दि फ़र्टिलाईज़र्स एण्ड केमिकल्स ट्रावनकोर लिमिटेड
FACT
THE FERTILISERS AND CHEMICALS TRAVANCORE LIMITED
(भारत सरकार का उद्यम) / (A GOVERNMENT OF INDIA ENTERPRISE)
CORPORATE MATERIALS
PD ADMINISTRATIVE BUILDING
UDYOGAMANDAL - 683 501, KOCHI, KERALA, INDIA
GST No : 32AAACT6204C1Z2
Phone : 0484-2546778
2546629 / 2545222

निर्घ केलिऐ अनुरोध/REQUEST FOR QUOTATION

Detailed Specification

Enquiry:MM/172/G30177

Contact Details

Name: Binduja Menon
Phone: 0484 2568253 , 0484 2568204
Email ID: binduja@factltd.com

Please submit your offer for supply of the following items as per the instructions, technical specifications and other terms and conditions specified herein/ attached.

Note:
1. The delivery period mentioned in the BoQ is our indicative requirement. You may offer your earliest delivery period.

Please refer our above referred enquiry number in all correspondence.

SL No.	Material Code	Detailed Specification/s	Quantity	Unit of Measure
1	811000530	Continuous Process Gas Analyser System for measurement of Hydrogen in Carbon Dioxide (0.1% H2 in CO2) in CO2 Supply to Caprolactam for Analyser Room1 as per Technical Procurement Specification: INST- ANALYSER-PROCESS GAS(PH-2)-AMMONIA PLANT, Rev 0 attached.	1	Number
2	811000535	Continuous Process Gas Analyser System for measurement of AMMONIA (0.5% NH3) in OFF gas from F551, Synthesis Section for Analyser Room2 as per Technical Procurement Specification: INST-ANALYSER-PROCESS GAS(PH-2)-AMMONIA PLANT, Rev 0 attached	1	Number
3	811000540	Continuous Process Gas Analyser System for measurement of Methane (2% CH4) in process gas from B311 seperator, Synthesis Section for Analyser Room2 as per Technical Procurement Specification: INST-ANALYSER-PROCESS GAS(PH-2)-AMMONIA PLANT, Rev 0 attached	1	Number
4	811000545	Continuous Process Gas Analyser System for measurement of Carbon Monoxide (5ppm CO) in process gas from B311 seperator, Synthesis Section for Analyser Room2 as per Technical Procurement Specification: INST-ANALYSER-PROCESS GAS(PH-2)-AMMONIA PLANT, Rev 0 attached.	1	Number

5	811000550	Continuous Process Gas Analyser System for measurement of Carbon Dioxide(50 ppm CO2) in process gas from B311 seperator, Synthesis Section for Analyser Room2 as per Technical Procurement Specification: INST-ANALYSER-PROCESS GAS(PH-2)-AMMONIA PLANT, Rev 0 attached.	1	Number
6	811000555	Continuous Process Gas Analyser System for measurement of Ammonia (20% NH3) in Synthesis Section (Stream 1, Stream2 & Stream3) Analyser Room2 as per Technical Procurement Specification: INST-ANALYSER-PROCESS GAS (PH-2)-AMMONIA PLANT, Rev 0 attached.	1	Number
7	811000560	Continuous Process Gas Analyser System for measurement of Methane (10% CH4) in Synthesis Section (Stream 1, Stream2 & Stream3) Analyser Room2 as per Technical Procurement Specification: INST-ANALYSER-PROCESS GAS(PH-2)-AMMONIA PLANT, Rev 0 attached.	1	Number

SPECIAL TERMS AND CONDITIONS

1) Offer shall be as per the TPS – INST-ANALYSER-PROCESS GAS (PH-2)-AMMONIA PLANT R0.

2) Pre Qualification Criteria is provided and only Pre Qualified Bids shall be considered for Technical Evaluation.

3) Guarantee for 12 months from the date of acceptance required.

4) Test Certificate for the offered items to be provided.

TECHNICAL PROCUREMENT SPECIFICATION

FOR

PROCESS GAS ANALYSER SYSTEM (PHASE-2)

IN

AMMONIA PLANT,

FACT - UDYOGAMANDAL COMPLEX

KOCHI, INDIA

REV	DATE	DESCRIPTION	PREPARED	CHECKED	APPROVED
3					
2					
1					
0	01.08.2024	FOR ENQUIRY	AM	BK	KVG

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1. GENERAL

1.1. The Fertilisers and Chemicals Travancore Limited (herein after referred to as "FACT") is A Government of India Enterprise, engaged in manufacture and sale of Fertilisers/ Chemicals/ Petrochemicals, Consultancy Services, Engineering Fabrication etc, with its major manufacturing units located at Udyogamandal and Ambalamedu in Kochi, Kerala, India.

1.2. The Ammonia plant, a part of FACT Udyogamandal Complex (FACT- UC) proposes to replace the existing independent analyser systems used for continuous measurement of process gases like – Carbon dioxide (CO_2), Carbon monoxide (CO), Methane (CH_4), Hydrogen (H_2) and Ammonia (NH_3) in the Ammonia Plant to state of the art new Analyser systems.

1.3. This specification covers the minimum user requirements for Design, engineering, manufacture, procurement of materials and bought out items/components, assembly at shop, internal testing, inspection, Factory testing and acceptance at manufacturer's works, packing, delivery, Supervision of Installation and commissioning, including services of Comprehensive Annual Maintenance Contract (CAMC) /warrantee.

1.4. The entire job has to be carried out adhering to all relevant standards, regulations, and best engineering practices, utilizing new, high-quality materials and workmanship. The absence of specification on any aspect implies that best engineering practices shall prevail.

1.5. It may please be noted that compliance to this document alone does not absolve the supplier from supplying a system/equipment that does not meet all the specified operating and service requirements.

1.6. Prior to the submission of the bids, bidder shall inform the purchaser in the event of any conflict between data given in this specification and the requirements with respect to statutes/standards/regulations. The purchaser will provide his resolution in such cases and the bidder shall follow the same without any impact on cost or time schedule.

1.7. Bidder shall visit the site and collect all details, prior to submitting the Bid.

1.8. The specification attached herewith is the general requirement of process gas analyser. Refer attached data sheets for more details regarding specific requirements of each analyser, type of measurement, environmental conditions, hazardous area classification,

process gas composition, location, process details etc as applicable.

1.9. The offers that are meeting both the PQ criteria will only be considered for Technical evaluation.

1.10. For price evaluation the total cost including supply part (complete system, documentation) & service part (installation & commissioning, training and CAMC/warrantee) will be considered.

1.11. **DEFINITIONS**

- "Purchaser" means The Fertilisers And Chemicals Travancore Ltd, Udyogamandal Complex, Udyogamandal, Eloor, Kochi – 683501, hereinafter referred to as FACT-UC.
- "Bidder" means Person(s), firm(s) or company(ies) on whom the purchase order(s) is placed by PURCHASER for supply/installation/testing/commissioning of equipment and materials required vide this enquiry.
- "Contract" means the Purchase Order together with these conditions and any specifications, drawings or other documents, which are attached or are referred to in the Purchase Order or this specification.
- "Site" means the site at which the Analyser and accessories are to be installed.
- "Shipment" means dispatch, transportation, storage at transporter's godown, delivery at purchaser's site and all such activities involved during dispatch and transportation.
- "Plant" means the Ammonia Plant at FACT-UC, Udyogamandal, Kochi.

1.12. **CLIMATIC DESIGN CONDITIONS**

- The project site is at FACT Ammonia Complex, Udyogamandal, Kochi, Kerala, India.
- In addition, the plant is in proximity to coastal region. The environment has high humidity throughout the year. The climate is Tropical.
- The Analyser Rooms has no air conditioning and is same as outdoor environment. All equipment/materials supplied shall be suitable for such conditions and the design/selection of equipment shall be done with this consideration.
- All equipments supplied shall be suitable for continuous operation and shall not

suffer any damage or degradation in power on or power off condition in the environment described above.

- Temperature and Humidity
  - Ambient temperature range : 20 °C to 45 °C.
  - Relative maximum humidity : 99 %
  - Maximum Temperature : 50 °C.

1.13. Bidder shall note that a 'Zero Deviation Bid' is envisaged. There will be a pre-bid meeting with bidders. The bidder shall submit pre-bid queries, if any. Any technical clarification, deviation, or exceptions shall be brought out by the bidder in pre-bid meeting. The bidder shall ensure that this meeting is attended by both technical and commercial personnel who have thoroughly scrutinized the TPS beforehand so that all issues are resolved in this meeting. Pre-bid queries shall be submitted within the stipulated time period. After the pre-bid meeting, replies to pre-bid queries will be given to the bidders, which has to be followed by the bidder in their offer. Further, the bidder shall not bring out any additional clarification, deviation, or exception in their offer. Offers with additional clarification, deviation, or exception will be liable for rejection.

1.14. Bidder shall be responsible for selecting the correct model nos. of the analysers, components and all other accessories to meet the purchaser's specification given in the TPS. Any change found necessary at a later stage of the project to meet the purchaser's specification covered under this TPS, shall be carried out by the bidder without any cost and time implications.

1.15. Bidder shall submit the proven track record (PTR) for the offered items in the proven track record format attached with this TPS as Annexure VI, along with the submission of offer.

1.16. All items as offered shall be field proven and should have been operating satisfactorily on bid due date in conditions / services / process conditions similar to as specified in purchaser's data sheets. Items with prototype designs or items not meeting provenances criteria specified above shall not be offered.

1.17. The offered analysers shall not be withdrawn by analyser manufacturer from market in next ten years (from the date of placement of order) as a matter of corporate policy. Vendor and analyser manufacturer shall continue to support the Purchaser in providing back-up engineering, maintenance support and spare part support for a period of fifteen years from the date of expiry of performance warranty.

1.18. Bidder and analyser manufacturer shall stand guarantee for the performance of all the analysers offered as per specified performance specifications (Annexure - IIIA & IIIB) given in TPS. All analysers shall be sourced from the OEM / place which meets the PTR requirement specified in TPS. Further the bidder shall ensure that the supply, engineering, testing, integrated testing, site commissioning of the complete analysers system shall be carried out as per the conditions of TPS. At any stage during execution of the order, if it is found that the analysers offered by bidder are not as per TPS, bidder shall replace the same without any cost and time implications.

1.19. Purchaser reserves the right to assess the capability and capacity of the bidder for execution of the project. Purchaser also reserves their right to reject any offer received at its discretion without assigning any reason whatsoever.

1.20. Bidder to comply with Standard specification for Analysers system covered in this TPS. The same shall be read in conjunction with the datasheets enclosed in this Tender.

1.21. Bidder shall be completely responsible for the selection of proper material & design to ensure proper functioning of the analyser based on sample process conditions described in data sheets and specifications. Material of construction (MOC) for body, pipes, tubes, all fittings and other wetted parts shall be SS 316 or better.

1.22. Bidder to furnish complete drawings schematic / hookup diagram along with the offer for the offered analyser systems indicating the complete analyser system from the sample take-off point to the sample return including sample probe / sensor , sample handling systems (SHS), Analyser Electronics, freestanding/wall mounted analyser cabinet , sample transportation / fast loop/ return line etc. Complete details of sample conditioning systems shall be furnished in the offer by bidder to ensure complete understanding of the application by bidder. The schematic submitted along with the offer shall be retained for information and shall in no way absolve the bidder of his responsibility for analyser performance.

2. SYSTEM PHILOSOPHY

2.1. The Ammonia Plant is installed with few independent process gas analysers for measuring Carbon dioxide (CO2), Carbon monoxide (CO), Methane (CH4), Hydrogen (H2) and Ammonia (NH3) at different process streams. As the existing analysers reached their maximum life expectancy, renewal of these analyser systems is necessary for smooth operation and control of the plant. The procurement of the same was planned in a phased manner. The Analysers along with their sample handling systems included in Phase – I (Annexure - I, table 1)have already been procured and installed. Procurement of balance analysers (Annexure - I, table 2) is envisaged in this phase.

2.2. The analysers and components should be of flameproof, IP65 and EExd type. The make and model no. of the analyser should be PESO/CCOE certified suitable for the area classification of IEC Zone 2, Gas group IIC, T3.

2.3. All the Analysers in the plant are installed in two Analyser rooms located inside the plant viz. Analyser Room no. 1 [AR1] and Analyser Room no. 2 [AR2]. These rooms are open type having same ambient conditions similar to the plant environment. The details of the Analyser rooms are as follows.

2.3.1 Analyser Room 1 [AR 1]

This room houses Analysers envisaged for front end of Ammonia plant and located South East of Primary Reformer.
Room Size : 6400 mm(L) X 5000 mm(B).
Door Entry (In & Out) : 1190 mm(W) X 2360 mm(H).

2.3.2 Analyser Room 2 [AR 2].

This room houses Analysers envisaged for Synthesis section and located near to the compressor house maintenance bay.
Room Size : 6460 mm(L) X 6460 mm(B).
Door Entry (In & Out): 1060mm(W) X 2160 mm(H).

2.4. All the Analysers should have Primary Sample Handling system [PSHS] and Secondary Sample Handling System [SSHS]. The primary sample handling systems [PSHS] has to be installed locally near to the sample point and the secondary sample handling systems [SSHS] is to be installed near to the Analysers in the respective analyser rooms. This philosophy is envisaged for the Analysers in Phase 1 and this has to be continued for Phase 2 analysers too.

2.5. Some of the new analyzers included in this procurement can utilize the existing primary and secondary sample handling systems that were installed in phase 1. The PSHS & SSHS requirements of the new Analysers envisaged in this TPS are as detailed below:-

Sl No	Tag Number	Primary SHS	Secondary SHS	Field Tubing
1	AT306	**To be supplied**	**To be supplied**	**To be supplied**
2	AT327	Can use existing	Can use existing	Can use existing
3	AT328A	Can use existing	Can use existing	Can use existing
4	AT328B	Can use existing	Can use existing	Can use existing
5	AT511	**To be supplied**	**To be supplied**	**To be supplied**
6	AT507	Can use existing	Can use existing	Can use existing
7	AT508	Can use existing	Can use existing	Can use existing

2.6. For the analysers AT 327, AT 328A, AT 328B, AT 507 & AT 508 existing PSHS & SSHS can be used. Existing tapping from process line, existing tubing from tapping to Primary SHS, and Primary SHS to Secondary SHS will be retained and reused. The existing tubing used is 6 mm, SS316. The suitability of the existing tapping, sample handling system and tubing to be confirmed by the bidder, if alteration is required, the same to be indicated and quoted by the bidder.

2.7. For the analysers AT 306 & AT 511 for which both PSHS and SSHS is to be supplied by the bidder and the tubing's from the sample point to the PSHS, from PSHS to SSHS and from SSHS to Analyser is under the scope of vendor.

2.8. The existing PSHS and SSHS drawings including the analyser room general arrangement and tubing philosophies are attached as Annexure VII

2.9. Primary sample handling system shall have provision for taking the lab sample and Secondary sampling system shall include provision for connection of calibration standards.

2.10. ANALYSER REQUIREMENTS

2.10.1. The analysers has to be selected considering following criteria's as a minimum to ensure that they work efficiently and achieve designated operational and maintenance requirements.

- High reliability
- Simple design
- Proper MOC.
- Fast and accurate response
- Thermal Conductivity/ NDIR Cell suitable for the process environment
- Easy maintenance.

2.10.2. Analyser and its related equipment's directly connected to the process line shall be capable of withstanding line pressure and temperature conditions specified in the data sheets.

2.10.3. 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 filters, pressure regulators, flow indicator, detector, electronic modules etc.

2.10.4. All Analysers shall be supplied as pre-calibrated from bidder's works.

2.10.5. Analyzer shall have an integral built in LCD/LED display unit, read out in engineering units and shall be configurable at site from front panel.

2.10.6. All cable glands required for main incoming power supply, power distribution, signals, warning panel, safety equipment items, items required to be kept "power on", shall be certified flameproof (Exd). Increased safety equipment (EXe) and/or Purged (EXp) type shall not be acceptable.

2.10.7. Analyser shall be microprocessor based and shall be capable of being configured by Keyboard even during operation and it should be suitable for the hazardous area classification. In case external configurator is required, same shall be supplied by bidder. All suitable additional hardwares/configuration tools, associated cables, necessary configuration software's, other associated accessories, converters etc. as required shall also be supplied.

2.10.8. 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 off condition. In case bidder's standard product stores configuration data in battery backed RAM,

analyser shall have facility to provide battery drain alarm as diagnostic maintenance message.

2.10.9. Analyser shall run diagnostic sub-routines on continuous basis and shall be able to provide diagnostic alarms related to analyser detector and electronics as and when any failure /malfunctioning are detected.

2.10.10. All the individual electrical/ electronic components of the offered analyser system, sample handling system components, pump (if required) etc. shall be flameproof EExd type suitable for area classification of IEC Zone 2, Gas group IIC, T3.

2.10.11. The bidder shall be responsible for obtaining any statutory approvals/certification, as applicable for all instrument/ equipment's/ items and its associated accessories.

2.10.12. Equipment/instrument/systems located in electrically hazardous areas shall be certified for use by statutory authorities like PESO/CCOE for their use in the area of their installation.

2.10.13. Bidder shall supply all the interconnecting cables, cable glands, tubes/ tube fittings etc. to achieve proper functioning of analysers.

2.10.14. Tube fittings shall be SS 316 or better.

2.10.15. All the cables shall be properly terminated in junction / terminal boxes. Flying leads are not acceptable. Separate junction / terminal boxes shall be provided for power and signal cables. Unused cable entry holes shall be plugged using SS316 plug.

2.10.16. All electrical components like junction boxes, etc. shall be flameproof EExd+ weatherproof to IP65 suitable for specified hazardous area classification. Junction boxes shall be of die cast aluminum alloy (LM-6) body and shall have terminals suitable for accepting minimum 2.5sq mm copper conductor for signal, alarm and control cables. 20% spare terminals shall be supplied in each junction box. The power switch shall be certified flame proof (EExd) suitable for specified hazardous area classification. All interconnecting cables shall be PVC insulated armored with flame retardant and low smoke, PVC inner & outer sheath.

2.10.17. The primary sample handling system and secondary sample handling system (for each analyser room) shall be supplied pre-tubed and with proper tagging. All the individual equipments in the SHS shall be tagged separately. Site activities shall be kept as minimum. The Analyser and Sample handling system components (which are mounted inside the Analyser panel) shall be in separate section of the panel, so that the

hazardous area protection of the Analyser is not altered when the Sample handling system components are being attended/ maintained.

2.10.18. Bidder shall furnish bill of material for analysers during bid submission. Bidder shall be fully responsible for providing all necessary items / accessories to meet the functional and operational requirements as specified in this TPS. Any additional hardware or software found necessary at a later date to meet TPS requirements shall be supplied by the bidder without any time and price implications.

2.10.19. Vendor shall review the feasibility of using separate measuring paths/routes with separate inlets within the single analyser for process streams mentioned later in Annexure-II without affecting any of the system performance parameters, and shall submit their technical bids accordingly. Analysers capable of measuring multiple parameters without degradation of performance of any of the parameters will be technically acceptable.

2.10.20. AT 507 & AT 508 sample is being taken from three locations in the Synthesis Section (Steam 1, 2, and 3). The stream details and its composition are elaborated in Annexure-I and II. The sample switching SOVs (Exd type) have already been supplied and installed in the SSHS of Phase-1 Analysers in Room-2 and can change the sample source as and when required by the process as the PSHS of all the streams are continuously online. Sample switching SOV is actuated from the DCS.

2.10.21. The process composition details of individual analysers are attached as separate data sheet in Annexure - II.

2.11. SAMPLE HANDLING SYSTEM [SHS].

2.11.1. The Analysers AT 306 & AT 511 should be supplied with necessary sample handling system. The SHS has to be designed depending on the process conditions and requirement of the Analyser selected.

2.11.2. The sample handling systems shall contain two parts:

- **Primary Sample Handling System [PSHS]:** Installed in the field immediately after the process sample tapping point (1/2 inch NPTM) for preconditioning the sample before transportation to the respective secondary sample handling system in the respective analyzer rooms.
- **Secondary Sample Handling System [SSHS]:** Installed in the respective analyzer rooms based on the process and analyzer requirements for final conditioning of the sample before admitting it to respective analyzers.

2.11.3. The sample handling system shall consist of necessary components including sample filters, pressure reducers, safety relief valves, flow regulators, flow meters, pressure gauges, isolation valves, temperature gauges etc. as required to prepare the sample for proper analysis.

2.11.4. The bidder shall be responsible to design and size the entire sample handling system in line with sample schematic, process specification and standard specification attached with this TPS. Filter shall be designed suitably by the bidder, so as to avoid blocking of filter due to presence of moisture in the sample (as applicable). For specific requirement of sampling systems refer individual data sheet of each analyser (Annexure-II).

2.11.5. The sample handling system (primary and secondary) shall be offered with all necessary equipment and accessories to condition and regulate the sample to supply the analyzer with a continuously representative and measurable clean sample. The sample handling system shall be designed to move the sample from the process tapping point to the analyzer properly in the shortest possible time. There shall be a provision for taking lab samples for analysis by FACT from the PSHS.

2.11.6. Applicable primary sample handling system shall be housed on an independent self standing SS304 plate, 3MM thickness (minimum) with steel canopy for protection against effects of weather.

2.11.7. The secondary sample handling system shall be engineered, designed, fabricated and furnished completely assembled as a separate package. The Secondary SHS shall be self-standing enclosure/ panel type with components assembled on SS304 plate, 3mm thickness (minimum) mounted inside the panel/ enclosure. The enclosure/ panel requirements has been detailed in subsequent sections of this document.

