HSCC/SES/SSB-Tanda-MGPS/2013 Dated :10.01.2014

All Bidders

Amendment -VIII

Subject: Supply, Installation, Testing and Commissioning of Medical Gas Manifold System at existing Hospital and at Superspeciality Block at Dr. Rajendra Prasad Govt. Medical College, Tanda.

IFB No. : HSCC/PG-III/SSB –Tanda/MGMS/2013

Dear Sir,

This has reference to above IFB No. for the Subject works.

The following Amendment may be noted which shall be treated as part of the contract to be submitted duly signed & stamp along with tender.

	Bidder's Query	Amendment/Clarification
1.	The experience of having successfully completed similar work during last 7 years ending last day of months previous to the one in which applications are invited should be either of the following. i)Three similar completed works each costing not less than the amount equal to 40% of the estimated cost. ii) Two similar completed works each costing not less than the amount equal to 60% of estimated cost. iii) One similar completed work costing not less than the amount equal to 80% of the estimated cost. OR The experience of having successfully completed similar work during last 7 years ending last day of months previous to the one in which applications are invited should be either of the following. i)Three similar completed works executed for not less than for 200 Bed Hospital. ii)Two similar completed works executed for not less than for 300 Beds Hospital. iii)One similar completed work executed for not less than for 500 Beds Hospital. Please issue amendment to the PQ conditions related to the bidder experience in line with	The experience of having successfully completed similar work during last 7 years ending last day of months previous to the one in which applications are invited should be either of the following. i) Three similar completed works each costing not less than the amount equal to 40% of the estimated cost. ii) Two similar completed works each costing not less than the amount equal to 50% of estimated cost. iii) One similar completed work costing not less than the amount equal to 80% of the estimated cost. The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum, calculated from the date of completion to the last date of receipt of applications for tender.

	CVC guidelines for tender.	
2	As per PQ Criteria : Similar Nature of the works mean successful completion of supply, installation and commissioning of medical gas manifold system. One Completed work of any nature (either part of 2.2 (ii) or separate one) costing not less than amount equal to 40% of the estimated cost with some Central/State Govt. Organization/Central Autonomous body/Central Public Sector Undertaking. The Certificate should not be more than six months old. Pl amend that as per this clause any company which fulfills the conditions of completing similar job of any 200 bedded hospital of central/state govt. organization/central Autonomous body /Central public sector undertaking. But the order value should be 40% of the estimated cost of the tender. To have more clarity in the above statement, it is requested to amend the sentence as follows : " Similar nature of works means successful completion of supply, installation and commissioning of medical gas manifold system comprising of total similar equipment and accessories as given in the BOQ of the tender which is currently running satisfactorily.	As per Clause no. 2.2 of PQ, Vol-I, One Completed work of any nature (either part of 2.2 (ii) or separate one) costing not less than amount equal to 40% of the estimated cost in last seven years with some Central/State Govt. Organization/Central Autonomous body/Central Public Sector Undertaking.
3	As per tender clause :The bidder must quote cost of one year operation during defect liability period separately as per BOQ. Considering the hospital is located in a remote place and all the prospective bidders will be from outside from where day to day monitoring of operation of MGMS is not possible for this life saving system, it is not feasible to include one year operation along with turnkey project contract. Hence we would request you to please make this clause as "Quote Optional" considering recent incident in a Delhi Govt. Hospital where four patients died due to negligence of operation of MGMS.	Tender Terms & Conditions Prevails.
4	As per tender all imported items should be as per NFPA 99 standard and UL Listed or EN 737/HTM02-01 standard with CE Certificate. It may be amended as CE Cerificate should be at least of Class 2b with individual 4 digit	Pl. refer revised specification and BOQ as per Annexure-A & Annexure –B respectively.

	number for each equipment.	
5	As per tender Distribution Copper pipe manufactured as per BSEN: 13348 May be Amended as Distribution Copper pipe manufactured as per BSEN: 13348:2008.	Pl. refer revised specification and BOQ as per Annexure-A & Annexure –B respectively.
6	As per tender Horizontal Bed Head Panels : Facility per unit as under : (v) Nurse Call System module and vii) Monitor Tray with Slider. These two facilities should be amended as follows : (v) Provision for Nurse Call System module and (vii) Provision for Monitor Tray with Slider otherwise make and model of Monitor tray should be given in tender technical specifications.	Tender Terms & Conditions Prevails.
7	As per Clause 8.0, Vol-IV Valve Boxes (A) Three piece design valve (E) Valve shall be a 4 bolt design. Both these statements as mentioned in (A) & (E) indicates that valve should be imported. So, please confirm that valve boxes will be imported.	Tender Terms & Conditions Prevails.
8	As per tender clause Anesthesia Pendent : Both arms should have electromagnetic/Pneumatic brake. As there is no reliable supplier available in india who manufacturers such Anesthesia Pendent with electromagnetic/Pneumatic brake, please confirm whether the Pendent will be imported. If not, you are requested to please amend the technical specification as "Anesthesia Pendents without electromagnetic/Pneumatic brake.	Tender Terms & Conditions Prevails.
9	Supply & Installation of Liquid Oxygen Tank and regular supply of liquid oxygen will not come in scope of Medical Gas pipeline system companies as being the expertise company there are only few companies who took this whole work. If this work will come into the scope of Medical Gas pipeline system company there are only few companies who has experience in this as as another companies don't have any expertise doing the work of supply & installation of Liquid oxygen tank and supply of other gases with Medical Gas pipeline system and through this only few companies will participate in this tender and due to this	Tender terms & conditions prevail.

	they will bid higher and this will un-necessarily increase the cost of the project. You are requested to remove supply & installation of Liquid Oxygen Tank & regular supply of liquid oxygen.	
10	Hose Assembly is not required for AGSS Unit as per NFPA99C standard. Hospital has to order AGSS kit along with the Anesthesia Work Station.	Tender Terms & Conditions Prevails.
11	Ward Vacuum Units: Please clarify whether the collection bottle size will be 600 ml or 1800 ml as both have different rates.	Pl. refer revised specification and BOQ as per Annexure-A & Annexure –B respectively.
12	Please provide floor wise service wise list of outlet dispositions for better understanding of scope of work.	Outlets disposition floor wise is enclosed as per Annexure-C.
13	As per tender Third party quality certificate of the MGMS equipment from SGS/TUV/LYOYDS . It is suggested that as per the International Standards like NFPA 99/HTM 02-01/EN737, third party inspection of the system can be conducted only by the 'Authorized Person' of the relevant standard which involves substantial cost. So, it is suggested to accept quality certificates of product from the reputed manufacturers of the imported products and from the contractor for the indigenous products. However copper pipe certification can be provided through SGS/TUV/Lloyds.	Tender Terms & Conditions Prevails.
14	DLP for one year and CMC for 5 years: Please confirm that Consumables like gas electricity, oil and filter cartridges, rubber/plastic, electronic items etc. which have specific running life will not be considered under the scope of the contractor and the same will be supplied by the hospital.	Tender Terms & Conditions Prevails.

Revised Technical Specification and BOQ is enclosed as per Annexure –A & Annexure – B respectively.. Bidder should follow the tender terms & condition for the unanswered queries.

All other terms & conditions remain unchanged.

CGM (D&E & Projects)

ANNEXURE-A

TECHNICAL SPECIFICATION OF CENTRALIZED MEDICAL GAS MANIFOLD SYSTEM

Scope of work **Design, supply, installation, testing, commissioning and handing over of Medical Gases Manifold and Distribution System including turnkey work and providing of free spare parts and service during One (1) year Defect Liability Period.**

The system shall comprise of:

A. **Source Equipments**

Fully Automatic Oxygen manifold & control panel
Fully Automatic N2O manifold & control panel
Vacuum (suction) supply system
Medical Compressed Air System
Anesthesia Gas scavenging system
Liquid Medical Oxygen Tank

B. **Distribution pipes.**

C. **Outlets** and bed head panel for Wards etc. with accessories.

D. **Complete Alarm system**.

E **Horizontal Bed Head Panel**

F. **Accessories**

Oxygen flow meter with humidifier
Ward vacuum units
Theatre Suction units.

Standards

The design & selection of all imported items should be of international standard like NFPA 99(latest version) standard and UL listed or EN737(latest version) standard and CE marked or HTM 02 01 (latest version) standard and CE marked. This supersedes single/multiple standards mentioned at any other places in the tender specification involving item/system/capacity etc. The imported products should be of one standard only. All indigenous items should be of high quality to meet the international standard and compatible to the main system.

1.0 Oxygen System

Oxygen System Shall consists of the followings:-

a) Oxygen Manifold System

b) Fully Automatic Oxygen Control Panel

c) Oxygen Emergency supply system

1. a Oxygen Manifold

- ***The oxygen manifold shall be of size 20+20 bulk cylinders***. Manifold shall consist of two high-pressure header bar assemblies to facilitate connection of primary and secondary cylinder supplies. Each header bar shall be provided with 20 numbers of cylinder pigtail connections to suit cylinder valves as per IS 3224 incorporating a check valve at the header connection. The high-pressure header bar shall be designed in such a manner that it can be extended to facilitate additional cylinder connections. Each header bar assembly shall be provided with a high-pressure shut-off valve.

- The manifold should be so designed that it shall suit easy cylinder changing and positioning.

- The cylinder should be placed with the help of cylinder brackets and fixing chains which should be zinc plated.

- The manifold should be suitable to withstand a pressure of 145 Kg/cm2. The manifold should be tested (hydraulically) at 3500 psig pressure and to be supplied along with necessary test certificate.

- The Oxygen Manifold System shall be compatible to allow integration with the Liquid Oxygen Tank.

1. b Fully Automatic Oxygen Control Panel (Imported):

The Oxygen Control Panel shall be of microprocessor based and preferably Digital/Analogue Display Type. Pressure reduction shall be in two stages. Panel shall be integrated with pressure gauges inside panel on downstream of pressure regulator. Panel shall be fitted with standby line regulator. Line regulators shall have pressure relief mechanism for testing and servicing purpose.

b) Panel shall be Fully Automatic and shall switch over from "Bank in Use" to 'Reserve Bank' without fluctuation in delivery line pressure and without the need of external electrical power. After the switch–over, the "Reserve Bank" shall become the "Bank in Use" and the "Bank in Use" shall become the "Reserve Bank". The Control Panel will be powered by a microprocessor. The unit shall be compact and enclosed in NEMA 1 enclosure.

c) A Microprocessor circuit board assembly shall provide a relay output to give indication when or just before the manifold switches from one bank of cylinders to another. The switch over shall be mechanically controlled, not electrically.

d) To avoid excess pressure being supplied to the distribution system, a pneumatically relief valve for the line regulator shall be incorporated. An intermediate pressure relief valve shall be installed between the high-pressure regulators and the line delivery regulators.

e) The control panel incorporates six coloured LED's, three for the Left Bank and three for the Right Bank: One for Bank in use, One for Bank ready and One for Bank empty. Both the Left and Right bank pressures and the main line pressure should be displayed on the front door of the cabinet by means of LED's. All pressure transducers, micro switches, and display LED's shall be pre-wired to an internal microprocessor circuit board.

f) All components inside the Control Panel like Pressure Regulators, piping and control switching equipment shall be cleaned for Oxygen Service and installed inside the cabinet to minimize tampering with the regulators or switch settings.

g) The Control Panel should be made to provide Heavy Duty with a Delivery Flow Capacity of over **2000 lpm at 55-60 psig.**

1.c **Emergency Oxygen System:**

It will have emergency arrangement of 10-cylinder configuration, with Copper tail pipes, Non Return Valves & high flow regulator with pressure gauges for Cylinder & line pressure and safety valve. Pressure regulator shall be detachable from the manifold.

1d. **Terminal outlets with probes/adapters**

As per Sl. No.-16

1e. **Oxygen cylinders** (D type):

- Gas : Medical Oxygen
- Capacity of Gas : 7.00 CUM
- Capacity of Water: 46.7 ltrs.
- Standard : one to IS : 7285, BS : 1045
- Working Pressure : 150 KGF/CM^2
- Test Pressure : 250 KGF/CM^2
- Outside Diameter : 232 mm

- Wall Thickness : 5.5 mm
- Length : 1370 mm
- Tear Weight: 54 kg. (approx.)
- The valves fitted to these cylinders should confirm to specification IS:3224 & IS:3745
- The Cylinder being offered should be manufactured within the country or imported from abroad and should conform to IS Specification 7285 and BS 5045 Part I respectively
- They should also have approval of the Chief Controller of Explosives, Govt. of India, Nagpur
- Each Cylinder Shoulders should be stamped with GG : Symbol for Gas, Mfgr. : Identification Mark, MMYY : Month & Year of Hyd. Test, XYZ : Serial No. of Cylinder, IS 7285: B.I.S. Specification, TW : Tear Weight, TP : Test Pressure FP:

1f **Liquid Medical Oxygen 15KL capacity**

- Should be certified for medical use as per IP (Indian Pharmacopoeia).
- Should not contain less than 99.6% V/V of oxygen
- Should not contain more than 5 ppm V/V of carbon monoxide
- Should not contain more than 30 ppm V/V of carbon dioxide
- Should be free of halogens
- Should be free of oxidizing agents
- Should be free of water
- Regular maintenance & *supply of liquid Oxygen in to the liquid tank is firms responsibility.
- The vessel should be maintained in such a way so that the natural evaporation rate should be less than 1%.
- All formalities for installation of the tank like CCE clearance, third party clearance & any other formality is contractor's responsibility.
- Manufacturing facility should have ISO 9001:2000 / EN ISO 9001:2000 / ASQC 9001:2000.
- All necessary/ suitable certificates must be provided by the bidder to ensure compliance of the above-mentioned parameters
- The LMO storage tank shall be of suitable capacity to fulfill our requirement it is going to supply oxygen to, with Vaporizer of appropriate size, having safety features as per International standards. The tank shall be connected to manifold / central oxygen pipeline.
- Liquid oxygen will be the primary (main) supply source and the oxygen manifold will work as stand by. In case of failure in liquid oxygen, manifold will work as supply source. In case of failure in liquid oxygen supply, it should automatically switch over to oxygen manifold.
- The unit shall consist of a double walled vertical vessel (made of stainless steel and carbon steel) for outdoor installation capacity as per consumption of the institute.
- It should be fitted with standard accessories as minimum and should have undergone standard inspection requirement. A certificate in that respect to be submitted. Liquid Oxygen tank shall be of **15000 Ltrs** capacity

*Cost for regular supply of Liquid Oxygen is not included in the estimated cost and it will be paid separately by the Hospital authority. Separate contract agreement shall be made between the contractor and the Hospital authority.

1g. High Pressure tubing flexible having Antistatic core as per ISO with proper colour coded complete as per specifications.

2.0 Nitrous- oxide system

Nitrous Oxide system shall consist of the followings :

a Nitrous Oxide main manifolds supply system

b Fully automatic Nitrous Oxide control panel

c Nitrous-oxide emergency supply system

2.a Nitrous Oxide Manifold

- ***The Nitrous Oxide manifold shall be of size 8+8 bulk cylinders***. Manifold shall consist of two high-pressure header bar assemblies to facilitate connection of primary and secondary cylinder supplies. Each header bar shall be provided with 8 numbers of cylinder pigtail connections to suit cylinder valves as per IS 3224 incorporating a check valve at the header connection. The high-pressure header bar shall be designed in such a manner that it can be extended to facilitate additional cylinder connections. Each header bar assembly shall be provided with a high-pressure shut-off valve.

- The manifold should be so designed that it shall suit easy cylinder changing and positioning.

- The cylinder should be placed with the help of cylinder brackets and fixing chains which should be zinc plated.

- The manifold should be suitable to withstand a pressure of 145 Kg/cm2. The manifold should be tested (hydraulically) at 3500 psig pressure and to be supplied along with necessary test certificate.

2.b Fully Automatic Nitrous Oxide Control Panel (Imported)

- The Nitrous Oxide Control Panel shall be of microprocessor based and preferably Digital/Analogue Display type. Pressure reduction shall be in two stages. Panel shall be integrated with pressure gauges inside panel on downstream of pressure regulator. Panel shall be fitted with standby line regulator. Line regulators shall have pressure relief mechanism for testing and servicing purpose.

- Panel shall be Fully Automatic and shall switch over from “Bank in Use” to ‘Reserve Bank’ without fluctuation in delivery line pressure and without the need of external electrical power. After the switch–over, the “Reserve Bank” shall become the “Bank in Use” and the “Bank in Use” shall become the “Reserve Bank”. The Control Panel will be powered by a microprocessor.
- A Microprocessor circuit board assembly shall provide a relay output to give indication when or just before the manifold switches from one bank of cylinders to another. The switch over shall be mechanically controlled, not electrically.
- To avoid excess pressure being supplied to the distribution system, a pneumatically relief valve for the line regulator shall be incorporated. An intermediate pressure relief valve shall be installed between the high-pressure regulators and the line delivery regulators.
- The control panel incorporates six coloured LED’s, three for the Left Bank and three for the Right Bank: One for Bank in use, One for Bank ready and One for Bank empty. Both the Left and Right bank pressures and the main line pressure should be displayed on the front door of the cabinet by means of LED's. All pressure transducers, micro switches, and display LED’s shall be pre-wired to an internal microprocessor circuit board.

- All components inside the Control Panel like Pressure Regulators, piping and control switching equipment shall be cleaned for Oxygen Service and installed inside the cabinet to minimize tampering with the regulators or switch settings.

- The Control Panel will have heaters to prevent ice formation on the regulators at high flow rates.

- The Control Panel should be made to provide Heavy Duty with a Flow Capacity of over **1000 lpm at 55-60 psig.**

2.c **Emergency Nitrous Oxide System:**

Emergency system shall have arrangement of One set of Three Cylinder configuration with Copper tail pipes, Non Return Valves & high flow regulator with pressure gauges for Cylinder & line pressure and safety valve. Pressure regulator shall be detachable from the manifold.

2d. **Terminal outlets with probes/adapters**

As per Sl. No.-16

2e Nitrous Oxide cylinders (D type):

- Gas : Nitrous Oxide
- Capacity of Gas : 30.0 Kg
- Capacity of Water: 46.7 ltrs.
- Standard : one to IS : 7285, BS : 1045
- Working Pressure : 150 KGF/CM^2
- Test Pressure : 250 KGF/CM^2
- Outside Diameter : 232 mm
- Wall Thickness : 5.5 mm
- Length : 1380 mm
- Tear Weight: 53 kg. (approx.)

- The valves fitted to these cylinders should confirm to specification IS:3224 & IS:3745
- The Cylinder being offered should be manufactured within the country or imported from abroad and should conform to IS Specification 7285 and BS 5045 Part I respectively
- They should also have approval of the Chief Controller of Explosives, Govt. of India, Nagpur
- Each Cylinder Shoulders should be stamped with GG : Symbol for Gas, Mfgr. : Identification Mark, MMYY : Month & Year of Hyd. Test, XYZ : Serial No. of Cylinder, IS 7285: B.I.S. Specification, TW : Tear Weight, TP : Test Pressure FP:

2f. High Pressure tubing flexible having Antistatic core as per ISO with proper colour coded complete as per specifications.

3.0 <u>Vacuum (Suction) System</u> (Imported)

3a. Vacuum system shall be **Triplex/Quadruplex Medical Vacuum System having system capacity of 228 cfm/6460 LPM at 19" Hg as per the relevant International Standard.**

- The system shall be consisting of lubricated rotary vane vacuum pumps with Control Panel equipment and one tank.
- This system shall be capable of removing 99.9% of oil and smoke particles from the exhaust.
- The system shall include the following accessories for each pump: inlet check valve, inlet isolation valve, vacuum control switch, oil temperature gauge, thermal malfunction switch and vacuum control switch. Provide flexible connectors on inlet and exhaust of each pump, exhaust tee with union, cock valve as well as copper tubing with shut-off cock for gauge and vacuum switches. The system shall include vacuum storage tank of suitable capacity. The inside of the tank shall be coated for rust protection with a two component coating which provides a hard, durable lining.
- Provide vibration mounting as per NFPA 99/HTM2022/EN737.
- The system shall have UL listed/CE marked control panel

- Provide the panel with a programmable controller with removable terminals to allow quick and easy replacement in the field. The system should be designed to function even if the programmable controller fails. The system shall be equipped with a flashing light pump failure alarm/shutdown at any of the following conditions: motor overload tripped, main disconnect is off, blown fuse, control transformer failure, starter coil failure, Selector Switch is off. The central control unit shall incorporate a colour display with LED indicators and have easy access to system operational information.
- Provide audible and visual local alarm (complete with indicating lights and individual sets of auxiliary contacts wired to the terminal strip for remote alarm indication) for the following: vacuum pump thermal malfunction and reserve vacuum pump in use. Provide manual reset for thermal malfunction shut-down. All control and alarm functions shall remain energized while any vacuum pump in the system remains electrically on-line.
- The bacteria filtration system shall incorporate high efficiency filter elements. A differential vacuum indicator shall be installed across the filter to indicate blockage. Each filter shall be designed and sized to carry the full plant design flow capacity with minimum drop. Bacteria filter elements shall have penetration levels not exceeding 0.005% when tested and utilizing particles 0.02 to 2 micron size range.

3b. Terminal outlets with probes/adapters

As per Sl. No.-16

3c. Flexible tubing having Antistatic core as per ISO with proper colour coded complete as per specifications.

4.0 <u>Air Compressors</u> (Imported)

- The system shall be consisting of **one set i.e Quadruplex/Pentaplex Oil free Compressed Air System to provide system capacity 150 Scfm/4250 LPM at 8.5bar with** air compressors, allied equipment, suitable tank and control panel.
- The medical air compressors shall be of the totally oil-less reciprocating air-cooled design/ Screw/Scroll. Each compressor shall be belt driven by a suitable HP, 3 phase, 50 cycle, 415volt, motor.
- The system shall be equipped with filters.
- The system shall have UL listed/CE marked control panel.
- Dual air dryers, dual 0.5 micron pre-filters, dual 0.5 micron after-filters, line pressure regulating valves, dew point monitor, CO monitor and other accessories required to meet and exceed the current code requirements shall be mounted on the compressor system base.
- All components shall be completely single-point service connections as per latest international standards.
- There shall be two identical banks of air treatment equipment, piped in parallel and provided with valves to by-pass either filter set for element replacement, maintenance

and repair work on one of the sets while still treating medical compressed air through the other set without any sacrifice in air quality. Each bank should consist of three stages of treatment.

- The first stage shall be a prime efficiency come together with particles removal down to 0.5 micron with 99.9999% retention. This filter removes aerosols and solid particles.
- The second stage shall be desiccant heatless air dryer equipped with purge control. Built-in purge saver control shall automatically minimize and adjust the amount of purge air to match the variable airflow. The dry compressed air is discharged from the on-line tower into the third stage.
- The third stage shall be a prime efficiency particulate after filter with particle removal down to 0.5 micron. The after filter element shall be provided high particles retention, low pressure drop and long element life.
- Downstream pressure regulators shall maintain constant discharge pressure of 55 to 60 PSIG (field adjustable).
- Digital dew point and CO monitors with alarm set points at +39 ^{0}F and 10 PPM are provided with dry contacts for connection to remote alarm panels. A "demand check" for maintenance should as per current code requirements of latest international standards.
- Besides meeting the requirements of the relevant standard, filtration of medical compressed air shall conform to ISO 8573.1 Class 1.3.1 of medical breathing air.

4b. & 4c Terminal outlets with probes/adapters

As per Sl. No.-16

4d. High Pressure tubing flexible having Antistatic core as per ISO with proper colour coded complete as per specifications.

5.0 Distribution piping (Indigenous)

- Medical graded Copper pipes shall be solid drawn, tempered, seamless, phosphorous deoxidized, non-arsenic and degreased for oxygen service. The chemical composition shall be as per BS-6017: 1981 Table 2, Cu-DHP grade. Distribution Copper Pipe manufactured as per BSEN:13348: 2008
- The supply of pipes shall accompany with manufacturers test certificates for physical properties and chemical composition. The supply of pipes shall be further substantiated with inspection certificates from third party inspectors like LLOYDS.
- Each pipe shall be capped at both ends before supply.
- The contractor shall use the following sizes:

	Outer Dia.	Thickness
1.	12mm	0.7mm
2.	15mm	0.9mm

3.	22mm	0.9mm
4.	28mm	0.9mm
5.	42mm	1.2mm
6.	54mm	1.2mm
7.	76.1mm	1.5mm
8.	108mm	1.5 mm

Copper to Copper joints shall be made on site using silver-copper-phosphorous brazing alloy to BS-1845. Copper to brass or gunmetal joints shall not be made on site. Except for mechanical joints used for components, all metallic pipeline joints shall be brazed or welded. All pipelines shall be routed in such a way that their not exposed to a temperature less than 5 deg Celsius above the dew point of the gas distribution pressure. Pipeline shall be supported at interval to prevent sagging.

- Installation and testing

i) Installation of piping shall be carried out with utmost cleanliness. Only pipes, fittings and valves that have been degreased and fittings brought in polythene sealed bags will be used at site. Pipes fixing clamps shall be of non-ferrous and non-deteriorating plastic suitable for the diameter of the pipe.

ii) All pipe joints shall be made using inert gas using flux less silver brazing method (silver brazing). Continuous purging with oil-free nitrogen to be carried out while brazing is done.

iii) Adequate supports shall be provided while laying pipelines to ensure that the pipes do not sag. Suitable sleeves shall be provided wherever pipes cross through walls/slabs. All pipe clamps shall be non-reactive to copper.

iv) After erection, the pipes will be flushed with dry nitrogen gas and then pressure tested with dry nitrogen at a pressure equal to twice the working pressure or 150 psig, whichever is higher for period of not less than 24 hours.

v) All the piping system shall be tested in the presence of the site-engineer or his authorized representative.

vi) Painting :

All exposed pipes should be painted with two coats of synthetic enamel paint and color codification should be as per IS:2379 of 1963.

6.0 Alarm System (Imported)

a. The master and area alarms as per required locations.

b. Alarm shall be microprocessor based with individual microprocessors on each area display and sensor board. The sensors shall be capable of local or remote mounting. Each area display module/sensor unit shall be gas specific. With an error message display for an incorrect connection.

c. The alarms shall be field expandable with the addition of extra modules.
Upto six services can be accommodated per standard box

d. Each specific service shall be provided with an LED digital read out comprising of 0-250 psi for positive pressure and 0-30 inch Hg for vacuum. The digital readout shall provide a constant indication of each service being measured. A bar graph trend indicator shall be provided for each service indicating a green "NORMAL", yellow "CAUTION" and a red "HIGH" or "LOW" alarm condition. Under normal operation the bar graph display shall move up and down in the green range depending on service usage. If an alarm occurs, the "RED" alarm light will flash and the audible alarm will sound. Pushing the "ALARM SILENCE" button will cancel the audible alarm but the unit will remain in the alarm condition until the problem is rectified.

e. The default set points shall be +/- 20% variation from normal condition.

f. In the calibration mode the following parameters shall be field adjustable:

   i) High/Low set points

   ii) Imperical/Metric Units

   iii) Repeat alarm enable/disable

g. Set points shall be adjustable by two on board push buttons.

h. In addition "PUSH TO TEST" & "ALARM SILENCE" buttons shall be easily accessible to operate and test the unit.

i. Combination master/area alarms shall have no moving parts and shall require no maintenance after initial installation.

Alternately

Alarm System (Imported)

Alarm system should have microbial coating labels for touch control and capability of monitoring of installed gas services by means of sensors that detect deviations from the normal operating limits. The medical gas area alarm shall fully comply with requirements of BSEN 60601-1 and BS EN 60601-1-2 and BS EN ISO 7396-1. The cover, back box and bezel (if required) shall be polyester powder. A single tamper proof fastener shall be used to gain access to the hinged door. The hinge shall operate through a minimum of 120° to provide adequate access. It should have each gas service shall be displayed by cored LED to show Normal (green), Low and High pressure (red) conditions. Medical vacuum systems shall be displayed in the Normal (green) and Low vacuum (red) conditions. Failure indicators shall be displayed by flashing lights and normal indications shall be steady. Each LED block indicator shall be a plug-in component with individual long life LED connected in parallel in two banks to provide duplex circuits. An audible warning shall sound simultaneously with any failure indication and a mute facility shall be provided. Following a mute selection the audible will resound after 15 minutes (approx.) or shall operate simultaneously should a further alarm condition occur. A Mute switch shall be provided inside the panel for use during any maintenance resulting in prolonged pipeline or plant shutdown. This facility shall automatically reset when the gas service returns to normal. The alarm panel shall have a Test facility to prove the integrity of the internal circuits, LED and audible warning. The alarm panel shall incorporate a volt free normally closed relay to allow for interconnection to either a medical gas central alarm system or an event recording circuit of a building management system. Each Alarm shall provide a green LED to indicate that electrical power is available at the panel and a red LED to indicate 'System Alarm'. In the event of an electrical power supply failure the 'System Alarm' LED shall illuminate (flashing) and the audible warning shall be delayed for 30 seconds to enable standby generator tests. Line continuity monitoring circuits shall be provided to constantly monitor the integrity of the input sensors and interconnecting wiring . In the event of any fault the line continuity monitoring circuits shall initiate the specific gas service failure indication, a System alarm indication and an audible warning. Further aids to fault diagnosis shall be provided to allow connection of up to 5 repeater panels, enabling the visual and audible alarm signals to be repeated at other locations within department.

It should be connected through Pressure and Vacuum Switches. Pressure and Vacuum switches shall be manufactured with brass wetted parts and house a PCBA with line continuity monitoring resistors. Electrical connectors shall be designed for frequent disassembly (Spade connectors are not acceptable). Pressure switches shall include both high and low pressure settings in the same switch, using only a single 1/4" BSP threaded pipeline connection to minimize number of sealed joints. The body and housing of the Pressure switch shall be manufactured from impact resistance, rigid and inherently corrosion proof materials. (Coating or plating of Mild Steel is not acceptable). Pressure Switches shall connect directly to the Area Alarm Panel. (It is not acceptable to fit a separate connection Box to convert switch signals to data signal.)

7.0 Horizontal Bed Head Panels (HBHP) 1800mm long (Imported) for ICUs and Minor OT

ICU Bed (Outlets- Oxygen -2, Vacuum-2, Medical Air-1)

Minor OT (Outlets- Oxygen -2, Vacuum-2, Nitrous-1, Medical Air-1, Surgical Air-1 and AGSS-1)

- Efficient, safe &. Robust design in extruded aluminum section
- Smooth curved surfaces, and choice of base colour and fascia plates.
- Unit should have integrated rail system to mount accessories&.
- The headwall system should be constructed of aluminum extrusions joined together to form a carcass to suit the particular application. Unit shall be factory assembled for electrical and mechanical components.
- Segregation of services i.e. Low voltage supplies, High Voltage supply and Medical gases shall be maintained throughout.
- Front fascia plate should be removable individually to access for respective service.
- Bed space management system with optional equipment rail.
- With all Equipment Rail mount Accessories.
- All Down drops shall be installed at one end preferably & Vertical drop installed at one end should be covered with Aluminium boxing with matching color.
- Entire pipe line shall run in continuous horizontal panels with no break for each unit & length as per area where it has to be installed
- Provision Medical gas pipe line outlets (As mentioned above)
- Facility per unit as under;

i) 6/15 Amp Modular Electrical Sockets with switches = 6 sets
ii) IV Pole = 2nos
iii) Vacuum slide = 1no.
iv) Sliding blocks = 2nos.
v) Nurse call system module = 1No.
vi)) lnfusion Pump Mounts = 1 No
vii) Monitor Tray with Slider = 1 No.
viii) Utility Basket = 1 No.

8.0 Valve Boxes

A Each recessed zone valve box shall consist of the following components: A steel valve box which can house single or multiple shut-off ball valves with tube

extensions, A three piece design Valve, an aluminium frame, and a pull-out removable window.

B The valve box shall be constructed of 18 gauge steel complete with a baked enamel finish.

The doorframe assembly shall be constructed of anodised aluminium and shall be mounted to the back box assembly by screws as provided. The removable front shall consist of a clear window with a pullout ring pre-mounted to the centre of the window.

C Access to the zone shut-off valves shall be by merely pulling the ring assembly to remove the window from the doorframe. The window can be reinstalled without the use of tools only after the valve handles have been returned to the open position.

D The window shall be marked with the following :-

"CAUTION: MEDICAL GAS CONTROL VALVE

CLOSE ONLY IN EMERGENCY"

E Valves shall be a 4-bolt design, bronze body, double seal, union ball-type, with Teflon (TFE) seats and Viton seals, "O" ring packing, and ball which seals in both directions, blow-out proof stem, with a pressure rating of 2760 kPa (400 psig). Valves shall be operated by a lever-type handle requiring only a quarter turn from a fully open position to a fully closed position. All valves shall be equipped with type "K" washed and degreased copper pipe stub extensions of sufficient length to protrude beyond the sides of the box.

F The entire valve body and pipe stubs shall be plated to a minimum of 25 mm (1") beyond the sides of the back box, but in no instance shall the plating be extended to the ends of the pipe stubs. All pipe stub extensions shall be supplied with suitable plugs or caps to prevent contamination of the assembly prior to installation.

G Each valve shall be supplied with an identification bracket bolted directly onto the valve body for the purpose of applying an approved medical gas identification label. A package of labels shall be supplied with each valve box assembly for application by the installer.

H Valves shall be available with line pressure gauges, as required. Gauges shall be 51 mm (2”) diameter, with metal case and ring.

I Pressure gauges shall read 0-700 kPa (0-100 psig) for all gases except nitrogen, which shall read 0-2000 kPa (0-300 psig), and vacuum, which shall read -100-0 kPa (0-30" Hg).

9. **PENDANT FOR ANESTHESIA (Imported)**

Pendant should be CE certified with four digit CE number

Should be double Arm Pendant horizontal movement

- One swivel arm of 800 mm and another of 600 mm.
- Both arms should have electromagnetic/pneumatic brake.
- Swiveling angle should be 330°
- The swivel arms move only horizontally and the length in fully stretched position is
- (800+600) = 1400mm
- Anesthesia pendant should have provision of oxygen outlets X 2, Air(4 bar) X 2, Air (7 bar) X 1, Nitrous oxide X2 and Vacuum outlet X 2, AGSS outlet X 2
- Pendant should have eight 5A/15A combined electrical socket. Electrical socket should be of reputed make. One electrical socket should be connected with central UPS and should of different colors for easy identification.
- Pendant should have two open shelves to keep Monitors/ESUs etc
- Should have provision RJ 45 /cat 5 for telephone communication.
- Should have provision RJ 45 /cat 6 for data communication.

10. PENDANT FOR SURGEON (Imported)

Pendant should be CE certified with four digit CE number

Should be double Arm Pendant with horizontal movement

One swivel arm of 800 mm and another of 600 mm.

Both arms should have electromagnetic/pneumatic brake.

Swiveling angle should be 330°.

The swivel arms move only horizontally and the length in fully stretched position is
(800+600) = 1400mm

Surgeon's pendant should have provision of 7 bar Surgical Air outlet for pneumatic drills. Oxygen Outlet x 2, Vacuum Outlet x 2.

Surgeon's pendant should have carbon dioxide outlet in laparoscopy and endoscopy theatres.

Pendant should have eight 5A/15A combined electrical socket. Electrical socket should be of reputed make. One electrical socket should be connected with central UPS and should of different colors for easy identification.

Surgeons pendant should have infusion management system.

Pendant should have two open shelves to keep Monitors/ESUs etc

Should have provision RJ 45 /cat 5 for telephone communication.

Should have provision RJ 45 /cat 6 for data communication.

11.0 Anesthesia Gas Scavenging System (Imported) :-

The Duplex Medical Vacuum System must be fully compliant with the latest edition of NFPA 99/HTM02-01/EN737/DIN Standard and should be suitable for anaesthetic gas scavenging for 21 nos. Operation Theatres, and 1 No. MRI Room, One pump will be standby with the other in operation.

The package should consist of two 'oil –less' rotary vane vacuum pumps, a control panel and a receiver all mounted on a common base frame.

Vacuum Pump :

Each vacuum pump shall operate completely dry and shall be equipped with self-lubricating carbon/graphite vanes.
Bearings shall be permanently lubricated and sealed
No oil shall be permitted in any pump
Each pump should be completely air cooled and have absolutely no water requirements
Each pump should have a 5 micron inlet filter and should be equipped with a vacuum relief valve, check valve to prevent back-flow through off-cycle units, flexible connector, isolation valve and vibration isolators at each mounting location

The receiver should be rated for a minimum 150 psig design pressure and have a three valve bypass system to allow for draining of the receiver without interrupting the vacuum service.

Control System :

The duplex control system should be U.L. labelled/CE marked
The control system should provide automatic lead/lag sequencing with circuit breaker disconnects for each vacuum pump with external operators, full voltage motor starters

with overload protection, control circuit transformers, visual and audible reserve unit alarm with isolated contacts for remote alarm, hand-off-auto lighted selector switches and runtime hour meters.
A programmable logic controller (PLC) should control the automatic alteration of both vacuum pumps with provision for simultaneous operation if required, and automatic activation of reserve unit if required.

Terminal outlets with probes/adapters

As per Sl. No.-16

12.0 **Electrical Distribution Panel (Indigenous):-**

Panel shall be wall mounted and fabricated from16/14 SWG CRCA Sheet duly powder coated. Panel shall incorporate isolators for the following equipments.

I. Isolator for Medical Compressed air system.
II. Isolator for Medical Vacuum System
III. Isolator for AGSS System.

Panel shall have following instrumentations for easy monitoring purpose.:-

a. Incoming power supply indications of each Phase
b. Mains indication for mains supply on for each Phase.
c. Mains shall have digital metering.
d. Each circuit shall have digital meter.
e. Mains and each circuit shall be with MCCB only.

13.0 <u>Accessories</u>

13.1 **Flow meter with Humidifier (Imported)**

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

A Control within a range of 0 – 15 Lpm.
B It will meet strict precision and durability standard.
C The flow meter body should be made of brass chrome plated materials.
D The flow tube and shroud components should be made of clear, impact resistant polycarbonate.
E Flow Tube should have large and expanded 0 – 5 lpm range for improved readability at low flows.
F Inlet filter of stainless steel wire mesh to prevent entry of foreign particles.
G The humidifier bottle is made of unbreakable & Reusable of polycarbonate material and autoclavable at 121 degree centigrade.

13.2 **Ward Vacuum Units**

Ward vacuum Unit shall be wall mounted and shall consists of followings with same make :-

- Suction Controller/ Regulator (Digital/Analogue type- easy view)
- Collection bottle 500 and 2000ml with mounting arrangement.

The vacuum regulator will be step-less adjustable and have large vacuum gauge providing digital/analogue indication of the suction supplied by the regulator.

Safety trap shall be provided inside the jar to safeguard the regulator from overflowing. Different color options should be available.

The unit will be consisting of reusable 500 to 2000 ml shatter resistant bottle, each made up of Polycarbonate material and fully autoclavable at 121 degree centigrade.

13.3 **Theatre Vacuum Units**

The vacuum regulator will be step-less adjustable and have large vacuum gauge providing Digital/Analogue indication of the suction supplied by the regulator. Safety trap will be provided inside the jar to safeguard the regulator from overflowing. Different color options should be available.

The unit will be consisting of two reusable 2000 ml each shatter resistant bottle, each made up of Polycarbonate material and fully autoclavable at 121 degree centigrade.

A 3-way valve will select the collection jars : Left, Right or Both.

All the above items should be mounted on aluminum Trolley having free moving castor wheels.

14. **Civil construction of Plant Room and Manifold Room**

Construction of Manifold room (40'x30') and Plant Room (25'x30') complete including, foundations, brick works, reinforced concrete work, Kota Flooring, plastering, Painting, aluminium frame and flush shutters 30mm thick for doors, aluminium frame and shutter with 4mm thick clear float glass and aluminim grill for windows, painting, roofing in Powder coated CGI sheets over truss and purlins, water supply and Toilet, internal electrical installations, power and telephone conduit and wiring, external service connection etc complete as per standard CPWD Specifications.

15. **Construction of Liquid Oxygen area**

Liquid Oxygen Area (Suitable to the requirement for 15KL Tank as per the CCE) surrounded with industrial typed Fencing of height 2mtrs. fabricated from Angle posts and 10 swg Diamond Mesh welded into MS frame from ISA 75x75x8 And Double leaf Gate 5mtr x 2mtrs of same material of Fencing. Gate should have lock and key arrangement from outside and should be opened outside. A 9Kg DCP Fire Extinguisher and sand Bucket should be provided at one corner of the installed area. Electrical Earthing Point and Electrical Power socket and proper lighting should be provided. A Hard Stand with Anti Crash Barrier of 1.2mtr height-3 Nos of area 9.5mtrx 5.0 mtrs should be provided in the Liquid Oxygen Area. RCC Hard Stand should be suitable for 40 MT Tank. Thickness of Concrete 150mm and the slope 1:200. Size of Concrete Plinth should be suitable to 15KL LMOTank . Proper signages should be fitted at the proper location. 1/2" water Tap with 6m Hose shall be provided at the installed area.

16.0 Gas Outlets (No. as per table annexed) (Imported)

- Outlets shall be manufactured with a 165 mm long Copper inlet pipe stub which is silver brazed to the outlet body. The inlet pipe should be capable of swiveling by 360 degrees for enabling the same to be connected to the pipeline system.

- Outlet shall be equipped with a primary and secondary check valve and the secondary check valve shall be rated at minimum pressure of 200 p s i. In the event the primary check valve is removed for maintenance there should not be any leakage (on-line maintenance should be possible w/o disrupting the functioning of other outlets). Outlet bodies shall be gas specific by indexing each gas service to a gas specific dual pin indexing arrangement on the respective identification module.

- There should be a push button release mechanism for disconnecting apparatus accessible from top, bottom and side of outlets.

- A large color-coded front plate shall be used for ease of gas identification and aesthetic appeal.

- With the back rough in mounted the outlet shall adjust up to 25 mm variation in wall thickness.

- The latch valve assembly should accept only corresponding gas specific adaptors.

- All outlets shall be cleaned and degreased for medical gas service, factory assembled and tested.

Alternately

Gas Outlet (Imported)

- Shall have gas indexing geometry to BS 5682:1998. Terminal unit front fascia should be metal and it should be hundred percent metal. Gas specific components comprising the terminal unit second fix shall be manufactured from die cast Zinc alloy or similar hard wearing metal. Plastic Components should not be acceptable. Terminal units socket shall be permanently coated with a low friction fluoropolymer for maximum reliability and service life.
- The terminal unit socket die-casting shall incorporate a gas indexing pin to overcome the risk of loosening due to rough handling/mishandling. The second fix socket shall incorporate a sheer plane to safeguard the first fix and pipeline in the event of accidental damage or bed jacking. Gas specific components shall incorporate the gas identity marking permanently stamped or cast into the component surface. The first fix shall all metal construction with a brass base block and copper stub pipe. The first fix shall incorporate an integral check valve to enable servicing of the second fix and valve seals without isolation of the gas supply. Probe roller pins shall be manufactured from stainless steel. Wall mounted terminal unit s shall be Provided with white ABS mounting Box with matching fascia. The mounting box shall have smooth rounded corners to avoid the possibility of injury. A bezel shall be available to cover the plaster edge, provide a neat and easily to clean finish.

IN ADDITION TO THE ABOVE, FOLLOWING <u>TURNKEY WORKS</u> FOR INSTALLATION AND COMMISSIONING OF MEDICAL GAS MANIFOLD SYSTEM ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR:

- Bidder must take into consideration in its bid, costs to be incurred for any additional work pertaining to Civil, Electrical, Mechanical and any other protections relevant as per State/Central Govt. regulation/local authority, Servo stabilisers, U.P.S. etc. required for successful installation testing and commissioning of the system and the offered price should include all such costs, each Schedule is to be considered a package in itself and contractor to execute the order package on a "turn key basis".

- Providing fixing of **Electrical Gadgets** like ELCB, MCB, Light Points, Power points, etc in the Medical Gas Pipeline System.

- Installation of MCB, ACB, ELCB & OCB of Havell/Siemens/L&T/Schneider etc for **Control Panel** for Medical Gas Pipeline System.

- Installation of all **electrical cabling** must be of IS: 1554 (As per latest amendment) standard and wiring as per IS: 732 standard and proper earthing of all Medical Gas Pipeline System and other electrical instrument and accessories in the Medical Gas Pipeline System as per standard guidelines of BIS.

- Ventilation of Plant Room and Manifold Room of the MGMS and exhaustion of suctioned gases/air from the Vacuum unit.

- Arrangement for requisite **Fire Extinguishing** for the entire effective zones in the Manifold and Plant Room

In addition to the above mentioned equipment/appliances, if the contractor thinks it necessary to include any other equipment/appliances, accessories etc. for the MGMS then that may be provided after approval from Engineer in-charge.
The sizes are approximate. Minor variations in sizes shall be acceptable subject to prior approval of the Engineer.

APPROVED MAKES

1.	Air Blower	SWAM/ EVEREST/ KAY/Beta
2.	Cable	SKYTONE/KEI/FINOLEX/HAVELLS/POLYCAB/RR CABLE
3.	Control Panel	L & T/ SIEMENS/ SCHNEIDER
4.	PVC Pipe Class III with Fitting	FINOLEX/ SUPREME/ PRINCE/ ORI-PLAST
5.	G.I. / M.S. Pipe Heavy Class	TATA/ JINDAL/SAIL /SURYA PRAKASH/HSL/ITC
6.	MCCB/Contactor/Relay	L&T/ABB/SIEMENS/SCHNEIDER
7.	Pressure Gauges	H.GURU /FIEBIG
8.	Stainless steel	TATA/SALEM/JINDAL/MUKUND/ BHAYANDER/ AMBICA
9.	Aluminium Sheet	BALCO/NALCO/HINDALCO
10.	Grilles/Diffusers	RAVISTAR/CARYAIRE/ MAPRO/DYNACRAFT
11.	Copper Pipe-	MAXFLOW/ RAJCO/ PRECISION

Note :

- **The bidder should attach Technical Compliance item wise with respect to the above technical specifications and turnkey work along with Printed catalogues**
- **Manufacturer's Authorization should be provided in case the bidder is not manufacturer.**
- **Bidder should quote <u>Operation of MGMS</u> for One Year. Bid shall be rejected if the cost of one <u>(1) year operation</u> during one year Defect liability period is not quoted by the bidder.**

- **Bidder should quote Cost of <u>CMC for five (5) years</u> which shall be considered for ranking purpose in tender evaluation. Bid shall be rejected if the cost of Post-DLP CMC is not quoted by the bidder.**

The contractor should provide following free of cost :

- **The contractor shall be responsible for the complete works including submission of working drawing.**

- **The contractor should provide complete parts manual/Service manuals for all systems and subsystems.**

- **The contractor should get Final electrical safety test, system test and calibration done by authorized person with test instruments.**

- **All electrical accessories like cable wire, electrical outlets, switches etc provided by the contractor should be fire proof of reputed make, certified for electrical safety.**

- **Wherever makes have not been specified for certain items, the same shall be as per BIS and as per approval of HSCC.**

- **The contractor should provide test certificate for all materials and equipments used for MGMS**

- **Training of personnel of the Institute should be 30 days at least by the contractor**

- **The contractor should prepare and submit to HSCC the layout plan for Gas Pipeline system (Copper piping including Valve Box and Alarm System) of the building from Plant and Manifold Room, Electrical Wiring, EDP, Fire Fighting System in the and Ventilation of Plant Room and Manifold Room for approval before beginning of supply and installation and provide As-built drawing after installation and commissioning at site.**

- **Third party quality certification of the MGMS equipment from SGS/TUV/Lloyds should be submitted as "Certifies that the MGMS equipment meets the technical specification and BOQ of the tender document".**

ANNEXURE-B

BILL OF QUANTITY (BOQ)

The prices are to be quoted in the below mentioned form and shall include the Supply, Installation, testing , commissloning of Medlcal Gases Manifold System, Operation and Its maintenance **(during one year Defect liability period)** and 5 years CMC at site includlng all the equlpments, ancillary materlals as specified and all such items what so ever whlch may be required to fulfill the intent and purpose as laid down in the specifications, condltions and or the drawlngs.

PART - I

Item No.	Description 2	Unit 3	Qty 4	Unit Rate (In Figure) 5 Rs.	Unit Rate in words 6	Amount Rs 7
1	**OXYGEN SYSTEM**					
1a	Oxygen Manifold of 20+20 Cylinders capacity(Bulk cylinder D Type). The Oxygen Manifold should be hydraulically tested to 3500 psig pressure. The Oxygen Manifold shall be complete with all accessories etc as required complete as per specifications.	Set	1			
1b	Fully Automatic Control Panel for the Oxygen Manifold system complete with all accessories etc. complete as per specifications **(Imported)**	Set	1			
1c	10 Cylinder Emergency Oxygen Manifold with a high flow regulator with gauges and safety valves complete with all accessories etc. as required complete as per specification	Set	1			
1d	Terminal (Oxygen) outlets with probes/adapters complete as per specifications **(Imported)**	Nos.	776			
1e	Oxygen Cylinders (D- Type) for Manifold as per Specifications enclosed	Nos.	50			
1f	Liquid Oxygen System with 15 KL Tank complete as required with all accessories as per technical specification	Lot	1			
1g	High Pressure tubing flexible having Antistatic core as per ISO with proper colour coded complete as per specifications.	mtr	1164			
2	**Nitrous Oxide System**					
2a	Nitrous Oxide Manifold of 8+8 Cylinder capacity(Bulk cylinder D Type). The Nitrous Oxide Manifold should be hydraulically tested to 3500 psig pressure. The N2O manifold shall be complete with all accessories etc. and complete as per specifications	Set	1			
2b	Fully Automatic Control Panel for N2O system and complete with all accessories etc. as required and complete as per specifications **(Imported)**	Set	1			
2c	3 Cylinder Emergency Nitrous Oxide complete with high flow regulator with gauges, safety valve and other accessories etc. complete in all respect complete as per specifications	Set	1			
2d	Nitrous Oxide Terminal Outlets with probes/adaptors complete as per specifications.**(Imported)**	Nos.	41			
2e	Nitrous oxide Cylinders (D- Type) for Manifold as per Specifications.	Nos.	19			
2f	Pressure tubing flexible having Antistatic core as per ISO with proper colour coded complete as per specifications.	mtr	121			

3	**VACUUM SYSTEM**					
3a	Vacuum system shall be Triplex/QuadruplexMedical Vacuum System having system capacity of 228 cfm/6460 LPM at 19" Hg as per the relevant Internationa Standardcomplete as per specifications. **(Imported)**	Set	1			
3b	Vacuum Terminal Outlets with probes/adapters complete as per specifications. **(Imported)**	Nos.	776			
3c	Flexible tubing having Antistatic core as per ISO with proper colour coded complete as per specifications.	Metre	1164			
4	**AIR COMPRESSOR**					
4a	The system shall be consisting of one set I.e Quadruplex/Pentaplex Oil free Compressed Air System to provide system capacity 150 Scfm/4250 LPM at 8.5bar with air compressors, allied equipment, suitable tank and control panel. complete in all respect and as per specifications **(Imported)**	Set	1			
	Compressed Air Terminal Outlets with probes/adapters complete as per specifications.					
4b	For C.A. (4 Bar) **(Imported)**	Nos.	203			
4c	For C.A. (7 Bar) **(Imported)**	Nos.	38			
4d	High Pressure tubing flexible having Antistatic core as per ISO with proper colour coded complete as per specifications.	Metre	482			
5	**DISTRIBUTION PIPING (Indigenous)**					
	Medical graded Copper pipes shallbe solid drawn, tempered, seamless, phosphorous deoxidized non-arsenic and degreased for oxygen service. The chemical composition shall be as per BS-6017: 1981 Table 2, Cu-DHP grade. Distribution Copper Pipe manufactured as per BSEN:13348 complete with dew point apparatus and carbon monoxidemonitoringfacilityas per specifications.					
a	108 mm Odx 1.5 mm thk	Metre	180			
c	76.1 mm ODx 1.5mm thk	Metre	380			
d	54mm ODx 1.2mm thk	Metre	1032			
f	42mm ODx 1.2mm thk	Metre	1150			
g	28mm ODx 0.9mm thk	Metre	2860			
h	22m ODx 0.9mm thk	Metre	5808			

i	15mm ODx 0.9mm thk	Metre	4313			
j	12mm ODx 0.7mm thk	Metre	3484			
6	**ALARM (Imported)**					
	Master (Main) Alarm Panel to indicate any abnormality of gas pressures and other failures of the system. The alarm system shall be complete with digital display, sensor module and power supply. The alarm shall be complete with all indications controls, wirings, accessories etc. complete as required and as per specifications.	Set	1			
	Area Alarms for all critical areas The alarm system shall be complete with pressure sensors, indications alarms etc. and with all accessories as required as per specifications.					
a	5 S	Nos	22			
c	3 S	Nos	20			
d	2 S	Nos	17			
7	**HORIZONTAL BED HEAD PANELS (Imported)**					
	Bed head panels for Installation of outlets with provision for mounting necessary gas outlets. The bed head panel shall be provided with electrical points, switches, wiring etc . The panels shall be made in extruded aluminium profiles with powder coating and shall accomodate the gas outlets, electrical sockets etc. complete as per specifications.	Set	72			
8	**VALVE BOX**					
a	Valve Box - 2 Gas Services	Nos	17			
b	Valve Box - 3 Gas Services	Nos	20			
d	Valve Box - 5 Services	Nos	22			

9	**ANAESTHETIC PENDANT (Imported)**					
	Pendant should CE certified with four digit CE Number. Double Arm Pendant horizontal movement, One swivel arm of 800 mm and another of 600 mm, Both arms should have electromagnetic/pneumatic brake, Swiveling angle should be 330° complete as per specifications.	Nos	11			
10	**SURGEON PENDANT(Imported)**					
	Pendant should CE certified with four digit CE Number. Double Arm Pendant horizontal movement, One swivel arm of 800 mm and another of 600 mm, Both arms should have electromagnetic/pneumatic brake, Swiveling angle should be 330° complete as per specifications.	Nos	11			
11	**ANAESTHETIC GAS SCAVENGING SYSTEM (AGSS) (Imported)**					
	Duplex Medical Vacuum System The system shall comprise of two oil less rotary vane vacuum pumps, a control panel and a receiver all mounted on a common base frame. One pump shall be a standby The system shall be complete with all accessories as required and as per specifications.	Set	1			
	AGSS Terminal Outlets with probes/adapters complete as per specifications **(Imported)**	Nos.	41			
12	**ELECTRICALDISTRIBUTION PANEL :-**					
	Panel shall incorporate isolators for the Isolator for Medical I. Compressed air system. II. Isolator for Medical Vacuum System III. Isolator for AGSS System.	Nos.	1			
13	**ACCESSORIES**					
13.1	**Oxygen Flowmeter with Humidifier (Imported)**(0-15 litres/minute) with adapter, tubing etc. complete with all the required accessories and shall be complete as per specifications	Sets	776			
13.2	**Theatre vacuum unit.** The vacuum regulator will be step-less adjustable and have large vacuum guage providing digital indication of the suction supplied by the regulator complete with all accessories and as per specifications.	Set	77			
13.3	**Ward Vacuum Unit** wall mounted type complete with all accessories as required and as per specifications.	Set	700			
14	**CIVIL CONSTRUCTION OF PLANT ROOM AND MANIFOLD ROOM**					
	Construction of Manifold room (40'x30') and Plant Room (25'x30') complete including, foundations, brick works, reinforced concrete work, Kota Flooring, plastering, Painting, aluminium frame and flush shutters 30mm thick for doors, aluminium frame and shutter with 4mm thick clear float glass and aluminim grill for windows, painting, roofing in Powder coated CGI sheets over truss and purlins, water supply and Toilet, Internal electrical installations, power and telephone conduit and wiring, external service connection etc complete as per standard CPWD Specifications.	SQM	1			
	Manifold Room (40' x 30')	SQFT	1200			
	Plant Room (25'x 30')	SQFT	750			
15	**LIQUID OXYGEN AREA**					
	Liquid Oxygen Area (Suitable to the requirement as per CCE) surrounded with Industrial typed Fencing of height 2mtrs. fabricated from Angle posts and 10 swg Diamond Mesh welded into MS frame from ISA 75x75x8 And Double leaf Gate 5mtr x 2mtrs of same material of Fencing. Gate should have lock and key arrangement from outside and should be opened outside. A 9Kg DCP Fire Extinguisher and sand Bucket should be provided at one corner of the Installed area. Electrical Earthing Point and Electrical Power socket and proper lighting should be provided. A Hard Stand with Anti Crash Barrier of 1.2mtr height-3 Nos of area 9.5mtrx 5.0 mtrs should be provided in the Liquid Oxygen Area. RCC Hard Stand should be suitable for 40 MT Tank. Thickness of Concrete 150mm and the slope 1:200. Size of Concrete Plinth should be suitable to **15 KL** LMOTank . Proper signages should be fitted at the proper location. 1/2" water Tap with 6m Hose shall be provided at the Installed area.	Lot	1			
16	Gas Outlet(Already considered in the above)					

17	Low Pressure Silicon Tubing	mtr	1500			
18	**TURNKEY**	Lot	1			

	Part-II					
	Item No. 1	**Unit 3**	**Qty 4**	**Unit Rate In Rs (in Figure) 5**	**Unit Rate in words 6**	**Amount Rs 7**
1	**Operation Charges** for the complete Medical Gas Manifold System during one year Defect Liability Period as per the contract.					
	Part-III					
	Item No. 1	**Unit 3**	**Qty 4**	**Unit Rate In Rs (in Figure) 5**	**Unit Rate in words 6**	**Amount Rs 7**
1	**Comprehensive Maintenance Charges** for the complete Medical Gas Manifold System including spares, repair or replacement of defective equipments/parts, tolls, tackles, accessories, consumables, labour charges etc. complete in all respect after completion of DLP as per the contract.					
	Ist Year	Job	1			
	2nd Year	Job	1			
	3rd Year	Job	1			
	4th Year	Job	1			
	5th Year	Job	1			
	SUB TOTAL Rs.					
	SUMMARY OF RATES QUOTED					
	TOTAL (PART-I)					
	TOTAL (PART-II)					
	TOTAL (PART-III)					
	Grand Total Amount (PART - 1 + PART - II+PART III) (in Figures) :-					

Note

SEAL & SIGN OF THE BIDDER

1 **The above format of Bill of Quantity(BOQ) should be neatly hand written.**
2 **The BOQ in any other format than the above format or tuped written shall be rejected**
3 **The above quoted rates will be inclusive of all taxes, duties and other charges.**
4 **Cutting and overwriting should be avoided. Correction should be countersigned always.**
5 **Incase any error between Unit rate in figure and unit rate in words, the unit rate in words shall be cosidered**
6 **Using of fluid should be avoided**
7 **Rates of Operation charges and CMC shall be for evaluation and ranking purpose**

ANNEXURE-C

Outlets Disposition Chart (Dr. Rajendra Prasad Hospital, