report in case of excess emission period less than 1 % of time of reporting period, in predefined formats.

2.7.5.4 The software provided for common stack analysers shall be certified compliance to USEPA or TUV or any other statutory regulations.

2.7.6 The consoles at shelter and at control room shall access data independently from analysers. In case of failure of one console the other console shall continue to receive data. Upon resumption of failed console, the stored data from other console shall be transferred by command.

2.7.7 Each console shall have the following minimum configuration.

a) Consoles shall be PC based, Pentium latest processor with retentive memory of 256K RAM, 80GB Hard disk with 19" SVGA colour monitor

b) No. of background colours and foreground colours for the CRT will be seven, as a minimum. These colours shall be used to distinguish parameters such as control, information, process and alarms etc.

c) No. of display characters is 80 character X 40 lines and No. of character type is min 96 ASCII characters with character construction of 5X7 dots and pattern of 7X8 dots.

d) Length of tag no is nine alpha numeric character.

e) Length of description is fifteen alpha numeric character.

f) CRT data display update rate shall not be more than two (2) seconds.

g) Dynamic graphics shall be provided with control.

h) Windowing facility is required with 4 No. of windows/Display.

i) Zooming facility is required.

j) The real time clock of each operator console shall be crystal controlled one which shall be independent of line frequency.

k) A minimum of two cursor control devices must be available with CRT of console. For example cursor control could be used for monitoring the data and engineering of the complete system.

l) Key board shall preferably be touch sensitive membrane type. Each key board entry shall be registered with an audio beep. However, if press type keyboard is provided it shall be ensured that the key board is not susceptible to dust and moisture.

m) The self diagnostic message for a subsystem failure shall appear on the analyser console irrespective of display selected. The choice of the detailed self diagnostic displays shall be made by a key lock switch.

n) The offered printer shall be HP laser jet colour printer.

2.7.8 The communication between CDSU at analyser shelter and the common stack analyser console at control room shall be through fibre optic cable with necessary converters and the same shall be provided by vendor.

2.7.8.1 All fiber optical cables shall be routed through hard HDPE conduits and shall be totally enclosed within using HDPE matching fittings. The HDPE conduits shall be as per IS-4984 or equivalent IEC standard. The outer Colour of the conduit shall be orange with black fittings throughout the run. Individual fiber optic cable shall have minimum one pair of spare fiber. All fiber optical cables shall be rodent resistant and armored type only.

3.0 NAMEPLATE

3.1 Each analyser and its accessory shall have a stainless steel nameplate firmly attached to it at a visible place, furnishing the following information as applicable:

a) Tag number as per purchaser's data sheets.

b) Manufacturer's serial number and model number.

c) Manufacturer's name/trade mark.

d) Component being analysed and its range.

e) Area classification in which the equipment can be used.

f) Power supply requirements.

g) Analyser Outputs

4.0 INSPECTION AND TESTING

4.1 Unless otherwise specified, purchaser reserves the right to test and inspect all the items at the manufacturer's works in line with the inspection test plan for process stream analysers. Contractor shall provide necessary facilities, utilities, competent manpower and consumables required for carrying out the inspection.

4.2 Contractor shall submit the following test certificates and test reports for purchaser's review for each of the analyser:

a) Dimensional verification certificate for each analyser.

b) Material test report as per clause 2.2 of EN10204 for all wetted parts.

c) Manufacturer's test reports as per clause 3.1B of EN 10204 for various bought out components.

d) Leak test report for complete analyser system including sample handling system using Nitrogen or instrument air at 1.5 times the maximum working pressure.

e) Calibration report for each analyser as per clause 4.3 of this specification.

f) Repeatability test for each analyser as per clause 4.4 of this specification.

g) Power supply variation check.

h) Test certificates for zero, span, carrier and fuel gases as applicable.

i) Certificates from statutory body for flameproof/intrinsic safety and weatherproof enclosures as applicable.

4.3 Analyser Calibration

4.3.1 Analyser alongwith sample handling system shall be calibrated using zero and span calibration gas samples in the following sequence:

a) Check/adjust zero by connecting zero gas and span by connecting span gas.

b) Check again zero by connecting zero gas after (a) above. Also repeat span gas check.

a) If either or both zero and span are adjusted in step (b), repeat (b) again to verify the calibration until no further adjustments are made in zero and span.

4.4 Repeatability Testing

4.4.1 Repeatability of the analyser shall be checked by connecting either span gas (if it is approximately 70% of analyser span) or any other gas sample on continuous basis for the following time period.

a) 24 hours by manufacturer and report to be submitted for review.

b) 8 hours during witness inspection.

4.5 Witness Inspection

4.5.1 All the analysers shall be offered for pre-dispatch inspection by the purchaser at manufacturer works. Following tests/ checks shall be carried out on each analyser as a minimum:

a) Physical dimensional verification and workmanship.

b) Bill of material check for each analyser system including sample handling system.

c) Leakage testing of complete system using nitrogen or instrument air.

d) Calibration check as per clause 4.3 above.

e) Repeatability check as per clause 4.4.

f) Power supply variation check. Analyser must function satisfactorily on specified variation of power supply voltage.

g) Review of all test certificates and test reports indicated in clause 4.2 above.

4.5.2 In the event when the witness inspection is not carried out by purchaser, the tests shall any way be completed by the contractor and documents for same shall be submitted to purchaser for scrutiny.

5.0 SHIPPING

5.1 All threaded and flanged openings shall be suitably covered to prevent entry of foreign material.

5.2 Each major part shall be sealed in thick plastic bag. Suitable moisture absorbent shall be provided for electronic components.

6.0 REJECTION

6.1 Contractor shall prepare their offer strictly as per clause 1.2 of this specification and shall attach only those documents, which are specifically indicated in the material requisition.

6.2 Any offer not conforming to the above requirements, shall be summarily rejected.