2.11.8. Each sample handling system components shall have provision for removal without disassembling the entire system. If separate sampling system is furnished, it shall be designed for easy integration with the analyser.

2.11.9. The MOC of sample handling system components and Sample tube material shall be SS 316 / better. The tube size shall be recommended by bidder to suit process condition and to avoid possible clogging.

2.11.10. Auto Drains/ vents shall be provided in sample handling system for removal of liquids / gas from the sample loop. Flame arrester is to be provided at the vent/drain and Analyser inlet/outlet.

2.11.11. Sample handling system shall consist of one or more of the following components as required by the service conditions: Gas conditioner, filters (coarse and fine), Condensate monitor with alarm, solenoid valve, flame arrestors, guard filters, pressure regulators, relief valves, flow indicators with switch, flow controllers, temperature indicators, scrubbers, heaters, sample coolers, dryers, sample pumps, aspirators, Mist catcher, Auto liquid drain etc. any additional equipment required shall be included by the bidder.

Bidder shall submit separate schematic sketch, layout diagram and Bill of Material for the offered primary & secondary sample handling system.

2.11.12. Special filters shall be provided as required to minimize the interference of background components, which are of least interest in the process stream.

2.11.13. The sampling system shall be designed to ensure no deterioration or condensation of sample takes place in sample line.

2.11.14. For analysers viz AT327, AT328A, AT328B, AT507 and AT508, existing sample handling system (both PSHS & SSHS) can be utilized. Necessary provision for accommodating the current requirements, components, flow indicating rotameters and output connections were already provided during the first phase of procurement.

2.11.15. For analyser AT306 - Complete SHS to be supplied (Analyser Room1/AR1) and for analyser AT511 - Complete SHS to be supplied (Analyser Room2/AR2).

2.11.16. The GA/IA drawings of SSHS & PSHS shall be submitted by bidder along with offer for FACT review.

2.11.17. SOVs (wherever applicable) shall be suitable for operating on 110 V AC power supply. Solenoid valves, wherever used, shall be Explosion Proof type EExd suitable for specified area classification.

2.11.18. All tubes and fittings shall be Parker / Swagelok / Sandvik make, all MCBs shall be MDS / Siemens / Legrand / Schnider make, the bulk power supplies shall be Phoenix / ASHE / Siemens / Wiedmuller make, all the terminal connectors shall be Phoenix / Wiedmuller / Wago make, all SOVs shall be ASCO / Rotex / Shavo Norgen make, all manual valves shall be Parker / Swagelok / Baldota make and all the cylinder regulators shall be INOX / Alchemie / BOC / Air Products / Praxair makes.

2.12. CALIBRATION

2.12.1. Analyser offered shall have calibration/ validation facility. Bidder shall provide all the necessary arrangements for the same.

2.12.2. All equipment necessary for the field calibration / validation including valves, pipe fittings, SS tubes, cylinders with regulators (if required) etc shall be provided by the Bidder.

2.12.3. Reference / Calibration kits and Consumables: Bidder shall provide the Reference / Calibration kits and Consumables (as applicable) for the offered analysers as per Standard Specification for Process Stream Analysers. Price for the same shall be included by the bidder in the respective item price. Bidder shall supply all consumables required during start-up, commissioning and normal operation for analyser. List of consumables considered by bidder for analyser shall be furnished in the offer. Any additional

consumables required over and above the list furnished by bidder for the specified period shall be supplied by bidder without any price implications.

2.12.4. The calibration gas supply/refilling of supplied cylinders shall be included in the CAMC/Warranty period as and when required by the user. For each analyser, following sets of cylinders to be maintained. The empty calibration cylinders/kit shall be send to bidders facility for refilling on freight paid basis by the purchaser (FACT) and shall be returned after refilling on freight paid basis by the supplier / bidder.

Span : 2 sets (1 online + 1 standby), CS Cylinder, Capacity : 10ltrs @120kg/cm2.

Zero : 2 sets (1 online + 1 standby), CS Cylinder, Capacity : 10ltrs @120kg/cm2.

2.12.5. If consumables are not required for envisaging the calibration facility, bidder to provide standard calibration arrangements like kits/blocks/cuvettes etc .

2.12.6. Except calibration gas cylinders, the calibration kits/blocks/cuvettes etc supplied by the bidder shall have a minimum validation of 5 years. The bidder has to make necessary arrangements to validate the supplied reference standards within the CAMC/warrantee period as and when requested by the purchaser. The transport, insurance and handling charges of the same to be borne by the bidder.

2.13. PANEL/CABINET

2.13.1. The offered analysers shall be arranged in separate / group with self-supported free standing enclosed panel / cabinets and shall be installed in existing analyser rooms. The panel shall have provision to anchor to the floor of the analyser room.

2.13.2. The cabinet for analysers shall be of "RITTAL/ Hoffman" make , suitable for the supplied analyzer/ sampling system and shall be provided with louvers and shall be fitted with high cooling capacity Mechanical Vortex coolers (EExd/ATEX) heat dissipations as applicable/ panel conditioning.

2.13.3. The cabinets shall be provided with front & back doors (depending on the analyser type, size and condition), with concealed hinges, lock and flush/lever type handles. The doors shall preferably removable type, which can be opened / closed for easy access to the Analyser system. Analysers can be fixed in telescopic channels so that they can be pulled out / pushed in for easy access for inspection.

2.13.4. Cabinet shall have toughened safety glass, transparent doors (4 mm thick) to look through to see the status without opening the door. The panel shall be of dust and weather proof design.

2.13.5. However, Bidder as per their experience/ considering the aesthetic of the analyser room may offer own make or proven panel of equal grade to Rittal/ Hoffman/ superior specifications for the above indicated items and in such case; bidder must clearly

indicate same and FACT approval shall be obtained druing engineering.

2.13.6. Cabinets and panels for analyser shall be made from CRCA steel of sheet thickness 1.6 mm or more welded to a frame. Doors shall be CRCA steel of sheet thickness 2 mm or more. Each unitized section shall be provided with a separate pair of removable lifting eye-bolts. Panel height shall be of 1800 mm with suitable width.

2.13.7. If the width of analyzer cabinets are more than 800mm double doors for front and back shall be provided for easy access. Also the panel shall be arranged in such a way that there shall be mechanical separation between SSHS and Analyser unit.

2.13.8. All components of the panel shall be of EExd type suitable for the area classification. The Panel shall be mounted on base frame with vibration pad supplied by the Bidder. Cabinet shall be suitable for side and top cable entry of Cables & Tubing's.

2.13.9. The Analyser enclosure for the Exd Analyser should be provided with high capacity coolers certified for use in Zone 2 and the required cooling capacity in BTU/hr shall be calculated in such a way that the temperature inside the enclosure is below 25°C at all times.

3. PERIOD OF COMPLETION.

3.1. All the material shall be delivered at site of FACT-UC. Copies of the Bill of Material shall be shipped along with the material. Delivery of part material will not be entertained. Necessary precautions shall be taken for adequate protection of the equipment's during transit. In general the packing shall be shipment worthy, eco-friendly packing and labelled, indicating clearly the description of the item, hazardous nature if any, precaution and care to be taken.

3.2. The expected delivery period for the supply of all analyser system including sampling system and accessories as per this TPS shall be 12 weeks from date of manufacturing clearance. Bidder to offer best possible delivery time.

3.3. Commissioning of the supplied analyser system shall be completed within 30 days after supply / clearance from purchaser.

4. SCOPE OF SUPPLY AND WORK.

The scope of supply and work shall be as follows.

4.1. PURCHASER'S SCOPE.

4.1.1. Transportation & Handling of complete equipment at site, Installation, loop checking etc as required.

4.1.2. Wiring connection of Analyser's 4-20mA measured output to DCS for monitoring from the panel/junction box provided in the Analyser cabinet.

4.1.3. Arranging all utilities such as Instrument air, Cooling Water & Power supply as follows.

A) INSTRUMENT AIR: Minimum Pressure 4.5 Kg/cm2g, Normal Pressure 5.5 Kg/cm2g, Maximum Pressure 6.0 Kg/cm2g. Instrument air will be provided by Purchaser at one point near respective Analyser cabinet. Further distribution of air, using necessary items and associated accessories like installation materials, piping, tubing, isolation valves and fittings etc., shall be in bidder's scope. Instrument air end connections as provided by Purchaser shall be 1/2" NPT M.

B) POWER SUPPLY: Purchaser shall provide power supply feeder at one point near each analyser cabinet (110 V AC ± 10%, 50 Hz ± 5% UPS) for analysers. Further distribution to analyser and its accessories and derivation to the required power levels is in bidder's scope. Bidder shall provide power distribution junction box and all wiring within each analyser cabinet. Purchaser's feeder shall be terminated in the power distribution box supplied by the bidder. The power distribution box shall be explosion proof to the specified hazardous area classification.

C) COOLING WATER : Cooling water at the sample handling systems, if required by the analyser shall be provided at any one point near the process tapping. The water will be made available at 3 kg/cm^2 . The end connections shall be 1/2" NPT M.

4.1.4. Bidder to indicate the exact utility requirements for each of the offered analysers along with the offer.

4.2. BIDDER'S SCOPE

4.2.1 SCOPE OF SUPPLY

4.2.2.1. Design, manufacture, inspection, testing, supply of the process analyser system for measurement of below mentioned gases as per this TPS and data sheets in Annexure IIIA and IIIB. The same shall include but not limited to Primary sample handling system & Secondary sample handling system as per the requirement [For AT 306 & AT 511 only], Analysers for measuring all parameters, Cabinet/Panel for Analyser and SHS,

Calibration arrangements and other accessories as per this TPS

- AT306 (H2) with its sample handling systems & calibration arrangements in Analyser Room 1.
- AT327 (CH4), AT328A (CO), AT328B (CO2), AT507 (NH3) & AT508 (CH4) using existing sample handling system & supply calibration arrangements in Analyser Room 2.
- AT511 (NH3) with its sample handling systems & calibration arrangements in Analyser Room 2.

4.2.2.2. Supply of all documents such as Bill-of-Material (BOM) [hardware and software] with quantity, make, model and detailed specification of all components and sub-assemblies, the Internal General Arrangement (IGA) & Outer General Assembly (OGA), system configuration, specification & hook up schematic drawings and wiring & interconnection drawings required for the quoted system along with the offer.

4.2.2.3. The power supply will be made available at one point by FACT and further distribution to individual components via MCB shall be done by Bidder. Interposing explosion proof JB shall be supplied by the Bidder including supply of cable glands. Bidder shall submit necessary power consumption calculation along with the Technical Bid. Power supply consumption of the system shall be indicated for each component used in the system. For load calculation, maximum current drawn by the analyzer should be considered.

4.2.2 SCOPE OF WORK.

4.2.2.1. Design, Engineering, Integration, Factory Acceptance Test (FAT), Transportation, Delivery at FACT Site of the supplied process analyzers as per this TPS.

4.2.2.2. Supervision of Installation, Field-testing, loop checking and calibration of the complete system, Site Acceptance Test (SAT), Commissioning of the supplied process analyzers as per this TPS and specification/data sheets in Annexure IIIA and IIIB. Bidder to submit the detailed Time Schedule for the Engineering, Supply, Execution and Commissioning of the project in 'Excel Bar' format in weeks and shall essentially cover the following milestones:

4.2.2.3. Accommodation and travel of Bidder's personnel deputed to the site for all purposes in connection with this work including warranty period shall be under Bidder's scope.

4.2.2.4. Special tools, calibration equipment if any required during installation & commissioning,

4.2.2.5. Comprehensive Annual Maintenance Contact for the offered analyser system.

5. INSPECTION & TESTING.

5.1. The Bidder will be responsible for the examination, inspection and testing of all components of the analysers in accordance with the specification and enquiry.

5.2. Exemption of inspection or testing due to any reasons or receipt by purchaser of any equipment at site shall in no way absolve the bidder of the responsibility of delivering the equipment meeting all requirements as per the P.O ensuring satisfactory performance.

5.3 FACTORY ACCEPTANCE TEST (FAT).

5.3.1. The offered Analyzer with sample handling and calibration system shall be tested at the OEM's Indian facility for the Factory Acceptance Tests (FAT). The FAT will be witnessed by FACT Inspector(s)/ third party inspection agent prior to dispatch.

5.3.2. The QA plan and inspection test plan shall be developed by the bidder and shall be forwarded to the purchaser for approval. The detailed procedure for FAT shall be submitted by the Bidder to FACT at least one month before the FAT.

5.3.3. Bidder shall be fully responsible for demonstrating the functionality of the offered system.

5.3.4. Bidder shall provide necessary facilities, utilities, competent manpower and consumables required for carrying out the inspection and FAT at the bidder's works.

5.3.5. Following tests/ checks shall be carried out on each analyzer as a minimum:

- Physical dimensional verification and workmanship.
- Bill of material check for each analyzer system including sample handling system.
- Leakage testing of the complete system using nitrogen or instrument air.
- Calibration and Repeatability check.
- Functionality of the system in total.

5.3.6. All internal test reports shall be submitted to FACT at least 2 weeks prior to FAT.

5.3.7. All equipment's, tools, tackles, etc. required for the tests shall be arranged by the Bidder.

5.3.8. All transportation, boarding, lodging, etc. for the FAT Inspectors / 3rd party inspection agent shall be borne by FACT

5.3.9. Clearance for dispatch will be released only on approval of Factory Acceptance Test reports duly certified by FACT Inspectors/3rd party inspection agent.

5.4 SITE ACCEPTANCE TEST(SAT).

5.4.1 The Site Acceptance Test (SAT) shall be conducted at site after commissioning of the System to establish System performance, as detailed in the Specification.

5.4.2 The purchaser will take over the system from the supplier after the SAT, which shall include successful uninterrupted operation of the integrated system for two weeks after commissioning of the system. However, the total care and maintenance of the Analyzer Systems till SAT completion shall be in the Bidder's Scope.

5.4.3 Any malfunction of the system component during SAT shall be replaced / repaired as required.

5.4.4 Once the system failure is detected the SAT shall start from the beginning.

5.4.5 The Warrantee period shall start after SAT.

6. TRAINING

6.1. The Bidder shall provide satisfactory training to maximum 15 maintenance personnel of FACT at site. The onsite training facilities will be provided by FACT free of cost.

6.2. Bidder shall provide sufficient hard copies and two soft copies in CD/DVD of training manuals with appropriate details for each analyser.

6.3. The Training shall be arranged for each type of Analyser supplied.

7. PAYMENT & PERFORMANCE GUARANTEE.

7.1. Supply: 70% of the supply value as per agreed billing schedule will be paid within 30 days after receipt and acceptance of the supplies at site. Balance shall be paid on satisfactory completion of installation & commissioning of the system, issue of take over certificate against submission of Performance Bank Guarantee (PBG) for an amount equivalent to 10% of the total order value, valid till the end of the guarantee period plus a claim period of 6 months thereafter.

7.2. Supervision of Installation & Commissioning: 100% of the payment for the works done shall be paid with in 15days from successful commissioning and takeover of the system after SAT against invoice, commissioning report (tag wise) and submission of performance bank guarantee as above.

8. WARRANTY.

8.1. The Bidder shall provide warranty for 12 months from the date of acceptance.

8.2. Bidder shall be fully responsible for proper design, manufacture, selection, assembly of complete analysers including all accessories. The warranty shall also cover all bought-out items supplied by the Bidder for this project.

8.3. Bidder shall have full defect liability during the warranty period. It shall be obligatory on the part of Bidder to modify and/or replace any part free of cost, in case any malfunction is revealed during the warranty period.

8.4. Bidder shall provide total maintenance, including preventive maintenance stipulated in the AMC clause of the analysers and supplied accessories during warranty period including replacement of equipment / component at no extra cost. There shall be regular visit by the bidder for the checking of the installed analyser with calibration system for ensuring the performance. The calibration system shall be made available during the warranty period by the bidder.

9. DOCUMENTATION

9.1. Bidder shall submit detailed literature/Catalogue carrying all technical details, specification & ordering information of offered model along with the technical bid.

9.2. All documents and drawings submitted shall be legible in readable format (in English language) and shall be as per the good engineering practices. All dimensions shall be in mm.

9.3. Following documents shall be furnished along with the Technical Bid.

- BOQ [hardware and software] with make, model and detailed specification of all components and sub-assemblies.
- Schematic sketch of sample handling system (Primary & Secondary), General Assembly (Internal & Outer) of the analyser panel or cabinet, specification of analyser and hook up schematic drawings.
- Electrical Wiring and Interconnection drawings.
- As-Built drawings 3 sets of documents (both hard & soft copies in CD/DVD/Flash) of detail manuals shall be supplied along with supply of the analyser system.
- Installation, Operational (including calibration details) & Maintenance manual (including circuit diagram of electronic boards, trouble shooting guidelines etc.).
- Original test certificates & guarantee certificate along with two copy sets.

- Three sets of training manual.
- Original certification of calibration gas composition and CCOE certificate for the supplied gas cylinders.
- PESO/CCOE certificate for the supplied analyser specifying make and model.

9.4. Invoices furnished also shall have item cross reference with customers PO serial number and PO item code.

10. SUPERVISION OF INSTALLATION; COMMISSIONING.

10.1. Vendor's scope shall include Supervision of Installation of Analyser panel/cabinet housing analyser, Installation of Probe/sensor at sampling point, Installation of SHS both Primary and Secondary along with its interconnection tubing's, Providing power and signal connections, removal of existing system as required.

10.2. Assistance for Loop checking, Testing and Commissioning of the complete system.

10.3. Calibration of the system, verification of the analysis data and its correctness with laboratory analysis.

10.4. Any special tools/accessories required have to be brought by the vendor.

10.5. Vendor's personnel engaged for site work shall compulsorily be having ESI registration/ Insurance. Also vendor has to comply with FACT's standard rules and practices applicable for contract works.

11. COMPREHENSIVE ANNUAL MAINTENANCE CONTRACT (CAMC).

11.1. Bidder shall provide Eight years CAMC or Eight years extended warrantee as applicable for all analysers supplied including sample handling system components, calibration gas cylinder accessories, and all the components included in the supply. The CAMC or the extended warrantee shall start after the completion of one year performance guarantee. All clauses pertaining to CAMC shall be applicable during extended warrantee.

11.2. Capability of providing after sales service by the Bidder shall be important criteria for bid evaluation. The calibration gases shall be arranged by the bidder as required for the service in warranty and CAMC/Extended Warranty periods.

11.3. The scope of work shall be performed by trained analyzer specialists, focusing on the maintenance, operations, and performance improvement of analyzers. The bidder shall ensure the calibration and proper functioning of analyzers, sample handling systems, and other associated systems. The service personals deputed shall be having minimum qualification and experience in maintenance/service of the offered analyser system. Documentary proof for the same to be provided if requested by the purchaser.

11.4. Attending failure immediately by repair or replacement of the failed component.

11.5. Provide system maintenance and repair of system or workmanship defects during the contract period free of charge (parts and labour). Any third party equipment supplied along with the system namely under this project shall be part of the CAMC and shall be maintained by the Bidder.

11.6. CAMC / extended warrantee shall be inclusive of spares & consumables. All tools, test instruments and tackles required to maintain the analyzers shall be in contractor's scope.

11.7. Service or maintenance personnel shall be able to receive 24/7 help-desk technical support provided by the system manufacturer.

11.8. In the event of any malfunction of the analysers, experienced service engineer shall be made available at site within 48 hours on the receipt of such information from FACT.

11.9. Bidder shall carry out the job/ activity after obtaining the proper permit from the user/ operation department. Service Engineers will follow the safety rules, statutory rules and regulations, labor laws etc. of FACT.

11.10. Calibration shall be witnessed by M/S FACT officer in-charge for the purpose of establishing credibility and authenticity.

11.11. For any modification in the analyzer system the same shall be detailed and carried out after approval from M/s FACT for which necessary assistance shall be provided by M/s FACT.

11.12. Bidder to submit the report of the status of the analyser on completion of each visit.

11.13. Firmware / Software up-gradation shall be done for analysers & controllers during AMC period without additional cost.

11.14. The cylinders shall be supplied for one year consumption under main supply. Refilling of cylinders during CAMC/warrantee period shall be under Bidder's scope. All tubings and fittings for the purpose of calibration shall be checked for leakages during the CAMC visit.

11.15. Removing the analyzer from the cabinet/ process. Cleaning the sample cell thoroughly as per the instruction given in manual for removing any dust or contamination occurred.

11.16. Cleaning the filter and other reference /measuring filters. Cleaning the capillaries if any.Check the healthiness of the source and detector and rectify/replace the same if required.

11.17. Check for the heater and temperature sensor for its healthiness and rectify/replace the same if required.

11.18. Clean and Check the main board if applicable for its healthiness and rectify/replace the same if required. Check the signal output card.

11.19. Check the system tubing's for any leakage/ choking of sample inside the analyzer and replaces the tubing's if required. All jobs required for Cleaning of measuring cell & measuring cell windows shall be done as per the recommendations of the manufacturer's maintenance manual and direction of engineer-in-charge. Check enclosure purge air pressure as recommended in respective analyzer manual.

11.20. Replacement of Source lamps for any unstable lamp voltage or any unstable analyzer output under zero gas condition. Replacement to be done strictly as per manufacturer's manual/as per need. Checking of Detector for its healthiness and replacing/adjusting the same for better response. Checking 4-20 mA output of the analyzer and cross-check the same with respect to the reading.

11.21. Check the calibration of analyzer (zero + span) as per the instruction in manual and generate calibration report as per the formats of FACT. Record the reading of analyzer before calibration and ensure that there is no alarm in the analyzer w.r.t to sample flow, detector/cell temperature, pressure or any other fault/alarm which can affect the operation of analyzer. Rectify the fault if observed in the analyzer or its sampling system.

