

Office of Plant & Equipment (P&E)
Division,
Operational Building, 1st Floor,
Chiranjibpur, Haldia, Dist.: Purba
Medinipur,
West Bengal, India, PIN - 721 604.

Phone: +91 - 3224 - 252581

Mobile : +91 - 9434031336

E-mail: akmaity.hdc@kolkataporttrust.gov.in

No.: DM(P&E)/100A Port Hospital/ENQ/48

Dated: 28th September, 2021

Dear Sir,

Subject : Enquiry for budgetary offer related to "Supply, Installation, Commissioning of medical gas pipeline system (MGPS) including storage facilities at port hospital, HDC including five years comprehensive operation and maintenance."

You are requested to submit your **sealed budgetary offer**, for "Supply, Installation, Commissioning of medical gas pipeline system (MGPS) at Port hospital, HDC including five years comprehensive operation and maintenance." as per the 'Scope of Work' in **Annex-A 'Technical Specification'** provided in **Annex - "B"** (enclosed) and the 'Bill of Quantities' (BoQ) furnished in **Annex - "C"** (enclosed).

Your offer should be based upon the following terms and conditions:

1. **Price basis:**

- 1.1 The quoted price shall be based on **Free Door Delivery** at **Port Hospital** i.e. **the quoted price shall be inclusive of all charges for transportation, handling, supply, delivery, installation and commissioning at site, guarantee support (as per contractual conditions) and all other incidental charges for the execution of the contract including unloading at site will be done by HDC.**
- 1.2 The tenderer shall fill in 'Unit Rate' and 'Amount' for the item, as described in the '**Bill of Quantities**', as per the required break-up.
- 1.3 The prices quoted shall be exclusive of **GST** as well as any statutory levies and/or other charges levied by any Central/State/local authorities, which shall be paid extra, at applicable rates, at the time of supply of goods. As such, details thereof, as applicable, are to be furnished clearly in the offer.
- 1.4 The prices should be firm and no variation, except towards statutory duties, levies and taxes, shall be payable.
- 1.5 Any new statutory levies, taxes, duties, cess, etc. imposed by the Central/State/local authorities, by way of fresh notifications, subsequent to the issue of Work Order/Purchase Order, but within the stipulated delivery period, shall be paid extra.

2. **General terms & conditions related to GST:**

- 2.1 Supplier to confirm that the GST amount charged in invoice is declared in its returns and payment of taxes is also made.
- 2.2 The Supplier agrees to comply with all applicable GST laws, including GST acts, rules, regulations, procedures, circulars & instructions thereunder applicable in India from time to time and to ensure that such compliance is done within the time prescribed under such laws. Supplier should ensure accurate transaction details, as required by GST laws, are timely uploaded in GSTN. In case there is any mismatch between the details so uploaded in GSTN by Supplier and details available with Kolkata Port Trust, then payments to Supplier to the extent of GST relating to the invoice/s under mismatch may be retained from due payments till such time Kolkata Port Trust is not sure that accurate tax amount is finally reflected in the GSTN to KoPT's Account and is finally available to Kolkata Port Trust in terms of GST laws and

that the credit of GST so taken by Kolkata Port Trust is not required to be reversed at a later date along with applicable interest.

- 2.3 Kolkata Port Trust has the right to recover monetary loss including interest and penalty suffered by it due to any non-compliance of tax laws by the supplier. Any loss of input tax credit to Kolkata Port Trust for the fault of supplier shall be recovered by Kolkata Port Trust by way of adjustment in the consideration payable.
- 2.4 Supplementary invoices/debit note/credit note for price revisions to enable Kolkata Port Trust to claim tax benefit on the same shall be issued by you for a particular year before September of the succeeding Financial Year.
- 2.5 The purchase order/work order shall be void, if at any point of time you are found to be a black listed dealer as per GSTN rating system and further no payment shall be entertained.

3. **Payment terms:**

Payment will be made based on accepted rates of the bill of quantities. Monthly one bill would be accepted.

i) 70% Payment against each item will be made against supply of respective item at site and submission of bills along with Custodian Certificate and other relevant documents like Inspection Reports, Challans, etc.

ii) 20% Payment of each item will be made against installation & commissioning of the respective item and submission of bills along with Installation Certificate.

iii) 10 % Payment of each item against commissioning, handover and obtaining statutory certificate of the system by the contractor and submission of bills.

The bills should be submitted, in quadruplicate, to the office of the General Manager(Engg), along with all relevant documents like receipted Challan(s) [duly signed by the consignee or his authorised representative], Pre-despatch Inspection Certificate, Guarantee Certificate, Fitment Certificate, etc.

Payment will be made in Indian Rupees through the banker of the contractor i.e. through **ECS**. During submission of bill(s), the following information must be submitted by the Contractor regarding their banker:

- a) Savings/Current Account Number:
- b) Name of the Bank:
- c) Name of the Branch and address thereof:
- d) RTGS Code of the Branch:

4. **Delivery period:** The supply of the material to be completed in all respect within 75 (seventy five) days from the date of receipt of order.

5. **Inspection:** The Contractor shall have to afford all the requisite facilities for pre-despatch inspection by SMP officials at his/their premises, at his/their own cost and arrangement, for which clear **7 (seven) days** time from the date of receipt of inspection offer should be provided by the Contractor.

6. **Guarantee:**

- 6.1 The material(s), to be supplied, shall have to be guaranteed by the Contractor for a period of **12 (twelve) months from the date of commissioning against poor material and bad workmanship.**

- 6.2 **Guarantee Certificate** is to be furnished by the Contractor, in this regard. If any defect, whatsoever, develops during the guarantee period, the defective material(s) will have to be replaced/rectified by the Contractor at his/their own cost and arrangement.

- 6.3 The Contractor shall be responsible for making good, with all possible speed, at his/their expense any defect in or damage to any portion of the supply, which may appear or occur after the material(s) have been accepted by HDC, KoPT and before expiry of the Guarantee Period {including extension(s), if any} and which arises either:

- a) from any defective material(s), workmanship or design or
- b) from any act or omission of the Contractor done or omitted during the said period.

7. **Way bill:** If required and admissible, way bill will be arranged by HDC However, you should provide

clear 15 days time from the date of receipt of the request letter for way bill from your end.

8. **Liquidated Damage clause:** In the event of your failure to execute the contract within the stipulated dates or such extension(s) thereof, as may be allowed by General Manager(Engg) in writing, you will be required to pay as compensation to the Trustees and not as penalty @ $\frac{1}{2}$ % **for every week or part thereof of the total value of work (contract price)**, provided always the entire amount of compensation to be paid under the provision of this clause shall not exceed 10% of the said value of work. The Trustees may, without prejudice to any other method of recovery, deduct the amount of such damages from any money which is due or which may become due to you. The payment or deduction of such damages shall not relieve you from your obligation to complete the supply of spare(s) or from any other of your obligation or liabilities under the contract. GST will be applicable on L.D amount.
9. **Force Majeure:** In the event of either party being rendered unable by Force Majeure to perform any obligations required to be performed by them under the contract, the relative obligation of the party affected by such Force Majeure shall, upon notification to the other party, be suspended for the period during which such Force Majeure event lasts. The cost and loss sustained by either party shall be borne by the respective parties. The term 'FORCE MAJEURE', as employed herein, shall mean acts of God, Earthquake, Tsunami (caused by earthquake at the ocean bed), War, Revolt, Riot, Fire, Floods, Sabotage and Hurricane/Cyclone, Strike {excluding that of the contractor's supplier(s) or the sub-contractor's employees}. Upon the occurrence of such case and upon its termination, the party alleging that it has been rendered unable, as aforesaid, shall notify the other party in writing immediately, but not later than 48 (forty-eight) hours of the alleged beginning and ending thereof, giving full particulars and satisfactory evidence in support of its claim.
10. **Packing:** You shall be responsible for proper packing and delivery of the material(s). The material(s) should be packed in proper way by you, at your own cost, for protection against any damage, loss, breakage, etc.
11. **Validity:** The validity of your offer should **not be less than 120 (one hundred twenty) days from the date of opening of the offer.**
12. You shall have to furnish your **GST Registration Number** in your offer.

You are requested to return a copy of the instant enquiry letter, duly signed and stamped on each page, along with your offer, as a token of your acceptance of the aforesaid terms and conditions.

The sealed envelope, containing your offer, must be superscribed with the following:

Enquiry No. : **DM(P&E)/100A Port Hospital/ENQ/48**

Dated: **28th September, 2021**

You are requested to send your sealed budgetary offer, to the office of **Dy. Manager (P&E Div), Operational Administrative Building(1st floor), Haldia Dock Complex, Chiranjibpur, Haldia, PIN:721604**, within 1700 Hrs. of 8th October, 2021.

Your early action, in this regard, is solicited.

Thank you.

Yours faithfully,

-----Sd-----

AK.Maiti
Dy.Manager(P&E)
For General Manager(Engg)
HDC, SMP Kolkata

Encl. : As above.

**SUPPLY, INSTALLATION, COMMISSIONING & OPERATION OF MEDICAL GAS
PIPELINE SYSTEM (MGPS) at PORT HOSPITAL, HDC**

Terms of Reference:

I. General Scope of Work of the contractor

1. Supply Installation, Testing & Commissioning of "Vacuum Insulated Storage Vessel for storage of liquid product from which oxygen can be tapped from the liquid storage vessel after the vaporizer, through the pipe spool" at the Port Hospital, Haldia.
2. Design, Supply, Assembly, erection, pressure test & commission the supplied system (Cryogenic Storage Tank, vertical of Volume- 3 KL) along with all accessories. The contractor shall provide the basic engineering drawings for the Equipment and accessories.
3. Supply Installation, Testing & Commissioning of "Equipments" (as detailed in Technical Specifications at **Annex-B**) at Port Hospital, HDC.
4. Supply, Installation, Testing & Commissioning of Medical gas Pipeline System including associate accessories for the existing building as per the drawing enclosed at **Annex-D**. The requirement of pipeline along with associated equipments for the proposed building shall also be submitted in the offer as per the drawing enclosed at **Annex-D**. HDC may execute the quantity in the proposed building as per discretion. However, the contractor should consider the proposed building during fixation of capacity of oxygen storage tank.
5. Supply, Installation, Testing & Commissioning of VIE Vessel & AV Coil. Foundation for VIE Vessel & AV Coil. The contractor shall make the foundation of the oxygen storage tank and all civil work related to gas pipeline distribution network.
6. Supply of Liquid Medical Oxygen as per the requirement of Port Hospital. However, the contractor shall quote the rate for supply of oxygen F.O.R at the proposed storage yard at Port hospital.
7. Supply of Bottled Medical Gas (D type Jumbo type cylinder) viz, Medical Oxygen, Medical N₂O as per the requirement of Port Hospital. However, the contractor shall quote the rate for supply of oxygen F.O.R at the proposed storage yard at Port hospital.
8. Support for the PESO licensing.
9. Provide the required gas and consumable for Pressure Testing of the Equipment.
10. All electrical jobs like area lighting, earthing, power sockets, and drawing power cable to the control panel from the nearest source provided by HDC as per requirement.
11. Train selected employees of Port hospital on handling of the supply system & safety features.

12. Man the installation for 1-2 days during startup, as per the requirement.
13. Provide Civil Drawings pertaining to the Installation.
14. Provide equipment maintenance related to
 - i. Annual Pressure Testing (except gas & consumable)
 - ii. Replacement of Defective (either due to material or Workmanship defect) and worn out parts.

Medical Oxygen:

- Vessel Capacity : min. 3000 liters. However, the contractor shall suggest any higher capacity considering the proposed area.
- Configuration- Vertical
- Operating working pressure 8-12 kg/cm²
- Should have compact unit including vessel and vaporizer.
- Vessel should be of standard material and technology keep in view of safety.
- Purity-99-100%.
- Medical grade I.P. to be certified safe for human use.
- The system should have content indicator and preferably low liquid level alarm with safety system in case of emergency/un-natural calamities.

Supply, Installation, testing and commissioning of Medical Oxygen Container/Vessel

- A 3 Kl. Cryogenic oxygen Vessel/storage tank in vertical/horizontal position with all accessories and pipelines will have to be installed by the contractor. The maximum allowable working pressure for the cryogenic tank should be 17kg per sq cm or to withstand MAWP, Design pressure ,hydro test pressure as per EN13458 Standard or other national and international codes.
- New connection of the installed oxygen tank from the manifold room to be provided.
- Contractor should quote pipe length and other accessories requirement as per BoQ. However, the quantity may be more/less based on site requirement which will be paid as per unit rate quoted an actual executed quantity.
- Necessary certifications for licenses will have to be provided by the contractor for the installed vessel.
- The tank should include Ambient Air Vaporizer 100 nM³/hr, O&ED System, Pipe Spool, required fittings, Gauges, Regulators, Remote Telemetry Unit (RTU) etc. Charges should be all inclusive of the above items.
- Safety/security if any, other than fencing, guard etc which will be done by HDC should be provided by the firm.
- Any additional transportation charges for liquid oxygen to be included along with the basic price of gas.

The scope of work of contractor shall cover design, engineering, submission of drawings for approval, submission of assignment drawings, manufacture, factory testing, inspection by client / consultant, packing, loading, forwarding, delivery at Plant site, loading/unloading, storage, handling of material/equipment for erection, erection, testing, commissioning, PG test, PAT/FAT and liquidating the defects of all Electrical equipment/system,

Illumination equipment/system, Cables, erection materials etc. along with associated Civil works required for erection for the proposed manifold rooms within battery limit. Any item or equipment not specifically mentioned but required for completeness, proper installation, reliable operation, maintenance and statutory requirement including safety & shall be included by the Contractor in his scope of work.

Electrical scope of work:

Contractor's scope of work for this package shall include but not limited to the following:

1. Power distribution Board (PDB)– One no. (Total 12 nos.) Wall mounted/Pedestal Stand , Conventional, non draw-out type, Single front, Power distribution Board (PDB) in IP-55 enclosure with canopy and single incomer shall be provided for control of drives/motors and lighting . The panel shall be made of 2mm thick CRCA sheet and compartmentalized. The incomer shall have MCCB (Thermal magnetic) with S/C, O/C & E/F protection, RYB Phase indication lamp , Ammeter & Voltmeter. The PDB shall be with two outgoing motor feeders (1W +1S) and one power supply feeder feeding the lighting load. The motor feeder shall be with MPCB, Contactor, Electronic overload, Start Stop Push Buttons & Motor On, Off, Trip indications. The rating of MPCB, Contactor (min 25A rating) and EOCR shall be as per Type II coordination chart of the manufacturer. The outgoing power supply feeder feeding the lighting load shall be with MCCB (Thermal magnetic) with S/C, O/C & E/F protection and shall be with both Auto manual mode of operation.
2. Complete illumination system inside and the periphery of the shed by providing Lighting Pole (2 nos.) of suitable height (Swaged Tubular pole conforming to 410 SP 29), Junction box and lighting fixture (Bajaj Model No. BRTFG 140W LED or equivalent) for the shed. The junction Box shall be made of Polycarbonate with IP 66 protection.
3. Cu/Al XLPE insulated Armored Power cables conforming to IS 7098, IS 5831, IS 8130, IS 3961, IS 3975 shall be provided. 4C X 6 Al, XLPE insulated, Armored Power cable shall be provided for motors and 4C X 2.5 Cu, XLPE insulated, Armored Power cable shall be provided for lighting. All the cables as required shall be in the scope of the Contractor.
4. Earthing shall be provided for the PDB panel and lighting poles as per IS 3043.
5. GI Pipes, GI conduits of various sizes/duty required for cable laying/crossing floors, road/drainage etc. cable laying to motors, cable for lighting system etc.
6. Buried cable laying materials like sands, bricks, slabs, etc, all other materials required to make the installation complete.
7. One lightening arrestor conforming to IS 2309:1989 to be provided along with 4 no.earth pits at each corner of the proposed building.
8. Cable termination materials/termination kits, ferrules, cable markers, double compression cable glands, insulating tapes, cable lugs, cable tags, cable fasteners/dressing materials, sealing materials for openings/conduits,

insulating mats in front of panels, danger boards and all other materials required to make the installation complete.

9. All civil works associated with erection of Electrical panels, cables, conduits, outdoor illumination system equipment, etc. all civil foundation required for street light poles, all civil work like chipping of floors/walls and making good required for concealed wiring & installation of illumination system equipment, etc.
10. Danger boards, rubber mats, safety charts, sand buckets, fire retardant paint, fire sealing compound etc as required.

II. HDC's responsibility

1. Providing fresh water Source free of cost
2. Providing Electric Supply free of cost. HDC shall
3. Construction of Gas manifold Room.
4. Provide an open area of approximately 16m x 9m for the above Liquid Medical Oxygen Installation (as specified by PESO) with proper approach road for Heavy duty tankers drivable for refilling.
5. The Statutory Fees levied by PESO, Nagpur towards getting the Installation License for Storage shall have to be borne by HDC.
 - a. Hardstand and fencing of the proposed storage yard location. Hardstand inside the periphery of the tank.
 - b. Foundation of Structural Support for Pipeline (if any)
 - c. Other Punch List Items (earth pits, fire extinguishers, industrial lighting – flameproof, etc. if any).
6. Facilities to be provided by HDC during the time of erection & commissioning of installation:
 - a) Free access to HDC works for contractor and its representatives at all times. All utilities like Power, Water etc. and secured storage space for keeping contractor's material to be used during Installation shall be provided by HDC
 - b) Permanent provision for Water shall be provided by HDC at the Installation Site.
 - c) HDC shall provide tested and certified Crane/Hydra as specified by the Seller, for unloading and erection of the Equipment.

III. Mode of transport

Liquid oxygen shall be supplied by the contractor on Weighment Basis or Flowmeter through contractor's own Transport Tanker (Vacuum Insulated Transport Tanker, VITT) and the same will be decanted in the Storage Tank

Liquid Medical Oxygen should be 99.99% purity minimum (the Product). The volume of Product supplied in cubic meter (M³) shall indicate gas equivalent of the Product at standard temperature of 27 degree C and one atmospheric pressure Vacuum Insulated Storage Tanker, VIST) installed at HDC premises.

1 Kg of Liquid Oxygen = 0.770 m³ of gaseous Oxygen.

1 Litre of Liquid Oxygen = 0.877 M³ of gaseous Oxygen.

IV. Price Variation

Contractor shall be entitled for a revision in price of the gases at the rate of 5% per year .

V. SPACE REQUIREMENTS:

A space of 9 x 16 mtr will be provided for each separate LMO installations, with proper approach road for Heavy duty tankers drivability for refilling. Also, over head or underground electric wire & drainage/water line shall be avoided.

VI. TRAINING & OPERATIONAL MANUAL

1. The contractor will provide hands on training to two doctors / two technicians of Port Hospital, HDC in his own cost for operating / handling the medical equipment(s) at the time of installation of equipment.
2. The contractor will provide the operation / maintenance manuals of all equipment to the purchaser at the time of installation.

TECHNICAL SPECIFICATION FOR MEDICAL GAS PIPELINE SYSTEMS

Source Equipment & Manifold Management System

1.0 Oxygen Management System

1.1 Two- Sided Cylinder Manifold Indigenous (Oxygen) 8+8 (Make: Linde, MR, Ellenbarrie or equivalent)

One no of Oxygen Manifold extendable type of size 2 X 8 for bulk oxygen cylinder will be provided. The manifold will be suitable to withstand a working pressure of 140kg/cm². The manifold will also have high pressure copper annealed tail pipe with one end having brass adaptor suitable for oxygen cylinder and other end suitable for manifold non return valves. The manifold will also be provided with sixteen no. of non- return valve- one no for each cylinder. The material of construction of non – return valve will be brass. The manifold will also be provided with middle frame. The middle frame will be made with circumferential mild steel flat duly powder coated with black colour. (Only manifold shall be provided)

1.2 Fully Automatic Control Panel (Oxygen): 3- source (Make: AKTIV, MR, ALTOS or equivalent)

One no. of fully automatic oxygen control panel with 3-source will be provided to control the 2 X 8 Oxygen Gas manifold.

The Control Panel should be CE-certified / UL-listed.

It should fully comply and meets with the requirements of HTM 02-01 standards / NFPA-99C / DIN Standard.

Automatic Changeover Manifolds shall be duly CE marked / UL-listed. It should have all regulators which should be adiabatic certified. The manifold control panel shall be designed and certified for use with oxygen at 200 Bar and 60°C. Central regulator panels with cylinder headers each side. Headers are complete with gas specific cylinder tailpipes. All components should be degreased for oxygen use. Mild steel powder coated enclosure should have transparent window. The manifold control system shall be powered by an extra low voltage on board supply. The controller shall include normally closed alarm connections. Line pressure shall be continuously monitored by an electronic pressure switch; mechanically actuated pressure switches are not acceptable. Two non-return valves, one for each bank, shall be provided within a line pressure manifold block and shall provide gas tight isolation of each bank during maintenance and ensure supply continuity in the event of any upstream component failure. In the event of a low line pressure condition, both solenoid valves shall open to enable both banks to deliver gas and restore normal pipeline pressure. A manifold status panel shall be provided with colour coded LED indication lights for the following operating and fault indications:

- Power On (Green)
- High Line Pressure (Red)
- Low Line Pressure (Red)
- Reserve Low (Amber)
- Left Bank Running (Green)
- Left Bank Low (Amber)
- Left Bank Empty (Amber)
- Right Bank Running (Green)
- Right Bank Low (Amber)
- Right Bank Empty (Amber)

The Interface Indicator shall be provided with colour coded LED indication lights for the following operating and fault indications:

- ✓ Normal (Green)
- ✓ Duty Bank Empty (Amber)
- ✓ Standby Low (Amber)
- ✓ Reserve Bank Low (Amber)
- ✓ Pipeline Pressure Fault (Red)
- ✓ System Fault (Red)

In the event of a power supply failure, both solenoid valves shall open to enable gas to be supplied from both cylinder banks simultaneously until restoration of the power supply.

The minimum flow of Gas should be minimum 1300 LPM.

The Control Panel should be three-way type, where two inlets to be connected to the cylinder banks and the third one to be connected to LMO Supply.

1.3 Emergency Oxygen Supply System 4-cylinders: Indigenous (Make: Linde, MR, Ellenbarrie or equivalent)

The system is same as above for configuration of 4 X 1 system without any additional automatic control panel. The emergency oxygen supply system will be controlled from the Double-stage Regulator (Adiabatic –certified) to control the Line Pressure of Oxygen.

2.0 NITROUS OXIDE MANAGEMENT SYSTEM

(Make: Linde, MR, Ellenbarrie or equivalent)

2.1 Two-Sided Cylinder Manifold Indigenous (N₂O) 2+2

One no of N₂O Manifold extendable type of size 2 X 2 for bulk N₂O cylinder will be provided. The manifold will be suitable to withstand a working pressure of 140kg/cm². The manifold will also have high pressure copper annealed tail pipe with one end having brass adaptor suitable for oxygen cylinder and other end suitable for manifold non return valves. The manifold will also be provided with twenty no. of non- return valve- one no for each cylinder. The material of construction of non – return valve will be brass. The manifold will also be provided with middle frame. The middle frame will be made with circumferential mild steel flat duly powder coated with black colour. (Only manifold shall be provided)

2.2 Fully Automatic Control Panel (N₂O)

(Make: AKTIV, MR, ALTOS or equivalent)

One no. of fully automatic oxygen control panel will be provided to control the 2 X 2 N₂O Gas manifold.

The Control Panel should be CE-certified / UL-listed.

It should fully comply and meets with the requirements of HTM 02-01 standards / NFPA-99C / DIN Standard.

Automatic Changeover Manifolds shall be duly CE marked / UL-listed. It should have all regulators which should be certified. The manifold control panel shall be designed and certified for use with N₂O at 200 Bar and 60°C. Central regulator panels with cylinder headers each side. Headers are complete with gas specific cylinder tailpipes. It should be Pre-wired for alarm. Mild steel powder coated enclosure should have transparent window. The manifold control system shall be powered by an extra low voltage on board supply. The controller shall include normally closed alarm connections. Line pressure shall be continuously monitored by an electronic pressure switch; mechanically actuated pressure switches are not acceptable. **A 50 W cartridge heaters with thermostat control should be in N₂O Control Panel.** Two non-return valves, one for each bank, shall be provided within a line pressure manifold block and shall provide gas tight isolation of each bank during maintenance and ensure supply continuity in the event of any upstream component failure. In the event of a low line pressure condition, both solenoid valves shall open to enable both banks to deliver gas and restore normal pipeline pressure. A manifold status panel shall be provided with colour coded LED indication lights for the following operating and fault indications:

- Power On (Green)
- High Line Pressure (Red)
- Low Line Pressure (Red)
- Reserve Low (Amber)
- Left Bank Running (Green)

- Left Bank Low (Amber)
- Left Bank Empty (Amber)
- Right Bank Running (Green)
- Right Bank Low (Amber)
- Right Bank Empty (Amber)

The Interface Indicator shall be provided with colour coded LED indication lights for the following operating and fault indications:

- ✓ Normal (Green)
- ✓ Duty Bank Empty (Amber)
- ✓ Standby Low (Amber)
- ✓ Reserve Bank Low (Amber)
- ✓ Pipeline Pressure Fault (Red)
- ✓ System Fault (Red)

In the event of a power supply failure, both solenoid valves shall open to enable gas to be supplied from both cylinder banks simultaneously until restoration of the power supply.

The minimum flow of Gas should be minimum 500 LPM.

2.4 Emergency N₂O Supply System 2 -cylinders: Indigenous (Make: Linde, MR, Ellenbarrie or equivalent)

The system is same as above for configuration of 1+1 system without any additional automatic control panel. The emergency oxygen supply system will be controlled from the Double-stage Regulator to control the Line Pressure of N₂O.

3. COMPRESSED AIR SYSTEM

The compressed Air System would be used for the following services:

- a) Medical Air at 4 Bar Pressure

4.1 The major components of Compressed Air Management System comprising of two identical compressor units, Breathing Air filter, Duplex Air Dryer and Duplex Pressure Reducing System.

The system has been designed to maintain a pressure of not less than 4 Bar at the furthest terminal unit.

The Compressed Air System should be CE-certified.

The system comprises the following:

- Oil-injected Screw-type Air Compressor complete with Oil separator to deliver 47 CFM (FAD) at 7.5 Bar pressure: 2 No.

- Each compressor should be coupled with 11 kW (15 HP) Motor.
- Heatless Air Drier suitable for above Air Compressor: 2 No.
- 4-stage Breathing Air Filter: 2 Set
- Air Receiver with Water Capacity of 1500 Litre
- Duplex Pressure Reducing Station: 1 Set

4.1 OIL-INJECTED SCREW TYPE AIR COMPRESSOR

(MAKE: INGERSOLL-RAND, ATLAS COPCO, FS CURTIS)

The Oil-injected Screw Compressor along with Oil-filter and Oil Separator should be housed in a powder-coated enclosure to provide insulation from noise. Maxm sound level of the machine should be 69 d BA.

The Compressed Air System should come with alpha-numeric controller, 24V DC Controller voltage transformer, Spin-on Air Filter and High-efficiency Air/ Oil Separator. **The oil content of the air at outlet should not be more than 3 ppm.** The air-cooled Oil cooler and After-cooler should be a part of the system.

4.2 ELECTRICAL: The motor coupled with the compressor should be 11 kW Motor. The supply should be 415 V-3 Phase- 50 Hz. The motor starter would be Wey- Delta.

4.3 AIR DRIER: **(MAKE: EXAL, Trident, Parker)** Heatless Desiccant Type – 2 nos., each dryer should be suitable for above compressor system (i.e. each dryer should be suitable to take the total load of 2 compressors). Each Dryer should be supplied with suitable inlet filter.

Duplex Air Dryer, desiccant type, each having full capacity of plant flow with a minimum accuracy of $\pm 3^{\circ}\text{C}$ in a range from -20°C to -60°C atmospheric dew-point, with a set point of -40°C . It should be equipped with moisture separator, auto drain valve.

4.4 Pressure Reducing System:

For Medical Air : The System will have 2 sets of Pressure Regulators (one in working & one stand-by) with isolation valves to reduce air pressure to required 4.2 Kg./ cm² for Medical Air pipeline.

4.5 Automatic Drainage traps:

Electrically operated automatic drainage traps should be provided at the bottom of the receivers along with manual drainage facility with isolation valves. The discharge from these drainage traps should be piped outside the room at a suitable place.

4.6 4-Stage Breathing Air Filters: (Make: Parker, FS Curtis, Trident)

The breathing air filters should have maximum contaminant removal efficiency with minimum pressure drop. The filtration system should conform to breathing air filtration as per ISO 8573, Ch – I Standard.

Two sets of 4-stage filters will be provided; while one set will be working, the other set will remain as standby.

Stage-1 & 2: Coalescing filters (Water separator & Oil filter) upstream of the desiccant dryer for general purpose protection, removing liquid water and oil aerosol to 0.1mg, cum (0.1 ppm) and particles down to 1 micron.

Stage-3: Active carbon filter after the desiccant dryer for removal of oil vapours and hydrocarbon odours with maximum remaining oil content of 0.003 mg/M³ (0.003 ppm) will be installed after stage 3 filter.

Stage-4: Bacteria filter for particle removal.

Air Receiver: 1 no. of 1500 litres water capacity should comply with IS 2825/ BS EN 286 for maximum working pressure of 200 PSI. Air receiver shall be equipped with a suitable pressure gauge, safety relief valve, 3-way by pass and automatic electronic tank drain with manual override.

5.0 VACUUM SYSTEM

5.1 Vacuum System

To design, fabricate, test & install medical vacuum system comprising of Duplex System of Lubricated, Rotary Vane lubricated vacuum pump.

The system should consist of Vacuum Pumps each having desired capacity with suitable Motor and interconnecting piping with Filter, Silencer, Non-Return Valve, Isolation Valves, etc. along with 1 no. Receiver Tanks, 2 nos. of Bacteria Filters, Auto Switch Gear to set minimum & maximum operating vacuum to 450 mm Hg and 650 mmHg respectively to take care of the requirements of desired no. of vacuum outlets.

5.1.1 Type of Vacuum Pumps:

Lubricated, Air-cooled, Rotary Vane Vacuum Pumps along with TEFC squirrel cage induction motors.

Each Vacuum Pump will be complete with Base Plate, Belt Guard, V-Belts, Motor and Starter. The system will be of Automatic Start and Stop Type. The Pumps will be connected to 1 no. vertical receivers of 2000 litres capacity. Each receiver will have a drain valve at the bottom.

Specifications of each Vacuum Pump:

Vacuum pump: 2 nos. - One as standby (For each System)

Make: Edwards/ Gardner Denver /Busch

Piston Displacement: 280-300 M³/hour

Drive Data: 1 no. – One as standby

Motor: 10 H.P

Type: TEFC Induction Motor

Electric supply: 440 V, 50 Hz, 3Ph.

Vacuum Receiver: One no.

Capacity: 2000 Litres. each

Noise Level: 73-76 dB (A) maximum

Vacuum Receiver

Vertical type vacuum receiver shall comply with IS: 2825/BS EN: 286 for a vacuum pressure of 760mm of mercury, made of steel plate as per IS: 2062 and fitted with suitable fittings and accessories. The Pumps should be connected to common receiver. The receiver shall have a drain valve and vacuum gauge. The inside of the tank should be coated for rust protection with a double component coating which should provide a hard, durable lining.

Vacuum plant exhaust:

The position of the termination point should be carefully chosen outside the plant room to be clear of windows, ventilation intakes and the intake of air compressors and other equipment.

To reduce noise from the exhaust, a silencer should be fitted in the exhaust pipe of each pump.

The termination point should be turned down and provided with wire mesh protection to reduce the effect of wind pressure and prevent the ingress of rain, snow, insects or animals.

Bacteria Filters: (Make: Parker / Solberg / Walker)

The Duplex bacteria filters should be designed for critical applications involving the removal of liquid, solid and bacterial contamination from the suction side of vacuum pump systems, each filter is designed and sized to carry the full plant design flow and pressure. Bacteria filters shall have efficiency at least 99.999% when tested by the sodium flame method in accordance with BS 3928:1969 utilizing particles in the 0.02 to 2 micron size range. Bacteria filters shall be marked with the legend 'Bio-Hazard'. Bacteria filter shall be provided with a transparent sterilizable collection jar to collect condensate. It should be internally and externally epoxy coated, easily removable.

6.0 COPPER PIPE (Make: Mehta Tubes, Rajco, Star Copper, MAC)

Solid drawn, seamless, de-oxidized, non-arsenical, half-hard, tempered and de-greased copper pipe conforming to BS EN 13348: 2008 shall be used for the installation of pipelines. All copper pipes should be de-greased & to be delivered capped at both ends. The pipes should be accompanied with manufacturers test certificate for the physical properties & chemical composition. Copper pipes should have reputed third party inspection certificate from Lloyds' Register of Services.

The Pipe Sizes to be used as mentioned below:

Pipe OD (MM.)	Thickness (MM.)	Maximum interval between supports (Horizontal and Vertical) (in Meters)
12	0.7	1.5
15	0.9	1.5
22	0.9	2
28	0.9	2
42	1.2	2.5
54	1.2	2.5

Copper fittings has been made of copper and suitable for a steam working Pressure of 17 bars and especially made for brazed socket type connections. All copper fittings should comply with EN 1254-1:1998 and factory degreased. Each size of fittings should be individually packed for medical use.

Pipe Preparation

Pipe ends should be cut with the pipe axis, using sharp wheel cutters whenever possible, and be cleaned to get rid of any cuttings or burrs.

When brazing copper-to-copper joints:

- The brazed joints should be made using a silver copper- phosphorus brazing alloy and no flux should be used;
- Brazing should be carried out using oxygen-free dry nitrogen as an internal inert gas shield to prevent the formation of oxides inside the surface of the pipes and fittings.
- Ensure adequate protection of adjacent pipe runs and other services.

Capping

Sections of pipeline should be capped as soon as they are completed so as to prevent the ingress of debris and other impurities.

Pipe Supports

The pipeline should be adequately supported at sufficient intervals to prevent sagging or distortion.

Supports for surface mounted pipe work should provide clearance to permit painting of the surface.

Where it is essential for pipes to cross electric cables or conduit, they should be supported at intervals on either side of the crossing to prevent them from touching the cables or conduit. Supports should be of suitable material or suitably treated to minimize corrosion.

The spacing of supports shall be as per the latest HTM standard. Suitable sleeves shall be provided wherever pipes cross through walls / slabs. All pipe clamps shall be non-reactive to copper. Metallic pipe clamps must be separated from copper pipes by insulating materials.

INSTALLATION & TESTING

Installation of piping is carried out with utmost cleanliness. Only pipes, fittings and valves which has been degreased and brought in polythene sealed bags should be used at site. Pipe fixing clamps of non-ferrous or non-deteriorating plastic suitable for the lower diameter of the pipe (max. up to 42mm OD). For pipe size of over 42mm, metallic clamps may be used by separating the copper pipe by insulating materials.

All pipe joints should be made using flux less brazing method. All joints of copper to copper should be brazed by silver brazing filler material without flux.

After erection, the pipes should be flushed with dry nitrogen gas and then pressure tested with dry nitrogen/ Medical Air at a pressure equal to twice the working pressure (or 10.5 kg/cm² whichever is higher) for a period of not less than 24 hours. All leaks and joints revealed during testing should be rectified and re-tested till the pressure in pipes stands for at least 24 hours. Finally, before use of the system, each pipeline should be flushed with working gas.

All the piping system shall be finally tested in the presence of the authorized representative of hospital for final approval and Certification.

PAINTING

All exposed pipes should be painted with two coats of synthetic enamel paint and colour codification should be as per IS: 2379 of 1990.

Besides pipelines, colour band identification should be applied near to valves, junctions, walls etc. A label applied every 3 M bearing 6mm size letters should identify each gas. Self-adhesive plastic labels with direction of flow should be used for this purpose. A band 150 mm wide is usually adequate.

7.0 ISOLATION VALVES (Make: RB, ZOLOTO, LEADER or equivalent)

The isolation valves should be Non Lubricated Ball type, suitable for oxygen service. Necessary certificate should be provided from the manufacturer on this matter. All valves should be pneumatically tested for twice the working pressure and factory de-greased for medical gas service before supply. The necessary certificate for de-greasing is to be submitted.

8.0 Alarm Valve Service Unit

8.1 Valve Box Assembly (Make: AKTIV, MR, Mediline or equivalent)

Valve Box is made of Powder Coated M.S. Material. Valve Box Assembly consists of the following:

- Lever operated quarter turn valve (i.e. 90 degree shut off ball valve, factory degreased and suitable for oxygen service) with brass body and chrome plated brass ball.
- Brass fittings (Nut, Nipples and extruded brass Adapter) KE Type Seat Brass Block for pressure gauge.

- 2" Dial gauges (0 - 10 kg/cm², 0 - 760mm Hg) Nylon Bush for copper pipes holding with the valve box
- Beading for box lead
- NIST Connection to be provided in the downstream.
- Lockable cover with breakable glass so that during normal operation access by key. But during emergency operation, access by breaking the glass panel.

8.2. Medical Gas Area Line Pressure Alarm (Make: AKTIV, MR, Mediline or equivalent)

(4 Service: Oxygen, N₂O, MA4 Air, and Vacuum)

(3 Services: Oxygen, MA4 Air and Vacuum)

(2 Services: Oxygen, and Vacuum)

The area alarm panel will have connection for each gas service. The heart of each area control stations will be a state of the art microprocessor controlled clinical emergency alarm management system to monitor the status of the various clinical areas of the medical gas management system.

The system will constantly monitor the distribution line pressure in central medical gas management system. The display should indicate the actual line pressure measured by sensors as per the service under monitoring. The GREEN LED at the centre of the level meter should indicate the actual pressure / vacuum complying with the normal level defined.

YELLOW /RED LEDs indicate deviation of the service under monitoring to for Low or High pressure or only Low for Vacuum respective to normal level by 10% higher or lower respectively.

The pipe connection to the alarm should have NRV/ NIST connection.

10.0 GAS/ VACUUM TERMINAL OUTLETS

(MAKE: Linde, MR, AKTIV, Ellenbarrie)

The terminal outlets for gas & vacuum should comply with latest international standard ISO 9170-1 & BS: 5682.

1. The terminal outlets must be certified having the CE mark /UL Listing.
2. All the internal and external surfaces of the outlets should be appropriately treated and cleaned to ensure strict compliance to the standards.
3. The terminal outlets should operate at the standard distribution pressure level corresponding to the standard line pressure of the medical gas pipeline system, which is around 4 - 5 bar for compressed gases and 0 - 400mbar (absolute pressure) for vacuum. It must be possible to operate

- the outlets in one hand for the purpose of coupling (locking) and decoupling (unlocking)
4. The gas specific basic block should be fitted with a non-return and service valve. The non-return valve should open up when the gas specific probe for the terminal outlet is inserted to the terminal outlet and it should close automatically when the probe is removed. Probe parking position must be a standard feature of the gas outlet.
 5. The servicing valve should be able to be screwed to the connecting thread in the rear part of the basic block thereby interrupting the gas supply to the terminal block entirely. Thus ensuring a separate and gas tight shut-off of the terminal for any servicing work.
 6. All the wear and tear parts (like O-rings seals) should be combined in one single sub-assembly group inside the terminal outlet, so that these can be replaced easily by removing one easy fix and remove sub-assembly. The total number of O-ring seals in the entire terminal outlet assembly should be as less as possible but in any case should not be more than three maximum.
 7. All the sub-assemblies of the terminal unit should be clearly marked with the type of service it is intended for use. The gas indexing of the various sub-assemblies should prevent any wrong assemblies being made by the installers or service technicians.
 8. Two stage locking / parking position in outlets should be there for better safe operations.
 9. The terminal outlets should have the first fix assemblies available in the standard manufactured models suiting the various applications functionally as well as aesthetically strictly complying to the specific types as recommended in the respective standards.

11.0 Bed Head Panels (Horizontal / Vertical)

(MAKE: MR, AKTIV, MEDILINE or equivalent)

- Efficient, Safe & Robust design in extruded aluminium section.
- Smooth curved surfaces, and choice of base colour and fascia plates.
- The headwall system should be constructed of aluminium extrusions joined together to form a carcass to suit the particular application. Unit should be factory assembled for electrical and mechanical components.
- Front fascia plate should be removable individually to access for respective service.
- Length of horizontal/ vertical Bed Head Panel shall be 900 mm.
- Bed head should have provision for Facility of 4 Outlets per unit.

12.0 Combined Electrical Control Panel for Compressor & Vacuum System

Common Electrical Control Panel for Air-Compressors and Vacuum Pumps, cubicle type, complete with Mains Incomer, Bus Bar arrangement, Voltmeter with VSS,

Phase indicating lights, Phase loss or Phase Reversal indicating light, individual MCBs for all starters, individual Ammeters for all motors, Single Phasing Preventer, Contactors, Overload Relays, Control Circuit MCB, Start/ Stop Push buttons, Auto/ Manual switches, Pump "ON" & Pump "TRIP" indicating lights, sequencing Relays (Separate for Air Compressors and Vacuum pumps) with overriding feature.

The Control Panel should facilitate synchronize operation of Vacuum Pump and Compressor. Electrical control panel is made of MS Sheet having thickness 16 SWG and should be epoxy powder coated. The electrical control panel would be equipped with auto manual selector, Star-Delta starters each compatible to motors for compressors and DOL starter's compatible to each electric motor for Vacuum pumps.

The electrical control panel would be further equipped for Duplex and cascade system for vacuum pumps & Air Compressors and also be equipped with safety equipment for the air compressors.

Safety equipment for air compressors would include temperature controller and temperature indicator. All terminals, switches and lights must be duly marked.

Internal wiring must be duly ferruled. Incomer shall be of adequate size so that it is suitable for the total load of the system.

The panel shall be provided with am-meter, power control for Star-Delta / DOL Starter, Indication Lamp indicating all three phases, indication lamp indicating compressor 1 on, compressor 2 off, compressor 2 on, compressor 1 off and so on. The panel shall also be provided with Hour meter, stop, start and test, switch for control supply on and off, duty selecting switch (auto / manual), indicators for overload.

The panel is designed to trip off the system in case of overload by giving an audio and visual alarm. If the first compressor/Vacuum Pump fails due to any fault, the second compressor/vacuum pump will automatically start without giving any drop in pressure at the outlet point.

Duty selector switch can be used in auto or manual.

Electrical Control Panel will have following features:

- Incoming - MCCB with aluminium Bus Bar and complete metering (i.e. Ammeter & Voltmeter) with R-Y-B selector switches
- R-Y-B phase indicating lamps (LED type).
- Individual MCCB and Ammeter for Air compressors with Connector & over Load having Single Phase Preventer.
- Individual MCB for vacuum pumps with Connector & over Load having Single Phase Preventer.
- Individual start & stop push buttons with ON/OFF indicating lamps.
- Appropriate relay and programming for changing and running Air compressors & Vacuum pumps according to the mentioned sequence of operation.
- The panel should be provided with prominent engraved identification plates.

- In case of electrical power failure, both compressor and vacuum system should be re-started automatically with restoration of power.
- Individual Auto-Manual switches for Vacuum Pumps & Compressors.
- Tripping for abnormal operating conditions like earth fault, over current etc.
- Panel earthing of 2 nos. 50mm GI pipe electrode to be provided.
- Spare feeder of each type of feeder to be provided.
- The panel should be IEC 61439/1&2 and type test certificate should be in the name of the OEM.

13.0 CEILING PENDANTS FOR OT

The Ceiling Pendant should fully comply and meet with the requirements of the UK DOH Health Technical Memorandum 02-01 (HTM 02-01) standards / NFPA / DIN Standard. It shall be CE marked /UL-listed. A copy of the certificate of origin should be provided along with the supply.

The pendant should have Double Arm Configuration and non-motorized movement. The Pendant Column should be non-retractable.

The features of the Pendant should be as following:

- Double Arm Pendant having 800/1000 MM. length of each arm.
- The Column is customized and non-retractable.
- Non-motorized Movement.
- There would be 8 no. Electrical Sockets.
- There would be provision of 8 no. Gas/ vacuum Outlets.
- There will be 3 no. of shelves
- Swivelling range should be 320° at all joints.
- Possible stop of the movement at every 30°.
- Total Loading Capacity: 120 Kg.
- Material of Construction: Anodized Aluminium.

14.0 ACCESSORIES FOR PIPELINE SYSTEM

14.1 BPC Flow meter with Humidifier (CE-certified): (MAKE: RAMSON, MR, AKTIV or equivalent)

Back Pressure Compensated flow meter is of accurate gas flow measurement with following features:

- Control within a range of 0 – 15 LPM, out of which 0-5 LPM should be with expanded scale.
- It meets strict precision and durability standard.
- The flow meter body is made of brass chrome plated materials.
- The flow tube and shroud components are made of clear, impact resistant polycarbonate.
- Flow Tube has large and expanded 0 – 5 LPM range for improved readability at low flows.
- Inlet filter of stainless steel wire mesh to prevent entry of foreign particles.
- The humidifier bottle is made of unbreakable polycarbonate material and autoclavable at 121°C temperature.

14.2 Ward Vacuum Unit (CE-certified):

(MAKE: RAMSON, MR, AKTIV or equivalent)

Ward Vacuum Unit will be light weight and compact.

The unit will consist of-

- A regulator,
- A 600 ml. reusable collection jar, made of unbreakable poly carbonate material and fully autoclavable at 121°C temperature.
- A wall bracket for mounting the jar assembly on the wall.
- The vacuum regulator with instant ON / OFF switch should be infinitely adjustable and the vacuum gauge will indicate suction supplied by the regulator.
- Safety trap should be provided inside the jar to safeguard the regulator from overflowing.

14.3 Theatre Vacuum Units (CE-certified):

(MAKE: RAMSON, MR, AKTIV or equivalent)

The unit will be consisting of two reusable 2000 ml shatter resistant bottle, each made up of poly carbonate material and fully autoclavable at 121°C temperature.

BILL OF QUANTITY(BoQ)

Annex-C

SL. No.	DESCRIPTION OF WORK	UNIT	QUANTITY	UNIT Rate	AMOUNT
1	LIQUID MEDICAL OXYGEN 3KL CAPACITY TANK (LMO) including civil work of foundation and all accessories as per Tech Specs	No	1		
2	OXYGEN SYSTEM as per Tech Specs				
2.1	Two- Sided Cylinder Manifold Indigenous (Oxygen) 8+8	set	1		
2.2	Fully Automatic Control Panel (Oxygen): 3- source	set	1		
2.3	Emergency Oxygen Supply System 4-cylinders: Indigenous	set	1		
3.0	NITROUS OXIDE SYSTEM as per Tech Specs				
3.1	Two-Sided Cylinder Manifold Indigenous (N ₂ O) 2+2	set	1		
3.2	Fully Automatic Control Panel (N ₂ O)	set	1		
3.3	Emergency N ₂ O Supply System 2 -cylinders: Indigenous	set	1		
4.0	MEDICAL AIR SYSTEM as per Tech Specs				
4.1	OIL-INJECTED SCREW TYPE AIR COMPRESSOR	set	2		
4.2	AIR DRIER	set	2		
4.3	Pressure Reducing System	No	1		
4.4	Automatic Drainage traps	set	1		
4.4	4-Stage Breathing Air Filters	set	2		
4.5	Air Receiver	No	1		
5.0	VACUUM SYSTEM as per Tech Specs				
5.1	Vacuum Pumps:	No	2		
5.2	Vacuum Receiver	No	1		
5.3	Bacteria Filters	set	2		
6.0	PIPELINE DISTRIBUTION SYSTEM including Civil work as per Tech Specs				
6.1	12 MM. OD X 0.9 MM. Thick	Mtr.	400		
6.2	15 MM. OD X 0.9 MM. Thick	Mtr.	861		
6.3	22 MM. OD X 0.9 MM. Thick	Mtr.	748		
6.4	28 MM. OD X 0.9 MM. Thick	Mtr.	308		
6.5	42 MM. OD X 1.2 MM. Thick	Mtr.	273		
6.6	54 MM. OD X 1.2 MM. Thick	Mtr.	90		
7.0	Isolation Valve (factory-degreased) with brass adapters as per Tech Specs				
7.1	15 MM.	No.	10		
7.2	22 MM.	No.	3		
7.3	28 MM.	No.	3		
7.4	42 MM.	No.	3		
7.5	54 MM.	No.	3		
8.0	Alarm Valve Service Unit as per Tech Specs				
8.1	Valve Box Assembly				
8.1.1	4 Service: Oxygen, N ₂ O, MA4 Air, and Vacuum)	No.	1		
8.1.2	(3 Services: Oxygen, MA4 Air and Vacuum)	No.	9		
8.1.3	(2 Services: Oxygen, and Vacuum)	No.	2		
8.2	Medical Gas Area Line Pressure Alarm				
8.2.1	4 Service: Oxygen, N ₂ O, MA4 Air, and Vacuum)	No.	2		
8.2.2	(3 Services: Oxygen, MA4 Air and Vacuum)	No.	9		
8.2.3	(2 Services: Oxygen, and Vacuum)	No.	2		
	The pipe connection to the alarm should have NRV/ NIST connection.				
9.0	GAS/ VACUUM TERMINAL OUTLETS as per Tech Specs				
9.1	OXYGEN OUTLET	No.	66		
9.2	NITROUS OXIDE OUTLET	No.	4		
9.3	AIR 4 BAR OUTLET	No.	66		
9.4	VACUUM OUTLET	No.	66		
10.0	Bed Head Panels (Horizontal / Vertical) as per Tech Specs	No.	5		
11.0	Combined Electrical Control Panel for Compressor & Vacuum System as per Tech Specs	Set	1		
12.0	CEILING PENDANTS FOR OT as per Tech Specs	No	1		
13.0	ACCESSORIES FOR PIPELINE SYSTEM as per Tech Specs				
13.1	Back Pressure Compensated flow meter is of accurate gas flow measurement with following features:	No.	66		
13.2	Ward Vacuum Unit (CE-certified)	No.	66		
13.3	Theatre Vacuum Units (CE-certified)	No.	1		
14.0	Electrical work related to entire distribution system including illumination of Storage Area	set	1		
15.0	Operation & Comprehensive Manitenance				
15.1	Operation & Comprehensive Manitenance Charges for 1st Year	No.	1		
15.2	Operation & Comprehensive Manitenance Charges for 2nd Year	No.	1		
15.3	Operation & Comprehensive Manitenance Charges for 3rd Year	No.	1		
15.4	Operation & Comprehensive Manitenance Charges for 4th Year	No.	1		
15.5	Operation & Comprehensive Manitenance Charges for 5th Year	No.	1		
16.0	MEDICAL GASES				

	Item Description	Units	Unit Rate quoted per cum including delivery cost & other charges	Facility charges	Total Amount
16.1	Medical Oxygen Bulk Cylinder D Type Water Capacity (Litres):46.70, Volume of gas (cubic meter) contained in a full cylinder: 7.10 cum	Cum			
16.2	Medical Oxygen Cylinder B type Water Capacity (Litres): 10.00, Volume of gas (cubic meter) contained in a full cylinder: 1.43 cum	Cum			
16.3	Medical Oxygen Cylinder A Type Water Capacity (Litres): 5.00, Volume of gas (cubic meter) contained in a full cylinder: 0.71 cum	Cum			
16.4	Medical Nitrous Oxide Bulk Cylinder D Type Water Capacity (Litres): 46.7, Volume of gas (cubic meter) contained in a full cylinder: 17.1 cum	Cum			
16.5	Medical Nitrous Oxide Cylinder A Type Water Capacity (Litres): 5.00, Volume of gas (cubic meter) contained in a full cylinder: 1.74 cum	Cum			
TOTAL(SL. No. 1 to 16 excluding GST)***					
GST %					

TOTAL AMOUNT IN WORDS(EXCLUDING GST).....

Signature of Bidder

Stamp with date

Address

*** PRICE EXCLUSIVE GST 18%. GST TO BE CHARGED EXTRA.

