**Oil India Limited**

**(A Govt. of IndiaEnterprise)**

**P.O. Duliajan – 786602, Assam , India**

Telephone No. (91-374) 2800491

Fax No: (91-374) 2800533

Email: matdmmfd@oilindia.in&erp_mm@oilindia.in

**Tender No.& Date** **: SDG5523 P15/08 of 26.11.2014**

Tender Fee : INR 4,500.00 OR USD 100.00

Bid Security : Applicable

**Bidding Type** **: SINGLE STAGE TWO BID SYSTEM**

Bid Closing on : As mentioned in the Basic Data of the tender in OIL's e-portal.

Bid Opening on : As mentioned in the Basic Data of the tender in OIL's e-portal.

Performance Guarantee: Applicable

**OIL INDIA LIMITED** invites Global Tenders for item detailed below:

| Item No. /Mat. Code | Material Description | QTY. | UOM |
|---|---|---|---|
| 1. | **Design, Fabrication, Supply, Installation and Commissioning of a Pilot Plant for removal of heavier Hydrocarbons (C5+) and Saturated Water Vapors from 10,000 SCMD Natural Gas by Adsorption Process as per the following Annexures:**<br><br>**a) Detailed specification- Annexure -AA .**<br><br>**b) Bid Rejection Criteria (BRC) and Bid Evaluation Criteria- Annexure-BB .** | 1 | No. |

**Special Notes :**

1.0 The tender will be governed by "General Terms & Conditions" for e-Procurement as per Booklet No. MM/GLOBAL/E-01/2005 for E-procurement (ICB Tenders) including Amendments & Addendum to "General Terms & Conditions" for e-Procurement.

2.0 Technical Check list and Commercial Check list are furnished . Please ensure that both the check lists are properly filled up and uploaded along with Technical bid.

3.0 The item qualifies for Nil duty / Deemed Export benefits. For Deemed Export benefits, please refer Addendum to the General terms and conditions for Global tender.

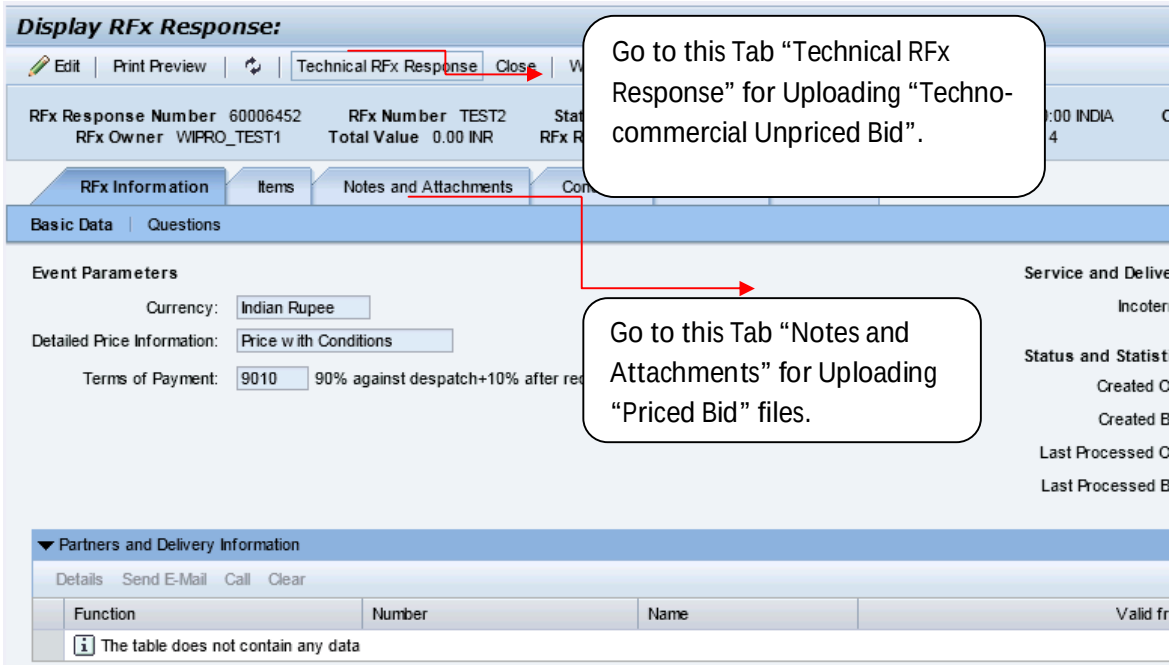
4.0 Please note that all tender forms and supporting documents are to be submitted through OIL's e-Procurement site only except following documents which are to be submitted manually in sealed envelope super scribed with tender no. and due date to The **Head Materials, Materials Department, Oil India Limited, Duliajan- 786602, Assam** on or before the Bid Closing Date and Time mentioned in the Tender.

a) **Original Bid Security.**
b) **Detailed Catalogue and any other document which have been specified to be submitted in original.**

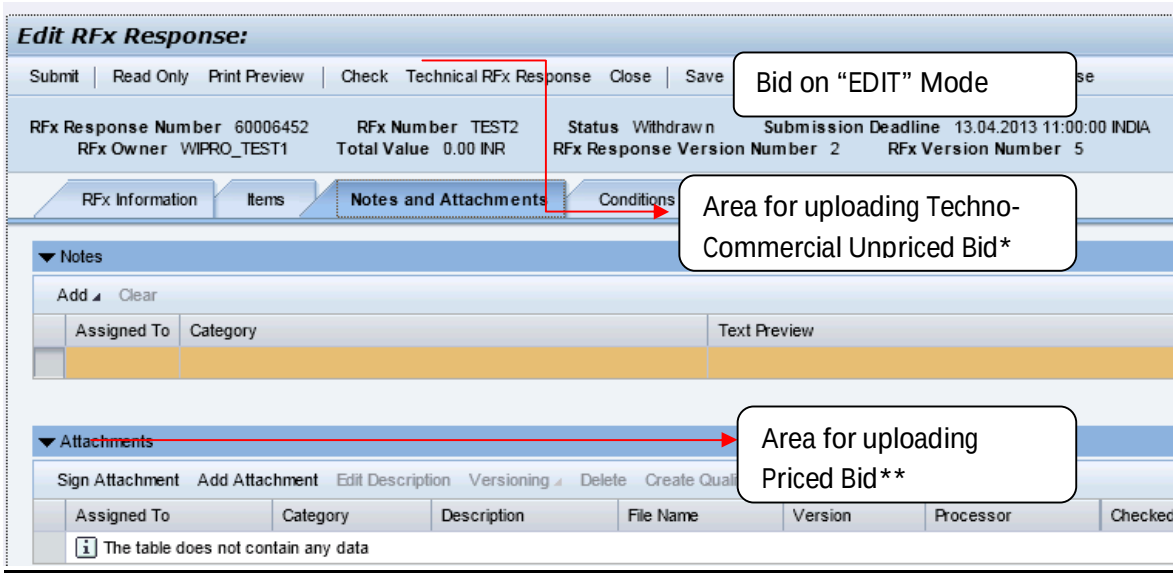
5.0 In case of SINGLE STAGE-TWO BID SYSTEM, bidders shall prepare the "Techno-commercial Unpriced Bid" and "Priced Bid" separately and shall upload through electronic form in the OIL's e-Tender portal within the Bid Closing Date and Time stipulated in the e-Tender. The "Techno-commercial Unpriced Bid" shall contain all technical and commercial details except the prices which shall be kept blank.Details of prices as per Bid format / Commercial bid to be uploaded as attachment in the Attachment Tab "Notes and Attachments".

**A screen shot in this regard is given below.**

Any offer not complying with above submission procedure will be rejected as per Bid Rejection Criteria mentioned in the tender.




**<u>On "EDIT" Mode- The following screen will appear. Bidders are advised to Upload "Techno-Commercial Unpriced Bid" and "Priced Bid" in the places as indicated above:</u>**




**Note :**

* The "Techno-Commercial Unpriced Bid" shall contain all techno-commercial details **except the prices**.

** The "Price bid" must contain the price schedule and the bidder's commercial terms and conditions. For uploading Price Bid, first click on Sign Attachment, a browser window will open, select the file from the PC and click on Sign to sign the Sign. On Signing a new file with extension .SSIG will be created. Close that window. Next click on Add Atachment, a browser window will open, select the .SSIG signed file from the PC and name the file under Description, Assigned to General Data and clock on OK to save the File.

6.0 Bidders are requested to examine all instructions, forms, terms and specifications in the bid. Failure to furnish all information required as per the bid or submission of offers not substantially responsive to the bid in every respect will be at the bidders risk and may result in the rejection of its offer without seeking any clarifications.

7.0 TheIntegrity Pact is applicable against this tender.OIL shall be entering into an Integrity Pact with the bidders as per format enclosed vide Annexure XII of the tender document. This Integrity Pact proforma has been duly signed digitally by OIL's competent signatory. The proforma has to be returned by the bidder (along with the technical bid) duly signed (digitally) by the same signatory who signed the bid, i.e., who is duly authorized to sign the bid. Any bid not accompanied by Integrity Pact Proforma duly signed (digitally) by the bidder shall be rejected straightway. Uploading the Integrity Pact with digital signature will be construed that all

pages of the Integrity Pact has been signed by the bidder's authorized signatory who sign the Bid.

OIL's Independent External Monitors at present are as under:

**(I) SHRI N. GOPALASWAMI,I.A.S ( Retd) ,**
**Former Chief Election Commissioner of India**

**E-mail Id : gopalaswamin@gmail.com**

**(II) SHRI RAMESH CHANDRA AGARWAL , IPS( Retd)**
**Former Director General of Police**

**E-mail Id : rcagarwal@rediffmail.com**

# Technical Specifcation

**ANNEXURE -AA**

## Design, Fabrication, Supply, Installation and Commissioning of a Pilot Plant for removal of heavier Hydrocarbons (C5+) and Saturated Water Vapors from 10,000 SCMD Natural Gas by Adsorption Process.

**SECTION – A**

### 1.0 Introduction

Oil India Limited (hereinafter referred to as OIL) is a premier National Oil Company engaged in the business of Exploration, Production & Transportation of Crude Oil & Natural Gas. Its operations are largely based in the North-Eastern part of India particularly in Assam and Arunachal Pradesh but extended its activities in different parts of India and abroad.

OIL uses natural gas at 13-15 kg/cm² for artificial lifting after compression to 80-90 kg/cm². This gas contains considerable amount of heavier ($C_5$+) hydrocarbons and saturated water vapor. OIL is interested to establish a suitable plant for removal of these heavier fractions of hydrocarbons ($C_5$+) and water vapor through adsorption process .Initially , OIL would like to setup a pilot plant to study the feasibility of the same.

Therefore OIL invites tender for Design, Fabrication, Supply, Installation and Commissioning of a Pilot Plant for removal of heavier Hydrocarbons ($C_5$+) and Saturated Water Vapors from Natural Gas by Adsorption Process in the field of OIL INDIA LIMITED in Upper Assam region of India.

### 2.0 Process Description:

2.1 Objective of the process is to clean up the rated quantity of natural gas and remove moisture and $C_5$+ Hydrocarbons (HC). Natural gas at 50 deg C (approx.) and 15 kg/cm$^2$ pressure shall pass through a Coalescence type Filter Separator for removal of any liquid in the flow stream. There are four adsorption beds in the process (two each for water vapor and HC removal). At a time, two (one each for water vapor and HC removal) will run in adsorption mode and the other two will run in desorption mode. The outlet stream of natural gas from the filters will pass successively through adsorption beds for water vapor and HC removal. Once an adsorption bed is saturated, it will be switched over to regeneration mode and the regenerated bed will be switched into the adsorption mode.

2.2 The dry gas (free of water vapour and heavier HCs) shall be delivered for downstream utilization. A part of the processed dry gas shall be used for high temperature regeneration of the saturated adsorption beds and therefore it will pass through a gas fired gas heater maintained at 300 deg C. Another part of the stream shall be used as cold regeneration purge stream for the beds during regeneration.

2.3 The wet gas from the beds during regeneration step will be sent into a Gas-Gas heat exchanger as hot stream. The dry gas (cold stream) to be used for regeneration gets preheated. The wet regeneration gas from this exchanger will be delivered to nearby oil processing station.

2.4 Details of the process along with the process sketch is attached as Annexure –I .

2.5 It may be noted here that IIT, Guwahati is the consultant for the said Project and will be associated with OIL for the whole project including installation & Commissioning till testing of the complete pilot plant project in cycle.

## 3.0 Scope of Work:

This is a TURN KEY PROJECT.

The scope of work covers the following;

i) Mechanical design, Fabrication and Supply of adsorption columns, all process piping, and gas fired gas heater, filter separator.
ii) Procurement and supply of all bought out items like valves, control valves, instruments, control panel(s), adsorbents and any other items to meet the process requirement.
iii) Cleaning, painting, testing, insulating the process equipment wherever required
iv) Assembling all equipment and instrument on suitable skid(s).
v) Erection, Testing and Commissioning of the pilot plant at the OIL's designated site.

Vendor shall also be responsible for ensuring inspection of the equipment at the vendor's works by OIL's representative and also testing of any equipment at their works if required.

Vendor shall also be responsible for pre-commissioning and commissioning activities to be performed at the site to the OIL's full satisfaction.

This specification is not to be interpreted as limiting whereby the vendor is relieved of meeting the requirements specified herein.

The vendor shall be responsible for the pilot plant to be completed with all equipment, controls and instrumentation necessary to make the unit a self-contained one for smooth and safe operation.

Sufficient descriptive information including a proposed skid layout must be furnished with the Vendors quotation to enable equipment size, performance, quality, and capacity and specification adherence to be determined.

It is also necessary that the bidders should furnish complete information / data of the requirement in order to avoid seeking any clarification.

The finalization of the engineering design and P&ID diagram will be based on mutual agreement between OIL and the vendor.

## 4.0 Design Information:

### 4.1 Process Design Basis:

#### 4.1.1. Feed Condition:

1) **Feed Gas Flow Rate (Capacity** **:** 10,000 SCMD (0.115 $m^3$/sec)
2) **Inlet Pressure (Maximum)** **:** 15.0kg/$cm^2$
3) **Inlet Gas Temperature** **:** 50$^0$C
4) **Inlet Gas composition (Vol.%)** **:** an approximate range of gas composition as indicated below –

| | | |
|---|---|---|
| Methane | : | 83.70 |
| Ethane | : | 6.80 |
| Propane | : | 4.50 |
| *i*-Butane | : | 1.00 |
| *n*-Butane | : | 1.30 |
| Pentane | : | 0.80 |
| Hexane plus | : | 0.70 |
| Nitrogen | : | 0.20 |
| Carbon dioxide | : | 1.00 |
| Moisture | : | 5000 ppm |
| **Total** | : | **100.00** |

#### 4.1.2 Climatic Conditions:

Maximum shed temperature : 45 Deg.C.
Minimum shed temperature : 6 Deg.C.

| | |
|---|---|
| Relative humidity | : at 21 Deg.C. = 100%<br>at 32 Deg.C. = 95%<br>at 41 Deg.C. = 70% |
| Height above sea level | : Duliajan 119 m (392 ft.) |
| Average rainfall | : 300 cm. |
| Minimum Ambient temperature | : 5 Deg.C. |

5.0 **Adsorption Column & Adsorbent**

| Item | 1 &2 columns for Water (as per annexure I) | 3&4 columns for Heavier Hydrocarbon (as per annexure I) |
|---|---|---|
| Approx. Height ,m | 1.4 | 4.75 |
| Approx. Diameter, m | 0.47 | 1.58 |
| Approx no. of columns | 2 | 2 |
| Adsorption time , hrs | 12 | 12 |
| Regeneration Temp DegC | 300 | 300 |
| Adsorption Inventory, Tons | 0.34 | 10.3 |

*** Mechanical design pressure of all the vessels shall be 20 kg/cm$^2$**

**6.0 Extent of Supply:**

**6.01** The Pilot Plant will consist of the following:

(i) Filter Separator (Picco or equivalent Coalescence Filter) : 01 No. – To arrest liquid particles in the flow stream.

Working pressure : 15 kg/cm2
Working Temperature : 50 Deg. C
Filter efficiency : up to 05 micron

(ii) Adsorption column : 02 Nos. for $C_{5+}$Hydrocarbon adsorption
(iii) Adsorption column : 02 Nos. for water vapour adsorption.

All the above adsorption columns (ii) & (iii) shall be complete with necessary instrument, controls for automatic switching of adsorption and regeneration (desorption) cycles as given in Annexure I. Valves and timers are needed for switch over of streams between adsorption and regeneration beds as described in the process.

(iv) Gas Fired Heater : 01 No. – For heating the lean gas for regeneration of the adsorbents.

Heater for regeneration of the adsorbent media: 30% (max) of the dry process gas (3000 SCMD) will be used at a temperature of 300 Deg C. Forced draft gas fired burner with burner management system having automatic on-off main burner to be provided. Pilot burner shall have flame failure shutdown switch. Pilot gas and main burner gas will be supplied to the burners from the residue gas line and each must have its own regulator and shut down valve. Details of burner instrumentation to be provided are given in instrumentation section (Section 8.0).

(v) Gas – Gas Heat Exchanger:01 No. - To cool down the warm outlet wet gas after regenerating the adsorbents and to preheat the dry regeneration / fuel gas. The heat exchange will take place between regenerated wet gas and the dry regeneration / fuel gas.

(vi) Pressure Control Valve with pressure controller: 01 No. - Up-stream control valve will be used for transferring process lean gas to Low Pressure system.

(vii) Check valve: 1 No. - To ensure one way flow of regeneration wet gas into LP unit

(viii) Flow control valve with flow controller: 6 Nos. (S1, S5, S7, S8, S10 and S11 – Refer Annexure -I)

(ix) The bidder to submit the following along with the bid:

a) Submission of technical specifications of all equipment to be used and supplied.
b) Submission of P&ID, different flow circuits, pressure/temperature control circuits etc.
c) Submission of General Arrangement Drawing (GAD)

(x) Bidder to give an undertaking that detailed Mechanical/ Engineering Design with Engineering drawing including internals of all equipment shall be submitted if the order is placed on them.

## 7.0 Adsorbents:

Adsorbent Type-1 : Molecular Sieve 4A, 1/16'' pellets
Adsorbent Type-2 : Silica Gel beads 2-5 mm

The physical properties of the adsorbents to be supplied are as follows.
(a) Molecular sieve 4A
   a. Size: 1/16" pellets or 2-4 mm spherical beads
   b. Water adsorption capacity: 20 wt % minimum at 18 mm Hg and 25 deg C

(b) Silica gel:

a. Size: 2-5 mm spherical beads
b. Pure methane ($CH_4$) capacity: not more than 11 cc at STP/gm of silica gel at partial pressure of 9 bar and 20 deg C and not more than 6 cc at STP/gm of silica gel at partial pressure of 93 bar and 75 deg C.
c. Pure *n*-pentane ($C_5H_{12}$) capacity: At least 40 cc at STP/gm of silica gel at partial pressure of 0.3 bar and 20 deg C and at least 6.5 cc at STP/gm of silica gel at partial pressure of 0.3 bar and 75 deg C.
d. BET Surface area: Minimum 550 $m^2/g$

(c) The adsorbents should be procured from reputed vendors such as Linde, UOP, M/s Chemicals India Company, M/s Drier Chemicals etc. The samples should be validated to OIL before actual purchase by the vendor.

**** All the adsorption columns / equipment will be exposed to around 300 deg C, all equipment /vessels instrument and materials shall be selected accordingly**

## 8.0 Instrumentation System:

**Project Requirement:**

The instrumentation & control system requirement pertaining to this pilot project is envisaged as per the following. However, the final quantity/specific range/exact requirement will depend on the final approval of the 'design of the pilot plant' by the qualified bidder.

- **Monitoring & Control of Gas Fired Heater**

  - Burner Management System (BMS) for sequence of operation like Blower (purging) Motor on/off, pilot ignition, main burner on/off, safety shutdown, alarm etc. through a dedicated Small Programmable Logic Controller considering forced draft heater.
  - A dedicated temperature control function for maintaining the regeneration gas temperature between 130 - 300 deg C through Small Programmable Logic Controller and thereby controlling main burner fuel intake to the heater.
  - Temperature transmitter(s)
  - Temperature Gauge for local indication
  - Heater stack temperature transmitter for indication & safety shutdown
  - Fuel Gas Pressure Transmitter
  - A dedicated control panel for burner on/off, pilot & main flame status, fuel valves status, emergency manual shutdown, temperature & pressure indications, indicating Lamp etc. The panel will house the Small

Programmable Logic Controller (SPLC) along with all standard accessories in the control panel as per standard engineering practice

- **Monitoring & Control of Adsorption Columns**

  - Automatic changeover of columns from adsorption to regeneration & vice versa after completion of definite time cycle operation, sequence of operation of control valves either in ON or OFF mode in the inlet & outlet sections of the respective columns through a dedicated Programmable Logic Controller (PLC). Provision for automatic emergency safety shutdown, manual step-up & step-down of time cycle operation of adsorption columns & manual changeover of adsorption column whenever process condition demands.
  - Pressure Transmitter(s) for adsorption columns (Total 8 nos. one each at the top and bottom for beds 1, 2,3 &4).
  - RTD with thermowell for adsorption columns one each at the top and bottom for beds 1, 2, 3, and 4. (Total = 8 nos.)
  - RTD with thermowell for Streams S1 (after filter separator), S5 (before entering the heat exchanger), S18 (before entering the heat exchanger) and S9 (at the outlet of the heater). (Total = 4 nos.)
  - RTD with thermowell at the following locations in beds 1 and 2. (Total = 4 nos.)
    a) 0.01 m from wall at a height of 0.7 m
    b) 0.22 m from wall at a height of 0.7 m
  - RTD with thermowell at the following locations in beds 3 and 4. (Total = 14 nos.)
    a) 0.01 m from wall at a height of 2.4 m
    b) 0.35 m from wall at a height of 2.4 m
    c) 0.70 m from wall at a height of 2.4 m
    d) 0.01 m from wall at a height of 0.8 m
    e) 0.01 m from wall at a height of 1.6 m
    f) 0.01 m from wall at a height of 3.2 m
    g) 0.01 m from wall at a height of 4.0 m
  - Temperature transmitters for all the above RTDs
  - Pressure & temperature switches for each columns for safety shutdown
  - Pressure & temperature gauges for each columns for local indication
  - Limit switches/LVDT for columns inlet & outlet valves status like ON/OFF and opening/closing position & sequence interlock and safety shutdown.
  - ON/OFF control valves
  - A dedicated main control panel for the adsorption columns which will comprises of Master Programmable Logic Controller, critical parameters display along with indicating lamps, start/stop & sequence of columns operation after getting required feedback signal (safety interlock) from the

Small Logic Controller in Gas Fired Heater & vice versa, all standard accessories in the control panel as per standard engineering practice.

- Solenoid valves. All solenoid valves to be housed in a separate enclosure with proper air supply regulator & filters assembly and to be placed near the near the main control panel for interlinking.
- Tapping ports to withdraw sample for concentration analysis in each of the streams S1, S2, S4, S9, S13, S14, S15, S16 and S18
- Pressure gauges at suitable locations in the pipeline as per standard engineering practice.

- **Monitoring & Control of Filter Separator**
  - Differential Pressure(DP) Gauge
  - Local pressure gauges for Inlet & Outlet of Filter Separator
  - Pressure transmitter in the filter separator outlet. The pressure transmitter signal to be feed to the Main Programmable Logic Controller for controlling columns operation based on the minimum & maximum permissible pressure limit as per design basis.

- **Gas-Gas Heat Exchanger**
  - Local Pressure & Temperature gauges

Control valve with positioner & I/P converter and pressure controller action (PID) from Main Programmable Controller (PLC) for Process Lean Gas to LP System.

- **Gas Flow Measurement & Flow Control**
  - Gas Flow Measurement & flow control in the stream S4, S5, S7, S8, S10 & S11
  - Gas flow measurement with Multivariable Transmitter along with orifice plate as per AGA-3.
  - All the above Gas Flow Calculation to be done in PLC with necessary programming software meeting requirement as per AGA-3.
  - PLC's must be compatible for gas flow allocution with sufficient memory (RAM) and display must be in the TFT display monitor.
  - Control valve(s) with positioned & I/P converter and flow control action(PD or PID) from main Programmable Logic Controller(PLC).

## APPLICABLE CODES & STANDARDS

The following Indian and International codes and standards are generally used for design of Instrumentation works. In all cases, latest revisions with amendments if any shall be followed. Apart from the specific codes mentioned herein, all other relevant and related codes concerning the specific job under consideration and/or referred to in these codes and technical specifications are followed wherever applicable.

a) ANSI/ISA S51.1 - Process Instrumentation Terminology.

b) IEC 60529 - Classification of Degree of protection provided by Enclosures

c) IEC 60079 - Specification for Flame Proof Enclosure

d) IEC 801 - Electromagnetic Compatibility for Industrial Process Measurement And control equipment

e) IEC 902 -Industrial Process Measurement and Control terms and definitions.

f) IEC 228 - Conductors of insulated cables.

g) IEC 5381 - Specification for PVC insulation and sheath of insulated cables.

h) API RP 520 - Sizing and selection of safety relief valves.

i) IS 1554 Part 1 - PVC insulated (heavy duty) electric cables- working voltage upto and including 1100 V.

j) IS 3975 - Mild steel wires, formed wires and tapes for armoring of cables.

k) IS2147 - Degree of protection provided by Enclosures for low voltage Switchgears and control gears

l) IS 2146 - Flame proof Enclosures of Electrical Apparatus

m) BS EN 50054 - Electrical Apparatus for the Detection and Measurement of Combustible Gas - General Requirements and Test methods.

n) BS EN 50057 - Performance Requirements for Group II Apparatus Indicating up to 100% LEL

o) BS 5308 Part 2 - Specification for PVC insulated cables.

p) ISA S75.01 - Control Valve Sizing

**Design Basis (Instrumentation):**

i) Field Transmitters should be intrinsically safe under leak proof enclosure for use in hazardous area. Function of the transmitter shall be transmission as well as indication. Type of transmitter shall be of electronic smart type transmitter

compatible with fieldbus protocol of latest version with capability to handshake with any communicating device. The enclosure should be weather proof to IP 65.

ii) RTD will be 4-wire duplex and thermo well's immersion length shall be suitable for the line size. RTD element shall be Pt 100 and it will be as per DIN 43760 and accuracy will be class A.

iii) For Gas Flow Application (flow measurement) multivariable transmitter along with orifice plate shall be used. Multivariable transmitter shall be of electronic smart type transmitter compatible with fieldbus protocol of latest version with capability to handshake with any communicating device. This transmitter shall have RTD connectivity also for flow calculation as well as transmitting temperature to PLC. Accuracy of this transmitter should not be degraded beyond ±0.15%.

iv) All field instruments shall be hooked up with the respective PLC control panel for necessary start/stop, display& monitoring, sequence interlock & safety shutdown, gas flow calculation as per AGA-3. All control logic for sequence of operation and safety shutdown of the unit to be developed accordingly.

v) A high resolution (1024 x 768, 18-bit color graphics) TFT display monitor unit with touch screen/ key board for monitoring of all parameters like Pressure, Temperature, Flow, Valves status(ON/OFF) etc. including alarm & graphical display shall be considered in PLC control panel. This LCD display unit shall be hooked up with the PLC through suitable communication protocol (Ethernet, RS 232, RS 485 etc.).

vi) A standalone Burner Management System (BMS) along with requisite accessories or through PLC including IR flame detector, Ignition transformer with electrode, damper control, pilot & main burner regulator with control etc. shall be considered.

vii) Based on the 'schematic flow diagram', shall have to design complete logic & sequence control operation and safety shutdown and assessment of total requirement of field & control instrumentation system for the entire dehydration unit.

**Scope of Work (Instrumentation):**

i) The instrumentation work for the pilot project shall include design, engineering, supply, installation, calibration, testing, erection and commissioning of field instruments, local control panel(s) and instrumentation cable with all

accessories, cable trays, junction boxes, erection hardwires etc as per requirements.

ii) The following selected ones or all instrumentation works are envisaged in this pilot project as minimum but shall not be limited to:

a) Engineering, supply, erection, testing and commissioning of field instruments, Burner Management System, instrumentation cables, junction boxes, serial link cable for PLC, Control Panels etc.
b) Cable lying through cable tray/cable trench from Gas Fired Heater/ Adsorption Columns/Gas-Gas Heat Exchanger to control panels via junction boxes with proper glanding, termination, ferruling, dressing etc.
c) Installation of junction boxes, I/O cabinets in the control panels.
d) Calibration of all instruments, leak test/hydro test of instrument impulse pipe, tubes, fittings etc.
e) To interface all instrumentation signals with the Programmable Logic Controller (PLC) in the control panel.
f) Supply of erection hardware's like cable gland, cable trays, support, SS tubing, fittings, flanges, valves, manifold, impulse tubing etc.
g) Supply of mandatory recommended spares for smooth running of the pilot plant after Post Commissioning Warranty.
h) Preparation of engineering drawing/documents/data sheet/P&ID etc.
i) Erection, testing & commissioning of ON-OFF control valves at the inlet & outlet of Adsorption columns.
j) Necessary control logic shall be developed in the Programmable Logic Controller (PLC) for smooth operation & safety shutdown of the pilot plant as well as display of critical parameters in the control panel(s) along with indicating lamp.
k) Interconnecting Gas Heater Control Panel and main Control Panel of Adsorption Unit for safety interlock.

iii) The system is to be provided complete with all instrumentation and valves for automatic operation and shutdown at all stages of the system. All pressure vessels are to be fitted with pressure safety valves.

iv) All control valves and metering systems are to be provided with manually operated by-pass arrangements. All instruments should be provided with suitable isolation valves on both sides to enable proper maintenance.

**Special Condition:**

i) All field mounted instruments (hazardous area) shall be 'Intrinsically Safe' under leak proof enclosure.

ii) All signals from field instruments in hazardous area shall be routed through suitable Zener barrier/isolator.

iii) All field instruments/control panel installed in Zone 1 are to be certified by CIMFR/ERTL and approved by DGMS as per OIL's approved safety policy as well as statutory body's requirement. Hence, the bidder to procure the various field instrumentation system/control panel which are already certified & approved by CIMFR/ERTL & DGMS and used in OIL's various installations subject to meeting the individual instrumentation design specifications. OIL will provide the list of the certified & approved only available field instrument/control panel along with the vendors address after final approval of the 'Pilot Plant Design'.

iv) Main Control Panel of Adsorption Columns Unit to be erected & placed at a distance of 6 to 8 meters from the vessel skid. The panel should be purging type & to maintain a positive pressure of +3 PSI inside the panel.

v) For Gas Fired Heater, Instrumentation System & Control Panel does not require CIMFR & DGMS certification as the Heater will be installed in safe area beyond Zone-2 which will be minimum 45 meters away from the process skid. However, all instrumentation system for heater should be intrinsically safe.

**Recommended vendor list for the instrumentation system shall be of the following make preferably.**

| | |
|---|---|
| Programmable Logic Controller | : Allen Bradley/SIEMENS |
| Control Panel | : Rittal/Pyrotech/ICA/Altronic/Murphy |
| Control Valves | : Fisher / Fouress / Instrumentation Ltd. |
| Transmitters (PR & Temp) | : ABB/EMERSON Process/ Murphy |
| Pressure Switch | : INDFOS/Switzer/ Murphy |
| Pressure & Temperature Gauges | : Warrey/Bourdon/Precision/ Murphy |
| Safety Relief Valve | : AIL /Farris. |
| Solenoid Valves | : ASCO / Rotex / Schradder |
| Limit Switch/LVDT | :Speed-O-Control/Remso Controls/Honeywell |
| IS Barrier/Isolator/Repeater | : P&F/MTL |
| Digital Panel Indicator | : Masibus/Honeywell/ABB |
| RTD with thermowell | : Pyrotech Controls/ALTOP/General Inst./ Murphy |
| Instrument & Power cable | : INCAB/Universal Cable/RPG Cables |
| Instrument Fittings | : Swagelok/Parker/IVI vales |
| SS Tube | : Sanvik |
| Terminal Block | : Phoneix/Elemex/Wago |

| | |
|---|---|
| Interposing Relay | : OEN/Jyoti/Omron |
| Alarm Annunciator | : IIC/Procon/ Murphy |
| Air Filter Regulator | : Shavonorgren/Placka |
| 24 V DC Power Supply | : Phoenix/Silop |
| Indicating Lamp | : Concord/Telemechnic/ Murphy |
| Cable Gland | : Baliga/Electromac |
| Lugs | : Dowells |
| Junction Box | : Baliga/Flexpro |
| Chemically treated earth pit | :Ashlok/Welcome World Engg/Power gomengg |
| MCB (Miniature Circuit Breaker) | : MDS/HAGER/Wowells |
| Fuse (LT) | : KAYCEE /GE/ALSTOM |
| Push Button | : KAYCEE/ Telemechnic/Siemens |
| Selector Switches | : KAYCEE/ Siemens |
| Control switches | : KAYCEE/ Siemens |
| Light Fittings (Panel Indoor) | : GE/Bajaj/Philips |
| Circuit Breaker (Inside panel) | : GE/Siemens/Schneider |
| Ball Valves (for impulse line0 | : Flow Control/L&T/Flow Chem |
| Globe Valves (for instruments) | : L&T/Hawa valves/NECO Valves |

General Specifications of the Instrumentation System: **As per attached Annexure-II**

**9.0 Valves:**

9.1 The valves shall be selected as per the process condition and shall be procured from L&T, Virgo Valves & Controls. For hydrocarbon service, ball valves to be used.

9.2 Valve trim in hydrocarbon service shall be suitable for hydrocarbon with 10% carbon dioxide.

9.3 All valves shall be of fire safe type as per API 1607 / BS 5146. Fire safe test shall be as per the standard and test certificate shall be furnished.

9.4 Body, bonnet, cover etc. of all valves shall be from carbon steel casting or forged steel. Steel casting or forging shall be of radiographic quality as per procedure and acceptance criteria specified in ANSI B 16.34 – 1977.

9.5 All valves shall be with flanged ends as per ANSI B 16.5.

**10.0 Pipes and Fittings:**

10.1 All piping materials and fabrication shall conform to ANSI B 31.3 (latest edition).

10.2 All carbon steel fittings shall be as per ASTM A 234 WPB seamless.

10.3 The vendor shall provide and connect all inter- all drain headers etc. Spool pieces, if required shall be provided to finally connect by the bidder to adjacent skids (if the number of skids is more than one) together at site.

10.4 All connection in piping, valves etc. shall be through weld neck forged carbon steel flanges as per ANSI B 16.5.

10.5 All pipe fittings shall be from carbon steel made through forging. Fabricated fittings such as bends, elbows, tees etc. made through welding are not allowed.

10.6 All welding joints shall be of radiographic quality as per API 1104 and at least 20% of the welding joints shall be radio graphed and radiographic films submitted to OIL.

10.7 Piping shall be arranged in such a manner to avoid crisscrossing or overhead problems. Piping or tubing of insufficient mechanical strength for standing or hanging shall be protected from personnel traffic.

10.8 All sub-suppliers items e.g., instruments, valves, pipes fittings etc. shall be from reputed manufacturer / supplier and should conform to relevant codes and standards.

Note: Since the plant equipment will be exposed above 250 deg C, all valves /pipes / pipe fitting metallurgy shall be selected accordingly .

**11.0 Codes and Standards:**

The following codes and standards will apply:

| | |
|---|---|
| ASME VIII DIV. 1 | Latest Edition |
| ASME Section IX | - Do- |
| ANSI B 16.5 | - Do- |
| ANSI B 31.3 | - Do- |

**12.0 Skids:**

12.1 Each unit like adsorption column, heater, filter etc along with its instruments should be skid mounted. The skids should be fabricated from suitable structural steel section. The skids must be rugged and compact, being designed for transportation by trailer and fitted with two bars. Vendor to provide lifting arrangements for all the skids and minimum number of skid should be employed. Details of bolting down for skids to be provided by vendor.

**13.0 Material of Construction:**

Materials to be used as follows:

| | | |
|---|---|---|
| Vessels / Tanks | : | SA-515 Gr. 60 / 70 / IS:2002 Gr. 2 |
| Shell flanges | : | SA-105 |
| Nozzle flanges | : | SA-105 |
| Supports | : | SA-283 Gr. C/IS:226 |
| Nuts & Bolts | : | SA 193 Gr. B7 |
| | | SA 194 Gr. 2H |

Materials for pipes, flanges, fittings to be in accordance with ANSI B31.3 / API 51 / ANSI B16.5. Material for instrument piping to be annealed seamless 316 stainless steel with Swagelok type fittings.

**14.0 <u>Available Utilities:</u>**

**14.1 Electrical Power Supply:**

| | |
|---|---|
| Rated voltage | : 240 V-AC (± 10%), 3 phase |
| Rated frequency | : 50 Hz (± 3%) |
| Control voltage | : 240V, 1 phase |

**14.2 Instrument Air:**

| | |
|---|---|
| Operating Pressure | : 6 - 9 kg/cm$^2$(g) (Normal / Maximum). |
| Temperature | : 65°C Maximum |

**15.0 Inspection:**

Vendor to provide a schedule of onsite inspection for the manufacturing stages including bought-out items of instrumentation and controls with the tender at Vendor's Works. All materials to be used in the process of manufacturing are to be provided with test certificates. OIL's personnel may visit at any stages of execution of the job for which necessary facility and co-operation will have to be extended by the vendor and minimum 45 days prior intimation is required for schedule inspections.

**16.0 Painting & Insulation:**

The equipment and skids are to be externally painted for environmental protection after thorough cleaning. As a minimum, this is to include zinc rich primer (1 coat) and epoxy based final covering. Vendor to provide the proposed specification with his tender. Cleaning shall be done through sand blasting before painting with spray.

The heater delivery line (hot surfaces) shall be properly insulated with and then covered with aluminum sheet jacket.

**17.0 Guarantee:**

17.1 Vendor to stand guarantee for a period of 6 months from the date of successful commissioning of the plant for any type of mechanical, instrumentation design failures including performance of the equipment and instruments at specified conditions.

17.2 Guarantee period will start from the date the plant operates satisfactorily as per design parameters and ordered specifications.

**18.0 Spares and Adsorbents:**

Spares and adsorbents wherever required for successful testing, commissioning and operation of the unit after erection at sites in all respect must be supplied by the vendor at their own cost.

19.0 **Testing and Commissioning:**

19.1 The vendor will be responsible for testing and commissioning of the unit at site. The commissioning period will be for 3 days (72 hours) and will be counted from the time when the plant becomes normal and operates as per design / ordered parameters. If the plant requires to be shut down before completion of 03 days operation period due to malfunctioning of equipment, instruments etc. supplied by the vendor, 03 days operation period will be counted afresh. Only after continuous operation of the unit for a period of 3 days (72 hours), it will be considered as commissioned successfully.

19.2 If any malfunction, abnormality occurs during trial/commissioning period, the party to rectify the same at their own expense.

20.0 **Operation and maintenance:**

20.1 The pilot plant is expected to operate for 3 (three) months (90 days) continuously for establishing the process parameters and operating principle for a scaled up plant. The vendor shall have to provide round the clock operation and maintenance of the plant during this period. Accommodation and transportation for the vendor's staff during this period shall be arranged by the vendor. OIL may provide accommodation on chargeable basis.

20.2 Charges for operation and maintenance shall be quoted separately on per month basis.

**21.0 Exception and Deviation:**

Vendor should mention separately, in clear terms the deviations and exclusions in his offer from the tender specification.

**22.0 Delivery Schedule:** Bidders are to give their best delivery schedule.

**23.0 Payment Terms:**

Payment shall be released as follows:

a) Plant supplied with valid DGMS Approval of components :

i) 80 % value shall be released on supply against proof of despatch/shipment of the package and submission of valid DGMS certificate .

ii) Remaining 20 % along with installation & commissioning charges shall be paid after successful commissioning and acceptance by OIL at site.

OIL may consider making 100 % payment of the value towards supply of the plant against proof of dispatch/shipment provided bidders agree to pay interest @ 1% above prevailing Bank Rate (CC rate) of State Bank of India for 20 % of the plant value and also submit Bank Guarantee for the equivalent amount plus interest valid till successful commissioning of plant at site. This is in addition to the 10 % of the order value towards Performance Security as per the tender requirement.

b) Plant supplied without DGMS approval of components, but with Field Trial Permissions only:

(aa) 50 % value shall be released on supply against proof of despatch/shipment of the plant .

(bb) 30% value upon submission of DGMS approval only.

(cc) Balance 20 % along with installation & commissioning charges shall be paid after successful commissioning and acceptance by OIL at site.

Note : ( I ) In case DGMS approval is not available, the same shall be supplied with DGMS field trial permission certification. Details of obtaining DGMS field trial

permission are available at the web site of DGMS. The field trial may be carried in any E&P Company operating in India or during the commissioning of the project for it is procured.

(II) The price of each electronics/electrical equipment/instrument wherever DGMS approval is required as per technical specifications shall be quoted separately.

(III) A system shall be considered as successfully commissioned only after obtaining valid DGMS approval for all the constituent/instruments of the system.

23.1 Operation & Maintenance : on monthly basis at actual. If the plant is operated for a part of the month, payment will be done on pro-rata basis.

24.0 The plant to be procured against this tender will be used by OIL in the PEL/ML areas issued/renewed after 01/04/99 and applicable Customs Duty for import of goods shall be ZERO. Indigenous bidders shall be eligible for Deemed Export and should quote Deemed Export prices Excise Duty under Deemed Export exempted.

**SECTION - B**

(i) For any HSE matters not specified in the contract document, the contractor will abide the relevant and prevailing Acts/rules/regulations/ pertaining to Health, Safety and Environment.

(ii) Contractor will be allowed to work normally during working hours i.e. from 7 AM to 3 PM. Sometimes in special circumstances this duration may be extendable upto 5 PM with due permission from Installation Manager / OIL's Engineer.

(iii) All expenses including air fare, boarding, lodging, enroute expenses etc. will be borne by the successful bidder.

(iv) All the required commissioning tools shall be arranged by the contractor.

(v) The site will be made available to vendor in properly graded condition. M/s. Oil India Limited will provide only necessary support during the unloading and installation on the civil foundation.

(vi) For sampling purpose, sampling ports at inlet and outlet in each columns with manual valves are to be provided.

**ANNEXURE-BB**

**BID REJECTION CRITERIA (BRC) / BID EVALUATION CRITERIA (BEC) :**

(I) BID REJECTION CRITERIA (BRC)

The bids must conform to the specifications and terms and conditions given in the tender. Bids shall be rejected in case the item(s) offered do not conform to the required minimum/maximum parameters stipulated in the technical specifications and to the respective international / national standards wherever stipulated. Notwithstanding the general conformity of the bids to the stipulated specifications and terms and conditions, the following requirements shall have to be particularly met by the bidders, without which the offer will be considered as non-responsive and rejected :

(A) **TECHNICAL**:

1. BIDDER'S QUALIFICATION:

The bidder shall be a reputed firm having experience of successful execution of 01(one) similar nature of job in industries in last 5 (five ) years from bid closing date. Documentary credentials of the firm are to be provided to carry out this job.

Similar nature of job means design, packaging, commissioning of plants with pressure vessels /separators/Indirect Heaters along with process instruments etc.

In support of experience, the bidder shall submit the following documents -

(a) Copy(ies) of Purchase Order(s) / Contract document(s), and
(b) Any of the following documents that confirms the successful execution of the order(s)-
- Performance report from the clients,
- Bill of lading,
- Consignee received delivery challan / invoice etc.
- Any other documentary evidence that can substantiate the successful execution of each of the Purchase Orders cited.

**(B) COMMERCIAL :**

1.0 Bids are invited under Single Stage Two Bid System. Bidders shall quote accordingly under Single Stage Two Bid System. **Please note that no price details should be furnished in the Technical (i.e. Unpriced) bid**. The “Unpriced Bid” shall contain all techno-commercial details except the prices which shall be kept blank. The “Priced Bid” must contain the price schedule and the bidder’s commercial terms and conditions. Bidder not complying with above submission procedure will be rejected.

2.0 Bid security of **US $ 15,000.00** or **Rs. 6,74,000.00** shall be furnished as a part of the TECHNICAL BID. Any bid not accompanied by a proper bid security in ORIGINAL will be rejected without any further consideration. For exemption for submission of Bid Security, please refer Clause No. 9.8(Section A) of General Terms and Conditions for Global Tender. The Bid Security shall be valid till 03/02/2016. Bids with lesser validity of Bid Bond shall be rejected.

3.0 The prices offered will have to be firm through delivery and not subject to variation on any account. A bid submitted with an adjustable price will be treated as non-responsive and rejected.

4.0 Bidders must confirm that Goods, materials or plant(s) to be supplied shall be new of recent make and of the best quality and workmanship and shall be guaranteed for a period of 6 (six) months from the date of commissioning against any defects arising from faulty materials, workmanship or design. Defective goods/materials or parts notified by OIL shall be replaced immediately by the supplier at the supplier's expenses.

5.0 Successful bidder will be required to furnish a Performance Bank Guarantee @10% of the order value. The Performance Bank Guarantee must be valid for 6 (six) months from the date of successful commissioning of the equipment . Bidder must confirm the same in their Technical Bid. Offers not complying with this clause will be rejected.

6.0 Bids received after the bid closing date and time will be rejected. Similarly, modifications to bids received after the bid closing date & time will not be considered.

7.0 Bidders shall quote directly and not through Agents in India. Offers made by Indian Agents on behalf of their foreign principals will be rejected. Similarly offers from unsolicited bidders will be rejected.

8.0 No offers should be sent by Telex, Cable, E-mail or Fax. Such offers will not be accepted.

9.0 Validity of the bid shall be minimum 180 days from the bid closing date. Bids with lesser validity will be rejected.

10.0 Bids containing incorrect statement will be rejected.

11.0 Offers received without Integrity Pact duly signed by the authorised signatory of the bidder will be rejected.

12.0 **Bidders are required to submit the summary of the prices in their commercial bids as per bid format ( Summary ), given below :**

**(i) Commercial Bid Format ( SUMMARY ) for Foreign Bidders :**

**(A) Total Material value**
**(B) Packing & FOB Charges**
**(C) Total FOB Port of Shipment value, ( A + B ) above**

**(D) Ocean Freight upto Kolkata(India) port**
**(E) Insurance Charges**
**(F) Total CIF Kolkata value, ( C+ D +E)**
**(G) Installation & Commissioning charges**
**(H) Operation & Maintenance Charge for 3 months with monthly break up.**
**(I) Total value in words :**
**(J) Gross Weight :**
**(K) Gross Volume :**

**(iii) <u>Commercial Bid Format ( SUMMARY ) for Indigenous Bidders</u> :**

**(A) Total Material value**
**(B) Packing and Forwarding Charges**
**(C) Total Ex-works value, ( A + B above**
**(D) Excise Duty including Education Cess (Please indicate applicable rate of Duty & Cess )**
**(E) Sales Tax, (Please indicate applicable rate of Tax)**
**(F) Total FOR Despatching station price, ( C + D + E ) above**
**(G) Road Transportation charges**
**(H) Insurance Charges**
**(I) Total FOR Duliajan value, (F + G + H ) above**
**(J) Installation & Commissioning charges**
**(K) Operation & Maintenance Charge for 3 months with monthly break up.**
**(L) Total value in words :**
**(M) Gross Weight :**
**(N) Gross Volume :**

**<u>NOTE :</u>** 1.0 The item covered under this tender shall be used by OIL in the PEL/ML areas issued/renewed after 01/04/99 and hence, applicable Customs Duty for import of goods shall be ZERO. Indigenous bidders should quote Deemed Export prices. Excise Duty under Deemed Export exempted.

2.0 Installation/Commissioning charges must be quoted separately on lumpsum basis which shall be considered for evaluation of the offers. These charges should include amongst others to and fro fares, boarding/lodging, local transport at Duliajan and other expenses of supplier's commissioning personnel during their stay at Duliajan, Assam(India). All Income, Service, Corporate Taxes etc. towards the services provided under installation / commissioning shall be borne by the supplier and will be deducted at source at the time of releasing the payment. Bidder should also confirm about providing all these services in the Technical Bid.

**(II) <u>BID EVALUATION CRITERIA (BEC)</u> :**

**The bids conforming to the specifications, terms and conditions stipulated in the enquiry and considered to be responsive after subjecting to the Bid Rejection**

**Criteria will be considered for further evaluation as per the Bid Evaluation Criteria given below :**

**(A) TECHNICAL :**

1.0 All materials as indicated in the material description of the tender should be offered. If any of the items are not offered by the bidders, the offer will not be considered for evaluation.

**B. COMMERCIAL :**

1.0 The evaluation of bids will be done as per the Price Schedule (SUMMARY) detailed vide Para 12.0 of BRC.

2.0 If there is any discrepancy between the unit price and the total price, the unit price will prevail and the total price shall be corrected. Similarly, if there is any discrepancy between words and figure, the amounts in words shall prevail and will be adopted for evaluation.

3.0 For conversion of foreign currency into Indian currency, B.C. selling (Market) rate declared by State Bank of India, one day prior to the date of price bid opening shall be considered. However, if the time lag between the opening of the bids and final decision exceed 3(three) months, then B.C. Selling(Market) rate of exchange declared by SBI on the date prior to the date of final decision shall be adopted for conversion and evaluation.

4.0 Offers not complying with the payment terms indicated in the NIT shall be loaded with one percent above the prevailing Bank rate (CC rate) of State Bank of India for evaluation purpose.

5.0 To ascertain the inter-se-ranking, the comparison of the responsive bids will be made as under, subject to corrections / adjustments given herein.

5.1 **When only foreign bids are involved :**

**Comparison of bids will be done on the basis of "TOTAL VALUE" which is estimated as under:**

(A) Total Material value
(B) FOB Charges
(C) Total FOB Value, ( A +B) above
(D) Ocean Freight upto Kolkata(India) port (as quoted)
(E) Insurance Charges @ 1% of Total FOB Value vide ( C ) above
(F) Banking Charges @ 0.5% of Total FOB Value vide ( C ) above in case of payment through Letter of Credit ( If confirmed L/C at buyer's cost is required , 1.5% of Total FOB Value will be loaded )

(G) Total CIF Kolkata Value, ( D + E + F ) above
(H) Installation & Commissioning charges
(I) Operation & Maintenance Charge for 3 months with monthly break up.
(J) Total Value (G+H+I)

**Note : Banking charge in the country of the foreign bidder shall be borne by the bidder.**

5.2 **When only domestic bids are involved :**

**Comparison of bids will be done on the basis of "Total Value" which is estimated as under :**

(A) Total Material value
(B) Packing and Forwarding Charges
(C) Total Ex-works value, ( A + B ) above
(D) Excise duty as applicable
(E) Sales Tax as applicable
(F) Total FOR Despatching station Value, ( C +D + E ) above
(G) Transportation charges
(H) Insurance charges @0.5% of Total FOR Despt. Station Value ( F ) above
(I) Assam entry tax
(J) Total FOR Duliajan value, ( F+ G+H + I ) above
(K) Installation & Commissioning charges
(L) Operation & Maintenance Charge for 3 months with monthly break up.
(M) Total Value ( J+K+L)

Note : Excise Duty in case of indigenous bidder is EXEMPTED under Deemed Export.

5.3 **When both Foreign and Domestic bids are involved :**

The Total Value of domestic bidder (inclusive of customs duty on imported raw material and components etc, and applicable terminal excise duty on the finished products and Sales Tax) excluding inland transportation to destination and Insurance charges worked out as per Para 5.2 above and Total Value of the foreign bidder worked out as per Para 5.1 above excluding inland transportation to destination will be compared.

6.0 Other terms and conditions of the Tender shall be as per General Terms and Conditions for Global Tender. However, if any of the Clauses of the Bid Rejection Criteria / Bid Evaluation Criteria (BEC / BRC) mentioned here contradict the Clauses in the General Terms and Conditions for Global Tender and/or elsewhere, those mentioned in this BEC / BRC shall prevail.

## COMMERCIAL CHECK LIST

**THE CHECK LIST MUST BE COMPLETED AND RETURNED WITH YOUR OFFER. PLEASE ENSURE THAT ALL THESE POINTS ARE COVERED IN YOUR OFFER. THESE WILL ENSURE THAT YOUR OFFER IS PROPERLY EVALUATED. PLEASE MARK 'YES' OR 'NO' OR SPECIFY AGAINST THE FOLLOWING QUESTIONS, IN THE RIGHT HAND COLUMN.**

| | | |
|---|---|---|
| 1 | Whether bid submitted under Two Bid System ? | |
| 2 | Whether ORIGINAL Bid Bond(not copy of Bid Bond) submitted? If YES, provide details | |
| | (a) Amount : | |
| | (b) Name of issuing Bank : | |
| | (c) Validity of Bid Bond : | |
| | (d) Whether Bid Bond is valid till<br>(e) Whether Bid Bond is submitted as per Revised format ? | |
| 3 | Whether offered firm prices ? | |
| 4 | Whether quoted offer validity of 180 days from the date of closing of tenders ? | |
| 5 | Whether quoted a firm delivery period? | |
| 6 | Whether quoted as per tender (without any deviations) ? | |
| 7 | Whether quoted any deviation ? | |
| 8 | Whether deviation separately highlighted ? | |
| 9 | Whether agreed to the Warranty clause ? | |
| 10 | Whether Price Bid submitted as per Price Schedule (refer Para 12.0 of BRC ) | |
| 11 | Whether quoted all the items of tender ? | |

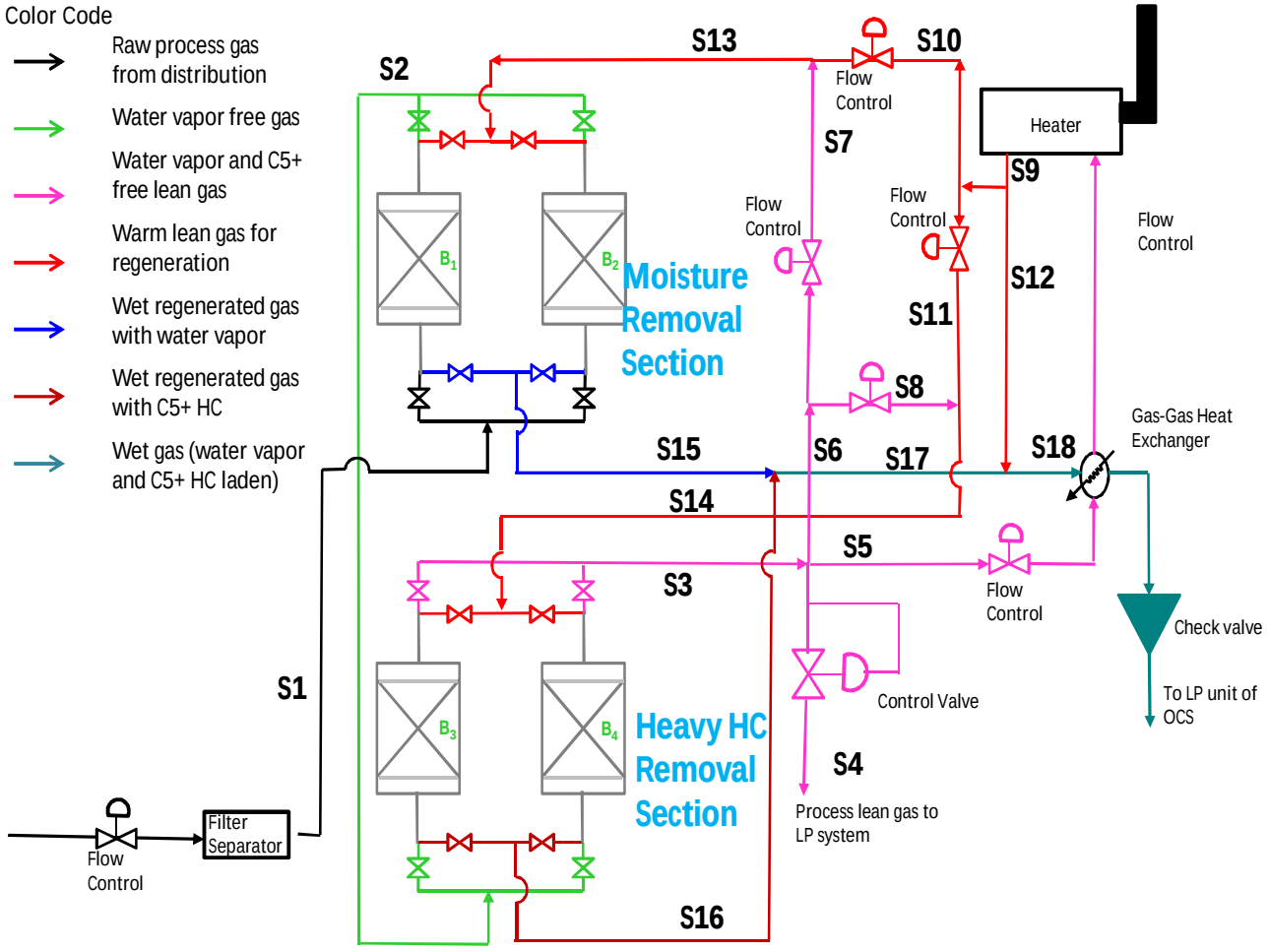
| | | |
|---|---|---|
| 12 | Whether indicated the country of origin for the items quoted? | |
| 13 | Whether technical literature / catalogue enclosed? | |
| 14 | Whether confirmed acceptance of tender Payment Terms . | |
| 15 | For Foreign Bidders - Whether offered FOB / FCA port of despatch including sea / air worthy packing & forwarding? | |
| 16 | For Foreign Bidders – Whether port of shipment indicated. To specify: | |
| 17 | For Indian bidders – Whether indicated the place from where the goods will be dispatched. To specify : | |
| 18 | For Indian bidders – Whether road transportation charges up to Duliajan quoted ? | |
| 19 | For Indian Bidders only - Whether offered Ex-works price including packing/forwarding charges ? | |
| 20 | Whether Indian Agent applicable ? | |
| 21 | If YES, whether following details of Indian Agent provided ? | |
| | (a) Name & address of the agent in India – To indicate | |
| | (b) Amount of agency commission – To indicate | |
| | (c) Whether agency commission included in quoted material value? | |
| 22 | Whether weight & volume of items offered indicated ? | |
| 23 | Whether confirmed to submit PBG as asked for in tender ? | |
| 24 | Whether agreed to submit PBG within 30 days of placement of order ? | |
| 25 | For Indian Bidders only - Whether indicated import content in the offer ? | |
| 26 | For Indian Bidders only - Whether deemed export quoted? | |
| 27 | For Indian Bidders only – Whether all applicable Taxes & Duties have been quoted ? | |
| 28 | Whether all BRC/BEC clauses accepted and supporting documents | |

| | | |
|---|---|---|
| | submitted as applicable ? | |
| 29 | Whether Integrity pact as per enclosed format with digital signature uploaded and whether all clauses of the pact has been accepted exactly as per format ? | |
| 30 | Whether Installation and commissioning has been confirmed and charges quoted ? | |

| | |
|---|---|
| OFFER REF | |

| | |
|---|---|
| NAME OF THE BIDDER | |

**Annexure I**




a) Stream S1 is rich natural gas at 50 deg C and 15 kg/cm$^2$ pressure. The goal of the process is to clean up S1 and remove moisture and $C_5$+ HCs.

b) There are four adsorption beds in the process. Beds 1 and 2 are used for removal of water vapour and the beds 3 and 4 are used for removal of heavier hydrocarbons (HCs). However, only one of the two beds, in each removal section, will be in the adsorption cycle at any time. The other two beds will be in regeneration mode. In other words, if bed 1 is in the adsorption cycle, bed 2 will be in the regeneration mode during that period. Similarly when bed 3 is in the adsorption cycle, bed 4 will be in the regeneration mode during that period.

c) The adsorption cycle will be carried out at a temperature of 50 deg C and a pressure of 15 $kg/cm^2$. Once an adsorption bed is saturated, it will be switched over to regeneration mode and the other regenerated bed will be switched over to adsorption mode. The saturated adsorption bed is first depressurized to 3 $kg/cm^2$ and then a hot purge gas stream at about 300 deg C is passed through the bed in order to desorb the bed.

d) The following steps are required for the operation:

1. Stream S1 is fed into adsorption column (1 or 2). As a result moisture free stream S2 is obtained. Only one of the two columns (1 or 2) would be operated in adsorption cycle while the other column would be in the regeneration cycle.

2. The stream S2 is fed into another adsorption column (3 or 4) to remove heavy HCs. The resultant stream S3 is free from both moisture and heavy HCs.

3. Stream S3 is divided into three streams S4, S5 and S6. The stream S4 is recovered as a product of the process and sent for further downstream operation. The stream S5 is used as purge stream for high temperature regeneration of adsorption beds. The stream S6 is further split into S7 and S8 to be used as cold regeneration purge streams for beds 1 (or 2) and 3 (or 4) respectively. These streams S7 and S8 can also be combined with appropriate flows of the hot regeneration stream to control temperature of the regeneration streams entering the beds.

4. The desired regeneration temperature is about 300 deg C. To achieve this, stream S5 is first passed through a gas-gas heat exchanger to recover some of the heat from stream S18 and subsequently heated in a heater and hot gas stream S9 is obtained.

5. S9 is further trifurcated three streams S10, S11 and S12. The two purge streams S10 (for columns 1 or 2) and S11 (for columns 3 or 4) are used for regeneration of the adsorbent columns. The stream S12 is a vent for excess gas from the heater and is combined with wet regenerated stream S17 before entering the gas-gas heat exchanger as stream S18. The hot stream S10 is combined with desired flow of cold lean gas streams S7 to obtain stream S13 used for regeneration of bed 1 (or 2). Similarly, the hot stream S11 is combined with desired flow of cold lean gas streams S8 to obtain stream S14 used for regeneration of bed 3 (or 4).

6. The streams S13 and S14 are recovered at the outlet of the beds as streams S15 and S16 respectively. The streams S15 and S16 will contain moisture desorbed from beds 1 (or 2) and HCs desorbed from beds 3 (or 4) respectively.

7. S15 and S16 are combined to S17, which is further combined with stream S12 to S18. Stream S18 is passed through a gas-gas heat exchanger as a pre-heater for S5.

ANNEXURE-II

# DATA SHEET FOR INSTRUMENTATION SYSTEM

| Data Sheet of Multivariable Transmitter(MVT) for Flow Measurement | | |
|---|---|---|
| 1 | Type | Electronic SMART Type MVT, Capacitance/Pizoresistance type |
| 2 | Output | Any protocol(Analog, HART, FF etc) |
| 3 | DP Range | As per design basis |
| 4 | Static Pressure Range | As per design basis |
| 5 | Isolation Material fill fluid | 316 L SST Silicon |
| 6 | Drain/Vent Material | SST |
| 7 | O-Ring | Glass Filled TFE |
| 8 | Process Input | RTD |
| 9 | Transmitter Housing Material | SST ½" – 14 NPT |
| 10 | Terminal Block | Standard |
| 11 | Meter | LCD Meter |
| 12 | Bracket | Coplaner SST Bracket for 2" pipe |
| 13 | Bolts | CS Bolts |
| 14 | Approval | Intrinsic Safety Certification |
| 15 | Enhanced Measurement Solution(EMS) | Mass Flow and measured variables(DP, P & T) |
| 16 | Power Supply | + 24 V DC |
| 17 | Load Driving Capacity | 250 – 1100 ohms |
| 18 | Accuracy | 1% of mass flow rate |

| | | |
|---|---|---|
| 19 | Stability | At least 5 zero |
| 20 | Enclosure Protection | IP-65 |
| 21 | Cable Entry | ½" NPT(F) |
| 22 | Electrical Area Classification | IEC Zone 2, Gas Group II A/II B, T6 |
| 23 | Function | Transmission & Indication |
| 24 | Mounting | Yoke |
| 25 | Rangibility | 40% or better |
| 26 | Element | Diaphragm |
| 27 | Element Material | SS316L |
| 28 | Valve Manifold | Required |
| 29 | Over Range Protection | Required |

| **Data Sheet of Resistance Temperature Detectors** | | |
|---|---|---|
| 1 | Element | 4-Wire RTD |
| 2 | No of Elements | Duplex |
| 3 | Calibration | As per DIN 43760 |
| 4 | Element Material | Pt 100 |
| 5 | Resistance at $0^0$ C | 100 Ohm |
| 6 | Leads | Hermetically Sealed |
| 7 | **Sheath** | |
| | OD | 8 mm |
| | Material | SS316 |
| | Nipple & Union Material | SS316 |

| | | |
|---|---|---|
| 8 | No of Wires | Four Wires |
| 9 | Head Cover Type | Screw Cap of Die Cast Aluminium of SS chain |
| 10 | Cable Entry | ½" NPT |
| 11 | No of Entries | Two(one SS pluged) |
| 12 | Protection Class | Intrinsically Safe EExia and Weather proof to IP 65 |
| 13 | **Thermowell** | |
| | Material | SS316 |
| | Construction | Drilled bar stock upto immersion length 500 mm(or depending on the design basis of pipe dia), otherwise fabricated |
| | Process Connection | 2" flanged/ 1" NPT(M) |
| | Instrument Connection | ¼" or ½" or 3/8" |
| 14 | Options | |
| | Extra Nipple Extension | 150 mm |

| **Data Sheet of Temperature Transmitters** | | |
|---|---|---|
| 1 | Function | Transmission & Indication |
| 2 | Type | Electronic Smart Type with any protocol(Analog, HART, FF etc) |
| 3 | Class | MFR Std |
| 4 | Mounting | Yoke |
| 5 | Protection Class | Intrinsically Safe EExia and Weather proof to IP 65 as per IEC 60529/ IS 2147 |
| 6 | Electrical Area Classification | IEC Zone 2, Gas Group II A/II B, T6 |
| 7 | Power Supply | 24 V DC |
| 8 | Cable Entry | ½" NPT(F) |

| | | |
|---|---|---|
| 9 | Accuracy | +/- 0.1% of span |
| 10 | Self-Diagnostic Facility | Yes |
| 11 | Transmitter Output | 4-20 mA DC |
| 12 | Load Capability | 600 ohm at 24 V DC |
| 13 | Sensor Element | Pt 100 |
| 14 | Calibration | As per DIN 43760 |
| 15 | Options | |
| | Mount. Acc. For 2" Pipe | Yes |
| | Intrinsically safe Output Meter(LCD) | Yes |
| **Data Sheet of Pressure Transmitters** | | |
| 1 | Function | Transmission & Indication |
| 2 | Operating Principle | Capacitance/Peizo-resistance |
| 3 | Type | Electronic Smart Type with any protocol(Analog, HART, FF etc) |
| 4 | Class | MFR Std |
| 5 | Mounting | Yoke |
| 6 | Protection Class | Intrinsically Safe EExia and Weather proof to IP 65 as per IEC 60529/ IS 2147 |
| 7 | Electrical Area Classification | IEC Zone 2, Gas Group II A/II B, T6 |
| 8 | Intrinsically Safe | Yes |
| 9 | Power Supply | 24 V DC |
| 10 | Cable Entry | ½" NPT(F) with SS plug |
| 11 | Accuracy | +/- 0.075% of span |

| | | |
|---|---|---|
| 12 | Rangeability | 40:1 or better |
| 13 | Transmitter Output | 4-20 mA DC |
| 14 | Load Capability | 600 ohm at 24 V DC |
| 15 | Service | Natural Gas |
| 16 | Element | Diaphragm |
| 17 | Body Material | SS316 |
| 18 | Element Material | SS316L |
| 19 | Process Connection | ½"NPT(F) or 3/8" NPT(F) |
| | Process Connection Location | Bottom |
| 20 | Fill Fluid | Silicone Oil |
| 21 | Zero & Span Adjustment | Non-interactive Type |
| 22 | Zero Suppression & Elevation | 100% of span continuously adjustable externally |
| 23 | Adapter 'O' Ring | PTFE |
| 24 | Over Range Protection | Yes |
| 25 | Option | |
| | Intrinsically safe Output Meter(LCD) | Yes in Engg. Unit |
| | Mounting Accessories suitable for 2" NB Pipe | Yes |
| | 2 Valve Manifold | Yes |

| Data Sheet of Pressure Switch | | |
|---|---|---|
| 1 | Type | Seal Diaphragm, Piston Actuated |
| 2 | Sensing Element Material | AISI SS-316 Diaphragm/Piston. All other wetted part SS-316 |
| 3 | Case Material | Epoxy coated steel plate or die-cast aluminium with neoprene gasket and clear glass. Cover conforming to IP-65( Explosion proof for NEC Class 1, Division 1 Area) |
| 4 | Setter Scale | Black graduation on white liner scale. Graduation 0-100% with red pointer for set points |
| 5 | Over Range | 150% of maximum pressure |
| 6 | Adjustments | Internal Set point |
| | | Internal Differential adjustment nut with dial for at least 10% of span(min.) |
| 7 | Process connection | Suitable as per design basis( or any ½" NPT(M) / 3/8" NPT(M)/ ¼" NPT(M) bottom connected) |
| 8 | Switch Configuration | Two SPDT |
| 9 | Switch Rating | 240 V, 5 A AC / 220 V, 0.5 A DC |
| 10 | Switch Type | Snap Acting, Shock & Vibration proof |
| 11 | Adjustability | a) Set point adjustable over span range |
| | | b) Differential adjustment by 10 percentage of span(min.) |
| 12 | Sealing ring | Viton, Buna-N |
| 13 | Terminal Block | Suitable for full ring lugs for cable connections |
| 14 | Cable Connection | ½" NPT(F) or 3/8" NPT(F) or ¼" NPT(F)Conduit connection or compression gland(as per design requirement) |
| 15 | Enclosure class | IP 65 |
| 16 | Performance | Accuracy ± 1%, Accuracy of setting indication of ± 1.5% |

| | | |
|---|---|---|
| 17 | Name Plate | Tag number, services engraved in stainless steel Tag plate |

| **Data Sheet of Control Panel** | | |
|---|---|---|
| 1 | Type | Enclosed self-supporting |
| 2 | Material | Heavy gauge CRCA sheet steel, reinforced to provide self-standing and rigid assembly |
| 3 | Thickness | Not less than 3 mm |
| 4 | Surfacing | Clean and smooth finish with anti-rust and anti-corrosion primer coating |
| 5 | Color | |
| | External | Light Grey |
| | Internal | Glossy white |
| 6 | Dimensions | As per design standard |
| 7 | Enclosure class | IP-65 |
| 8 | Temperature | |
| | Environment | Maximum 50 deg C |
| | Internal temperature control | Maintained at optimum value for system equipment |
| 9 | Door location | Back with door latch (removable) |
| 10 | Cable connection | Plug in |
| 11 | Process signaltermination practice | Screwed, terminal point, wire wrap or manufacturer's standard with 100 mm (minimum) gap between terminal block |
| 12 | Card mounting | As per PLCstandard rack |
| 13 | Wiring | |

| | | |
|---|---|---|
| | Terminal blocklocation | 30 cm above floor, easy accessible and maintenance |
| | No of processTermination per Terminal | Two (2) maximum |
| | Insulation grade | 600 V or above |
| | Designation | All cables shall be marked for identification by color code wires etc |
| | Termination spare | 20% after complete installation |
| | Cable and fitting | Prefabricated cable from process termination to the system cabinet with connection on both sides. |
| | Internal wiring | One fused terminal block with required glass fuse rating for each input and output. |
| | Isolation | All circuit including shield isolated from cabinet |
| | Panel lighting | Panel tube light should be ON while opening the door |

| **Data Sheet of TFT Display Monitor** | | |
|---|---|---|
| 1 | Operator Input | Keypad, Touch, or Key/Touch |
| 2 | Display Description | Color active-matrix TFT |
| 3 | Display Size | 15 inch |
| 4 | Display Area (WxH) | 304 x 228 mm (12.0 x 9.0 in) |
| 5 | Resolution | 1024 x 768, 18-bit color graphics |
| 6 | Luminance | 300 cd/m2 Nits |
| 7 | Backlight | 50,000 h life, min., field replaceable |

| | | |
|---|---|---|
| 8 | Real-time Clock | Battery backed clock timestamps critical data, ± 2 minutes per month<br>Battery life: 4 year min. @ 25 °C (77 °F) |
| 9 | Touch Screen Description | 8-wire analog resistive<br>Actuation: 1 million presses; operating force: 10…110 g |
| 10 | Keypad Description | Stainless-steel membrane<br>Numeric, navigation, and function keys<br>Actuation: 1 million presses; operating force: 10…340 g |
| 11 | Function Keys | 40 (F1…F20, K1…K20) |
| 12 | Operating Systems | Windows CE 6.0 with extended features/file viewers or better |
| 13 | Application Software | FactoryTalk View Machine Edition<br>FactoryTalk ViewPoint, version 1.2 or later |
| 14 | Memory | 512 MB nonvolatile flash and 512 MB RAM |
| 15 | Communication Ports | Ethernet (10/100 Mbps, Auto-MDI/MDI-X), RS-232, (2) USB host, (1) USB device,<br>Network interface for optional DH+/DH-485, or ControlNet (scheduled or unscheduled) communication module |
| 16 | External storage | Secure Digital (SD) card, supported by hot-swappable SD card slot<br>USB flash drives supported by high-speed, hot-swappable, 2.0 USB ports |
| 17 | Input Voltage AC | AC: 85…264V AC, 47…63 Hz |
| | Input Voltage | DC 18…32V DC (24V DC nominal) |
| 18 | Power Consumption | |

| | | |
|---|---|---|
| | Power Consumption, AC | 160VA max |
| | Power Consumption, DC | 70 W (2.9 A at 24V DC) |
| 19 | Operating Temperature | 0…55 °C (32…131 °F) |
| 20 | Dimension | |
| | Keypad (HxWxD)<br>or Key/Touch | 330 x 469 x 65 mm<br>12.97 x 18.46 x 2.55 in. |
| | Touch Screen (HxWxD) | 330 x 416 x 65 mm<br>12.97 x 16.37 x 2.55 in. |

| **Data Sheet of Solenoid valve** | | |
|---|---|---|
| 1 | Type | NORMALLY CLOSED DIRECT ACTING (3 way normally closed input port connected to out port, energized- out put port connected to exhaust) |
| 2 | Size | Port size:1/4", Connection size: 1/2" NPT |
| 3 | Protection Class | Intrinsically safe ,Flameproof, IP-67, All construction safety as per IEC61508, Suitable for Zone-1 Zone 2 hazardous area |
| 4 | Power Supply | 24 V DC |
| 5 | Enclosure | Electrical enclosure as per EN 60529, Aluminium IP-67, Zone II 2/G/D Eexd IIC T6, T4 IP 67 |
| 6 | Service | AIR & Natural Gas |
| 7 | Body/Material | 316SS, CORE & PLUG NET 430F SS, CORE TUBE 303 SS or 304 SS |
| 8 | RIDER RING | PTFE |

| | | |
|---|---|---|
| 9 | SPRINGS | 303 SS or 304 SS |
| 10 | Duty | Continuous, heavy duty |
| 11 | WATTAGE | 0.7 TO 12 WATT |

| **General Data Sheet of PLC(Programmable Logic Controller)** | | |
|---|---|---|
| 1 | Make | Preferably Allen Bradley |
| 2 | Total number of points | As per design |
| 3 | No of Instruction | As per design |
| 4 | No of Inputs/Outputs | As per design |
| 5 | Input Type | Analog/Digital/AC/DC/RTD/Thermocuple/All types of FieldBus protocol etc |
| 6 | Output Type | Analog/Digital/AC/DC/RTD/Thermocuple/All types of FieldBus protocol etc |
| 7 | Processor | 32/64 bit processor, maximum 0.5 micro seconds cycle time/1k words |
| 8 | flash memory(non-volatile) | Maximum 128 MB |
| 9 | User Memory | 384 KB to 3 MB |
| 10 | Expandable | Yes |
| 11 | Maximum no of channels | As per design basis of I/O |
| 12 | Programming | Computer programmable |
| 13 | PLC Programming Software | LD/SFC/IL/FBD/ST/RLL |
| 14 | Application Software | Gas Flow Calculation Software as AGA-3 for main PLC |
| 15 | Power | 24 V DC/230 V AC |

| | | |
|---|---|---|
| 16 | Communication Port | For Heater PLC: Ethernet- 1 no, RS 232: 1no<br>For Main PLC: Ethernet-1 no, RS232- 2no |
| 17 | Controller Task | Maximum 32 tasks, Maximum 100 programs/ tasks |
| 18 | Controller Application | General purpose, Small to medium size applications |
| 19 | Features | Visual LED indicators/Non-volatile Memory(EEPROM)/Integral Power Supply/Surge Protection/ Timer(s)/Counter(s) |
| 20 | Mounting | Panel Rack Mounted |