11.22. Record all the findings and the action taken in relevant register and the same should be certified by the FACT engineer in the register itself.

11.23. Check the Analyzer for any moisture carry over wherever applicable.

11.24. The CAMC payment shall be done on a half yearly basis and only after successful completion of the scheduled preventive maintenance. The payment invoice shall be sent via mail/post along with the respective preventive maintenance signed MOM for release of payment.

11.25. If any items require repairing/servicing outside the company premises, bidder shall make necessary arrangements as per FACT standard procedure.

11.26. PREVENTIVE MAINTENANCE

11.26.1. Two Preventive maintenance visits shall be provided by the Bidder on halfyearly basis every year during the period of CAMC/extended warrantee.This involves complete periodic overhaul of the analysers, inspection of the sample handling (primary + Secondary) , cleaning/replacement of filters as per schedule, environmental operating condition checks, calibration checks and detailed reporting.

11.26.2. Periodic servicing and calibration of analyzer, panel, sample handling (Primary + Secondary) and all the integral components.

11.26.3. Checking of gas cylinder pressure, remove empty cylinder and Connect new cylinder, if required, checking the regulator performance, etc.

11.27. BREAKDOWN MAINTENACE

11.27.1. In the event of any malfunction/breakdown of the analysers during this period, service Engineer must report at site within 48 hours of report of failure (including Saturday/Sunday/holiday), with necessary spares. The system shall be brought back into service within maximum 24 hours after reporting at site.

11.27.2. Troubleshooting of all instrument failures, In case the problem cannot be identified by the site engineer then analyzer specialist to be organized as early as possible. If problem cannot be solved by specialist and need OEM support in those circumstances methods of action will be mutually agreed and discussed.

11.27.3. FACT will provide single point power supply of 230/110V AC, any breakdown after that point including analyzer system shall be rectified by the Bidder.

11.27.4. There shall not be any limit on number of visits on breakdown/ emergency call.

11.28. Travel, Accommodation and other charges etc of the site engineer during the CAMC / breakdown maintenance visit shall be in the scope of the bidder.

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ANNEXURE I - LIST OF ANALYSERS

Table 1: Analysers already procured in Phase - 1

No	Tag No	Tag Description	Gas that is Analysed	Analysis Method	Measuring Range	Analyser Room
1	AT202	Secondary Reformer Outlet	Methane	NDIR	0-1%	Room 1
2	AT205	HT Converter Outlet	Carbon Monoxide	NDIR	0-5%	Room 1
3	AT206	LT Shift Converter Outlet	Carbon Monoxide	NDIR	0-1%	Room 1
4	AT316	Absorber Outlet	Carbon Dioxide	NDIR	0-0.5%	Room 1
5	AT326	Methanator Outlet	Hydrogen	TCD	60-80%	Room 2
6	AT506	a) Synthesis gas from Ist Cold Exchanger. (Stream-I)	Hydrogen	TCD	50-80%	Room 2
		b) Synthesis gas from Synthesis Gas Compressor. (Stream-II)				
		c) Sample from Purge gas (Stream-III)				

Table 2: Analysers to be procured in Phase - 2

No	Tag No	Tag Description	Gas to be Analysed	Analysis Method*	Measuring Range	Analyser Room
1	AT306	Carbon Dioxide Washing Tower Outlet	Hydrogen	TCD	0-1%	Room 1
2	AT327	Methanator Outlet	Methane	NDIR	0-2%	Room 2
3	AT328A	Methanator Outlet	Carbon Monoxide	NDIR	0-50ppm	Room 2
4	AT328B	Methanator Outlet	Carbon Dioxide	NDIR	0-50ppm	Room 2
5	AT511	Purge Gas Absorber Off Gas Outlet	Ammonia	NDIR	0-5000ppm	Room 2
6	AT507	a) Synthesis gas from Ist Cold Exchanger. (Stream-I)	Ammonia	NDIR	0-20%	Room 2
		b) Synthesis gas from Synthesis Gas Compressor. (Stream-II)				
		c) Sample from Purge gas(Stream-III)				
7	AT508	a) Synthesis gas from Ist Cold Exchanger. (Stream-I)	Methane	NDIR	0-10%	Room 2
		b) Synthesis gas from Synthesis Gas Compressor. (Stream-II)				
		c) Sample from Purge gas(Stream-III)				

ANNEXURE II - PROCESS GAS COMPOSITION

TAG NO	AT306	AT327	AT328A	AT328B	AT-507			AT-508			AT511
ANALYSER RANGE	0 - 1 %	0 - 2 %	0 - 50 ppm	0 - 50 ppm	0-10 %	0-20 %	0-10 %	0 - 10 %	0 - 10 %	0 - 10 %	0 - 0.5 %
PARAMETER	H2 in CO2	CH4	CO	CO2	NH3	NH3	NH3	CH4	CH4	CH4	NH3
SERVICE	CO2 to Caprolactam Plant	Synthesis Gas to K431	Synthesis Gas to K431	Synthesis Gas to K431	Stream 1	Stream 2	Stream 3	Stream 1	Stream 2	Stream 3	Off Gas from F55
MOL WT											
VISCOSITY					-	-	-	-	-	-	
PR. (kg/cm2) NOR/MAX	1.0/3.0	27.3/31	27.3/31	27.3/31	132/158	135.4/158	134/158	132/158	135.4/158	134/158	81/90
TEMP (°C) NOR/MAX	40/70	38/100	38/100	38/100	32/70	60/140	10.7/50	32/70	60/140	10.7/50	28/60
COMPOSITION	VOLUME %	VOLUME %	VOLUME %	VOLUME %	VOLUME %	VOLUME %	VOLUME %	VOLUME %	VOLUME %	VOLUME %	VOLUME %
H_2	0.17	73.29	73.29	73.29	65.93	55.43	62.23	65.93	55.43	62.23	66.89
N_2	0.02	25.71	25.71	25.71	21.98	18.47	20.74	21.98	18.47	20.74	22.28
AR	---	0.31	0.31	0.31	2.84	3.19	3.58	2.84	3.19	3.58	3.85
CH_4	---	0.69	0.69	0.69	5.16	5.81	6.49	5.16	5.81	6.49	6.97
NH_3	---	---	---	---	4.09	17.1	6.96	4.09	17.1	6.96	0.01
O_2	---	---	---	---	---	---	---	---	---	---	---
CO_2	99.81	---	---	---	---	---	---	---	---	---	---
H_2O	---	---	---	---	---	---	---	---	---	---	---
CO	---	---	---	---	---	---					

ANNEXURE III A - COMMON SPECIFICATION FOR PROCESS GAS ANALYSERS

S No	SPECIFICATION	DESCRIPTION
1.00	**GENERAL**	
1.01	Item	Microprocessor/ Micro Controller Based Continuous Measurement Process Gas Analyzer.
1.02	Sample Handling System (Primary SHS & Secondary SHS).	Required as per TPS.
2.00	PROCESS	
2.01	Gas Composition	Refer Stream Data.
2.02	Area Classification	Zone 2 Group IIC T3
3.00	INSTRUMENT	
3.01	Accuracy (for NDIR)	+/-2% FSD or better
3.02	Accuracy (for TC)	+/-2% FSD or better
3.03	Repeatability	+/- 1% FSD or better
3.04	Zero/ Span Drift	+/-2% FS per week. or better
3.05	Power Supply	110 VAC, 50 Hz
3.06	Response time (for NDIR)	< 10 sec for 90% of FSD or better.
3.07	Response time (for TCD)	< 30 sec for 90% of FSD or better.
3.08	Enclosure type	IP65 , EExd, PESO/ CCOE certified
3.09	Output Analog Signal	Isolated 4 to 20 mA DC linear
3.10	Maximum load	500 ohm
3.11	Digital Output	Two Nos. potential free configuration
3.12	Display	LCD with back light
3.13	Display Decimal	1 digits (min.)
3.14	Programming	Through front keypad.
3.15	Calibration	Required Zero & Span, Manual Through Front Keypad
3.16	Self diagnostic feature	Required, Software required for diagnostics / troubleshooting through configurator/ workstation shall be supplied.
3.17	Sample Gas inlet / outlet connection	¼ inch NPT.
3.18	Wetted Part	Suitable for Service
3.19	Cell Block (for TCD)	SS304/ SS 1.4571/ SS 1.4305/ better
3.20	Mounting Type	Panel mount/ Wall mount
3.21	Housing	Die Cast Aluminium/ SS/VTA
3.22	Mounting Brackets & Supports	SS304 Required

ANNEXURE III B – TAG SEPCIFIC DETAIL FOR PROCESS GAS ANALYSERS

S No	SPECIFICATION	DESCRIPTION
1.00	**Tag No**	**AT306**
1.01	Tag Description	CO2 to Caprolactam Plant
1.02	Analyser Room	AR 1
1.03	Gas to be Analysed	H2
1.04	Analysis Method	TCD
1.05	Measuring Range	0 - 1 % H2 in CO2
2.00	**Tag No**	**AT327**
2.01	Tag Description	Synthesis Gas to K431
2.02	Analyser Room	AR 2
2.03	Gas to be Analysed	Methane
2.04	Analysis Method	Non Dispersive Infrared
2.05	Measuring Range	0 - 2 % CH4
3.00	**Tag No**	**AT328A**
3.01	Tag Description	Synthesis Gas to K431
3.02	Analyser Room	AR 2
3.03	Gas to be Analysed	Carbon Monoxide
3.04	Analysis Method	Non Dispersive Infrared
3.05	Measuring Range	0 - 50 ppm CO
4.00	**Tag No**	**AT328B**
4.01	Tag Description	Synthesis Gas to K431
4.02	Analyser Room	AR 2
4.03	Gas to be Analysed	Carbon Dioxide
4.04	Analysis Method	Non Dispersive Infrared
4.05	Measuring Range	0 - 50 ppm CO2
5.00	**Tag No**	**AT511**
5.01	Tag Description	Off Gas from F551
5.02	Analyser Room	AR2
5.03	Gas to be Analysed	Ammonia
5.04	Analysis Method	Non Dispersive Infrared
5.05	Measuring Range	0 - 0.5 % NH3
6.00	**Tag No**	**AT-507**

6.01	Tag Description	a) Synthesis gas from Ist Cold Exchanger. b) Synthesis gas from Synthesis Gas Compressor. c) Sample from Purge gas.
6.02	Analyser Room	AR2
6.03	Gas to be Analysed	Ammonia
6.04	Analysis Method	Non Dispersive Infrared
6.05	Measuring Range	0-20% NH3
7.00	**Tag No**	**AT-508**
7.01	Tag Description	a) Synthesis gas from Ist Cold Exchanger. b) Synthesis gas from Synthesis Gas Compressor. c) Sample from Purge gas.
7.02	Analyser Room	AR2
7.03	Gas to be Analysed	Methane
7.04	Analysis Method	Non Dispersive Infrared
7.05	Measuring Range	0 - 10 % CH4

ANNEXURE IV - BOM PROCESS GAS ANALYSERS

SL. NO	DESCRIPTION	QUANTITY	UOM
A	**AT306 ANALYSER (CO_2 Washing tower Outlet H_2)**		
A1.1	ANALYSER AT306 WITH ACCESSORIES	1	SET
A1.2	ANALYSER CABINET FOR EExd ANALYSER WITH HIGH CAPACITY VORTEX COOLER FOR ROOM 1	1	LOT
A1.3	PRIMARY SAMPLE HANDLING SYSTEM (SELF STANDING INTEGRATED TYPE).	1	SET
A1.4	SECONDARY SAMPLE HANDLING SYSTEM (SELF STANDING INTEGRATED TYPE).	1	LOT
A1.5	ZERO GAS (NITROGEN) & SPAN GAS (HYDROGEN + Remaining Process gas) CALIBRATION CYLINDERS (IF REQUIRED)	2	SET
B	**AT327 ANALYSER (Methanator Outlet CH_4)**		
B1.1	ANALYSER AT327 WITH ACCESSORIES	1	SET
B1.2	ANALYSER CABINET FOR EExd ANALYSER WITH HIGH CAPACITY VORTEX COOLER FOR ROOM 2	1	LOT
B1.3	ZERO GAS (NITROGEN) & SPAN GAS (METHANE + Remaining Process gas) CALIBRATION CYLINDERS (IF REQUIRED)	2	SET
C	**AT328A ANALYSER (Methanator Outlet CO)**		
C1.1	ANALYSER AT328A WITH ACCESSORIES	1	SET
C1.2	ANALYSER CABINET FOR EExd ANALYSER WITH HIGH CAPACITY VORTEX COOLER FOR ROOM 2	1	LOT
C1.3	ZERO GAS (NITROGEN) & SPAN GAS (CARBON MONIXIDE + Remaining Process gas) CALIBRATION CYLINDERS (IF REQUIRED)	2	SET
D	**AT328B ANALYSER (Methanator Outlet CO_2)**		
D1.1	ANALYSER AT328B WITH ACCESSORIES	1	SET
D1.2	ANALYSER CABINET FOR EExd ANALYSER WITH HIGH CAPACITY VORTEX COOLER FOR ROOM 2	1	LOT
D1.3	ZERO GAS (NITROGEN) & SPAN GAS (CARBON DIOXIDE + Remaining Process gas) CALIBRATION CYLINDERS (IF REQUIRED)	2	SET
E	**AT511 ANALYSER (Purge Gas Absorber Off Gas Outlet NH_3)**		
E1.1	ANALYSER AT511 WITH ACCESSORIES	1	SET
E1.2	ANALYSER CABINET FOR EExd ANALYSER WITH HIGH CAPACITY VORTEX COOLER FOR ROOM 1	1	LOT
E1.3	PRIMARY SAMPLE HANDLING SYSTEM (SELF STANDING INTEGRATED TYPE).	1	SET

E1.4	SECONDARY SAMPLE HANDLING SYSTEM (SELF STANDING INTEGRATED TYPE).	1	LOT
E1.5	ZERO GAS (NITROGEN) & SPAN GAS (AMMONIA + Remaining Process gas) CALIBRATION CYLINDERS (IF REQUIRED)	2	SET
F	**AT507 ANALYSER (Stream-1: Synthesis gas from Ist Cold Exchanger Stream-2: Synthesis gas from Synthesis Gas Compressor Stream-3: Sample from Purge gas.) NH_3 Analyser**		
F1.1	ANALYSER AT507 WITH ACCESSORIES	1	SET
F1.2	ANALYSER CABINET FOR EExd ANALYSER WITH HIGH CAPACITY VORTEX COOLER FOR ROOM 2	1	LOT
F1.3	ZERO GAS (NITROGEN) & SPAN GAS (AMMONIA + Remaining Process gas) CALIBRATION CYLINDERS (IF REQUIRED)	2	SET
G	**AT508 ANALYSER (Stream-1: Synthesis gas from Ist Cold Exchanger Stream-2: Synthesis gas from Synthesis Gas Compressor Stream-3: Sample from Purge gas.) CH_4 Analyser**		
G1.1	ANALYSER AT328B WITH ACCESSORIES	1	SET
G1.2	ANALYSER CABINET FOR EExd ANALYSER WITH HIGH CAPACITY VORTEX COOLER FOR ROOM 2	1	LOT
G1.3	ZERO GAS (NITROGEN) & SPAN GAS (METHANE + Remaining Process gas) CALIBRATION CYLINDERS (IF REQUIRED)	2	SET

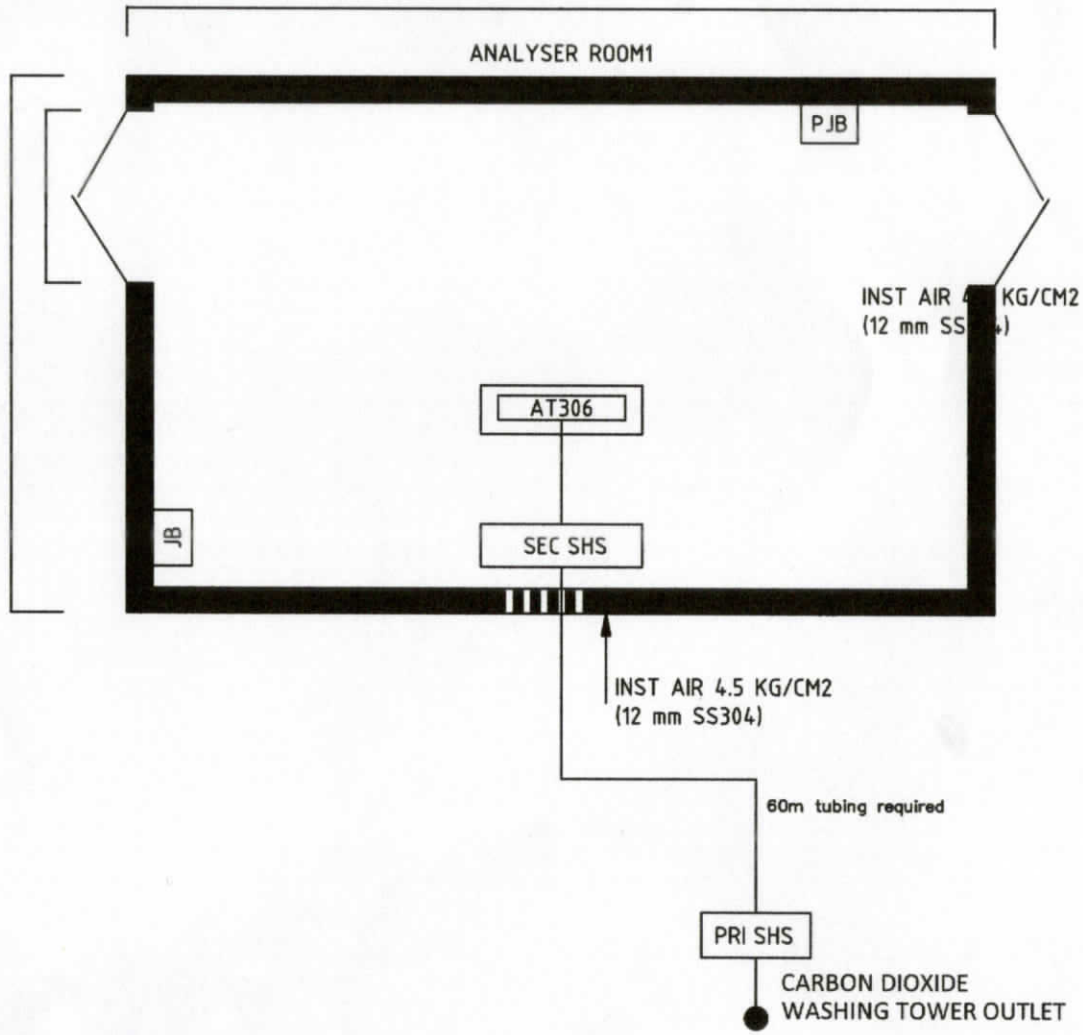
Note:-

- Single analyser Cabinets can be utilized for multiple analysers

ANNEXURE V – PROVEN TRACK RECORD

Sl.No.	Description	As offered for FACT project	System as installed at Site 1	System as installed at Site 2	System as installed at Site 3
1.0	Name of the Process plant				
2.0	Name, address, email id, mobile, phone of the contact person in the above Process plant.				
3.0	Purchase Order (PO) number and date				
4.0	Performance Certificate/ MOM/ E-mail from end user specifying analyser make, model and supplier service performance / CAMC support .				
5.0	Month & year of Analyser system supply and commissioning				
6.0	Any major breakdowns till date. If yes, cause and nature of break-down				
7.0	Analyser System details				
7.1	Make				
7.2	Model				
7.3	Parameter Measured				
8.0	Bidder's scope /responsibility				
8.1	Design & supply				
8.2	Installation				
8.3	Commissioning				
8.4	Comprehensive AMC				
9.0	Detailed schematic & hookup drawing for the system supplied as per above PO				

* Minimum two site data is required and is mandatory.



PJB - Power Junction Box (110V AC).

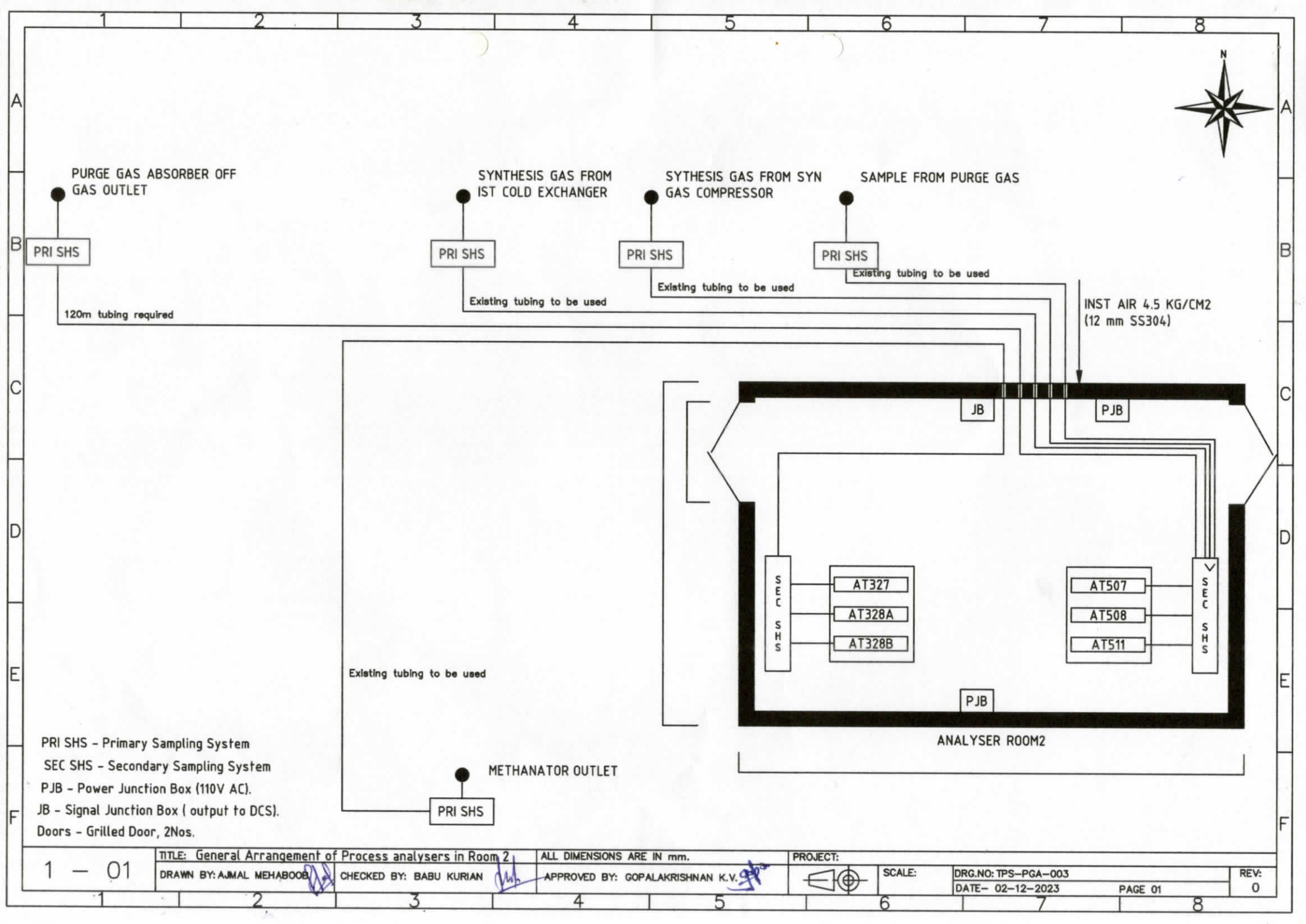
JB - Signal Junction Box (output to DCS).

Doors - Grilled Door, 2Nos.

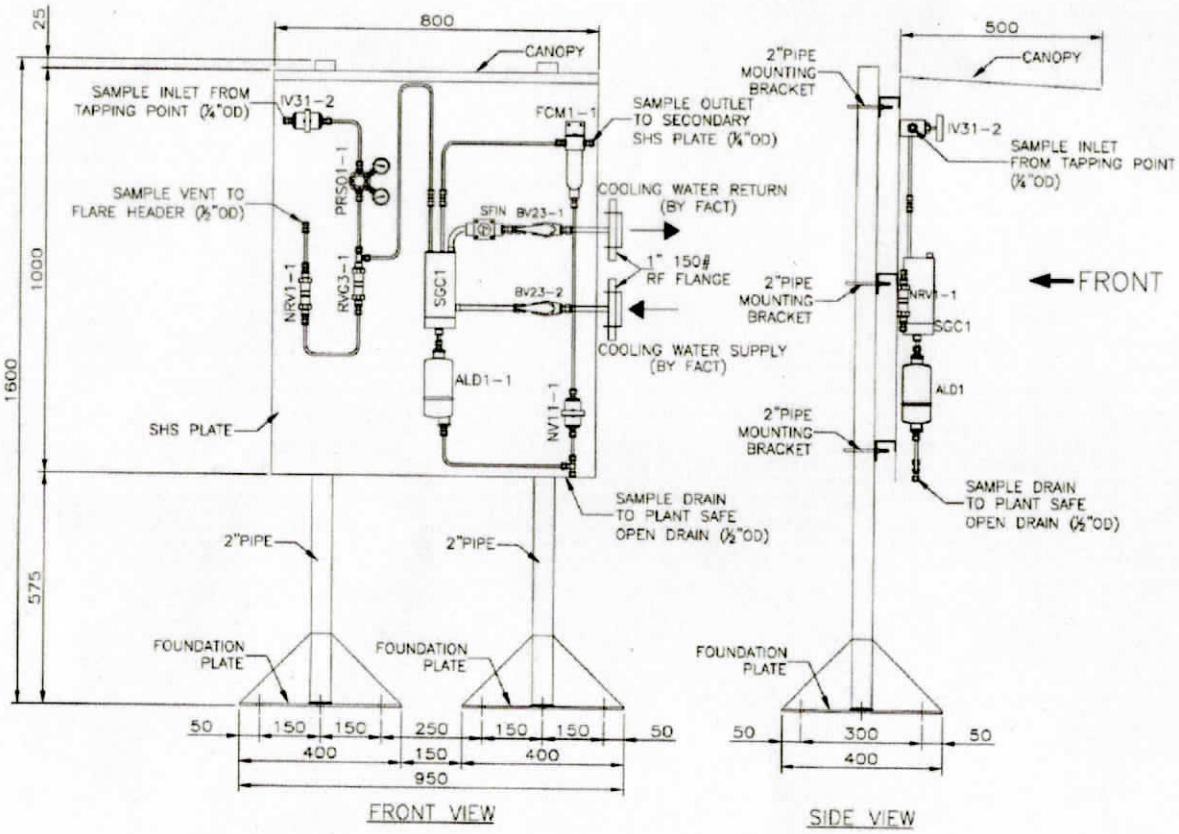
PRI SHS - Primary Sampling System

SEC SHS - Secondary Sampling System

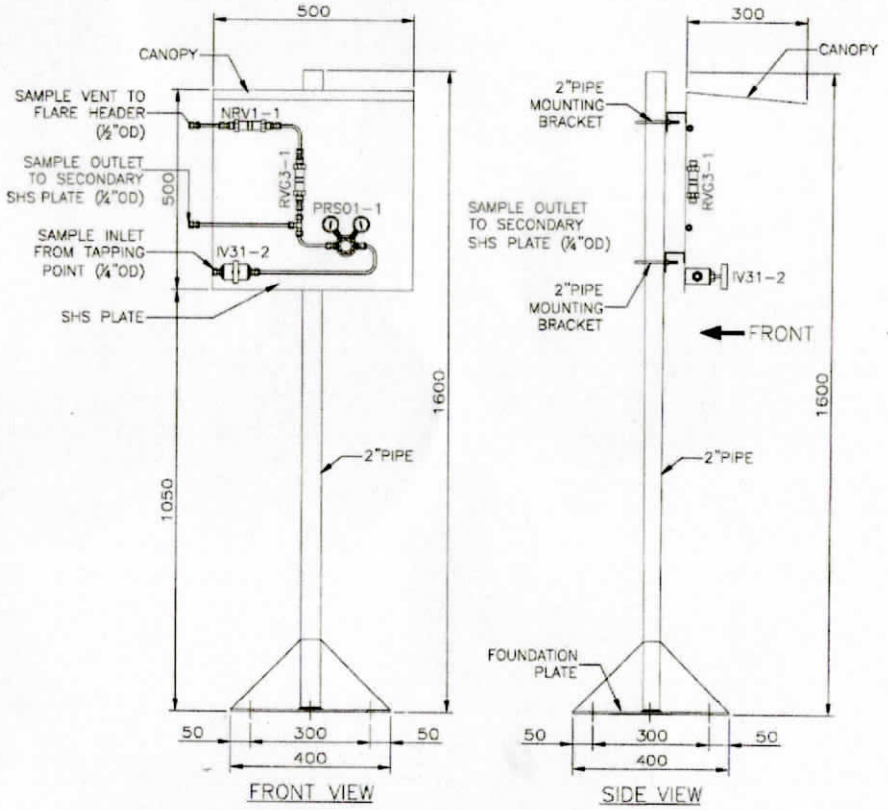
1 – 01	TITLE: General Arrangement of Process analysers in Room 1	ALL DIMENSIONS ARE IN mm.	PROJECT:	SCALE:	REV: 0
	DRAWN BY: AJMAL MEHABOOB	CHECKED BY: BABU KURIAN	APPROVED BY: GOPALAKRISHNAN K.V.	DRG.NO: TPS–PGA–004	
				DATE– 02–12–2023 PAGE 01	



1 – 01	TITLE: General Arrangement of Process analysers in Room 2	ALL DIMENSIONS ARE IN mm.	PROJECT:	SCALE:	DRG.NO: TPS–PGA–003	REV: 0
	DRAWN BY: AJMAL MEHABOOB	CHECKED BY: BABU KURIAN	APPROVED BY: GOPALAKRISHNAN K.V.		DATE– 02–12–2023 PAGE 01	

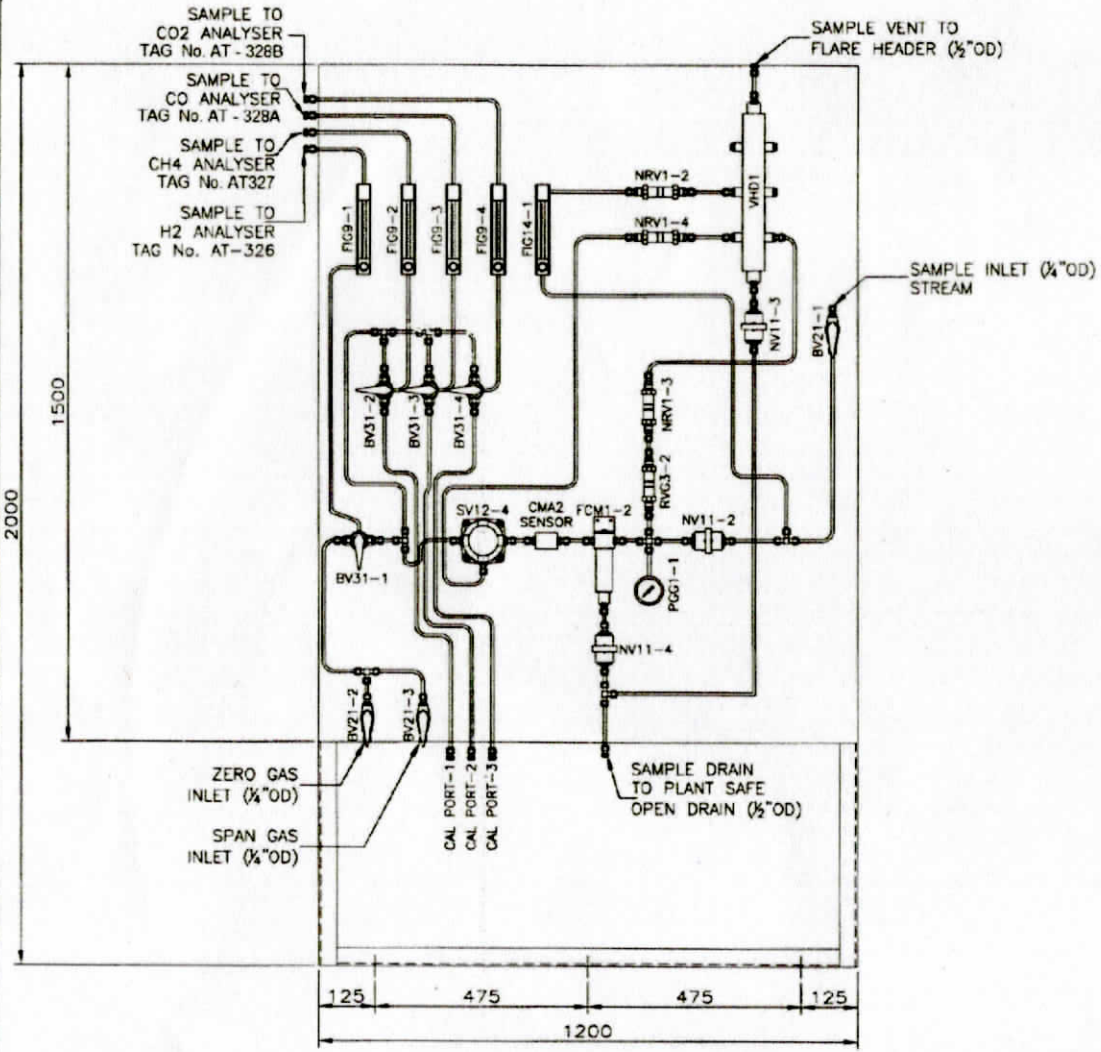


Existing AT326 PSHS

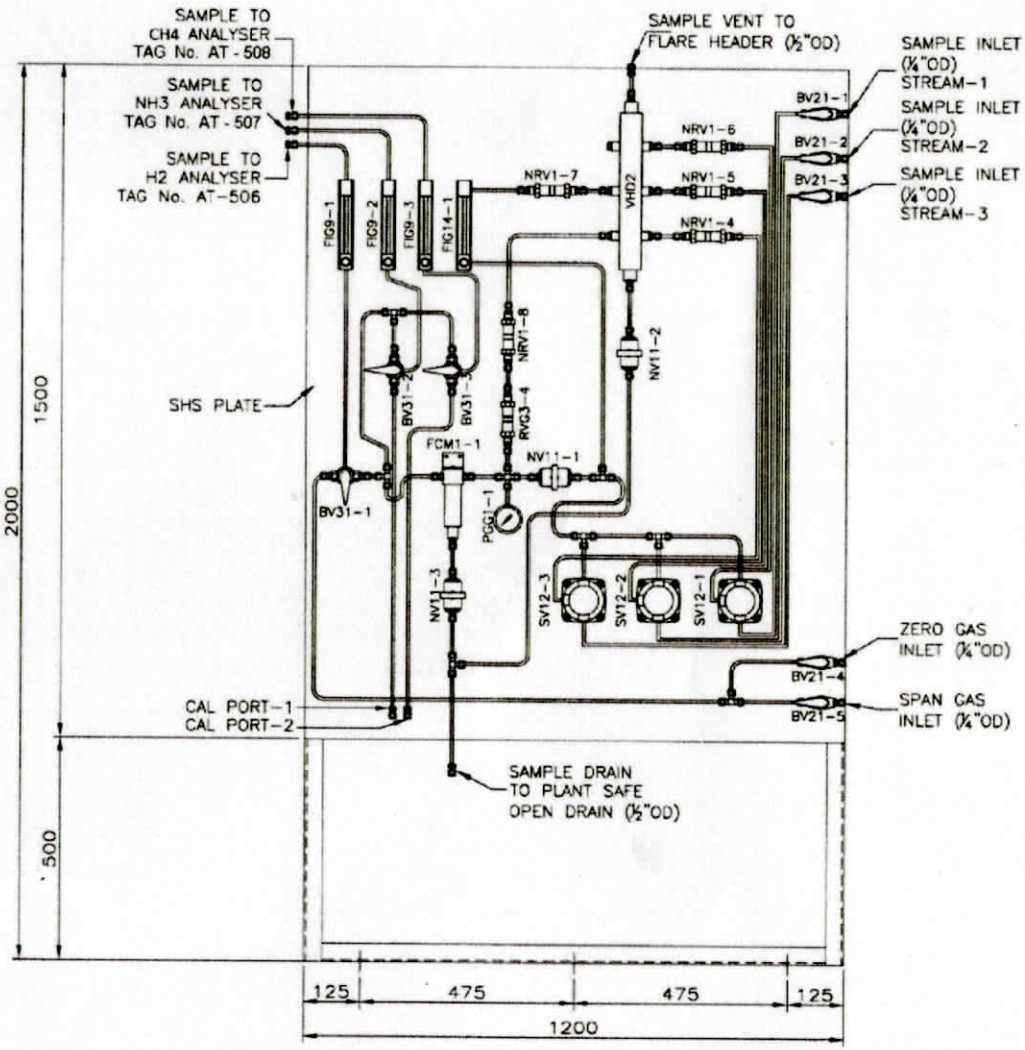


Existing AT506 PSHS

1 – 01	TITLE: Primary Sample Handling System (Synthesis Area)	ALL DIMENSIONS ARE IN mm.	PROJECT:	SCALE:	DRG.NO: TPS–PGA–001	REV: 0
	DRAWN BY: AJMAL MEHABOOB	CHECKED BY: BABU KURIAN	APPROVED BY: GOPALAKRISHNAN K.V.		DATE– 02–12–2023 PAGE 01	



Existing AT326 SSHS



Existing AT506 SSHS

1 – 01	TITLE: Secondary Sample Handling System (Synthesis Area)		ALL DIMENSIONS ARE IN mm.	PROJECT:		
	DRAWN BY: AJMAL MEHABOOB	CHECKED BY: BABU KURIAN	APPROVED BY: GOPALAKRISHNAN K.V.	SCALE:	DRG.NO: TPS–PGA–002	REV: 0
					DATE– 02-12-2023 PAGE 01	

PRE-QUALIFICATION CRITERIA

TENDER No. MM/172/G30177

Sl No	Pre-Qualification Criteria (PQC) Conditions	Documents to be submitted along with bid	Remarks	Bidders compliance
1	The Bidder shall be an original equipment manufacturer (OEM) or Indian Subsidiary for the offered Process Gas Analyser OR The bidder shall be the Authorised dealer/ distributor/channel partner of the OEM, of the offered Process Gas Analyser measurement prior to a period of 12 months as on date of Notice Inviting Tender (NIT)	a) In case of manufacturer, self- declaration with details of manufacturing facility along with full contact address along with product details and PO copies for meeting the PQC. b) In the case of Authorised dealer/ distributor/channel partner, an authorisation letter from the OEM indicating that they are the authorised dealer/ distributor/channel partner of the OEM prior to a period of 12 months as on date of NIT.	Relevant documents required	
2	The offered Process Gas Analyser or its earlier versions shall be in operation in India satisfactorily for a period of 5 years in Ammonia/Refinery/Petrochemical plants in a period of 10 years from the date of NIT.	Performance Certificate / MOM/E-mail issued by the end user clearly indicating the make of Process Gas Analyser measurement and shall reflect the period of performance. Detailed address and contact details of End User to be submitted.	Relevant documents required	
3	Bidder should have supplied Process Gas analyser measurement in India in Ammonia/Refinery/Petrochemical plants within last 7 years period as on date of NIT.	Copy/ Copies of the Purchase Order(s) in the name of the bidder or OEm clearly indicating the PO number with date, item description and quantity along with completion / performance certificate.	Relevant documents required	
4	The bidder shall not be black listed or under a declaration of ineligibility by any Central/State Govt.Departments/Agencies/PSUs for corrupt or fraudulent practices.	A self declaration by the bidder duly signed and stamped by their authorised signatory.	Relevant documents required	
4	a) Average annual turnover of the bidder for the last three financial years ending on 31-03-2023 shall be at least Rs. 400 /- Lakhs or above and b) Annual turnover for each year shall be at least Rs. 60 /- lakhs or above during the last three financial years ending on 31-03-2023	Annual report (audited balance sheet and profit & loss account) of the last three financial years ending on 31-03-2023 , duly authenticated by a Chartered Accountant/Cost Accountant in lndia or equivalent in relevant countries.	Relevant documents required	

Note:-

1) FACT has the liberty to verify the bidders performance and service support for those who have previous supplied analysers in FACT. The bidders satisfactory performance / after sales service support will also be considered for bid evaluation.
2) FACT has the liberty to verify the documents and details submitted by the bidder and to accept or reject the quotation.
3) Offers of Pre-Qualified Bidders only be Technically evaluated.
4) Offers, which comply both PQC and Technical requirements only be finally accepted. Any false information provided shall be a reason for disqualification without intimation to the bidder.
5) IMPORTANT: In case of ambiguity or incomplete or non submission of required relevant documents along with bid, FACT reserves the right, at its option, to reject the Bidders Bid without assigning any reason and without notice.

COMPLIANCE STATEMENT

Sl. No.	Terms	Bidder confirmation
1	Offer shall be as per the TPS – INST-ANALYSER-PROCESS GAS (PH-2)-AMMONIA PLANT R0.	
2	Pre Qualification Criteria is provided and only Pre Qualified Bids shall be considered for Technical Evaluation.	
3	Guarantee for 12 months from the date of acceptance required.	
4	Test Certificate for the offered items to be provided.	
5	Pre Bid Meeting Required and shall be conducted one week prior to the bid opening.	
6	Performance Bank Guarantee for 10 % of contract value for a period of 18 months from the date of delivery shall be submitted by the successful Bidder in the Proforma provided as per TPS conditions.	
7	Delivery period for the Supply shall be 12 weeks from the date of manufacturing clearance. Commissioning shall be completed within 30days after supply / clearance from purchaser.	
8	Please confirm : Price Basis – FOR FACT Stores (as per Gem T & C)	
9	Please confirm : Taxes and Duties - The Price offered in GEM is all inclusive of TAX. (as per Gem T & C)	
10	Please confirm : Payment Terms : Supply: 70 % of the supply value as per agreed billing schedule will be paid within 30 days after receipt and acceptance of the supplies at site. Balance shall be paid on satisfactory completion of Installation & Commissioning of the system, issue of take over certificate against submission of Performance Bank Guarantee (PBG) for an amount equivalent to 10 % of the total order value, valid till the end of the guarantee period plus a claim period of 6 months thereafter. Supervision of Installation & Commissioning : 100 % of the payment for the works done shall be paid with in 15 days from successful commissioning and takeover of the system after SAT against invoice, commissioning report (tag wise) and submission of performance bank guarantee as above.	
11	Please confirm : Liquidated Damages: As per GeM – "@ 0.5% of the contract value of delayed quantity per week or part of the week of delayed period as pre-estimated damages not exceeding 10% of the contract value of delayed quantity without any controversy/dispute of any sort whatsoever"(as per GeM T & C)	

Note : All the above columns shall be filled properly, without leaving blanks. Please upload / return this document duly filled-in, along with your bid.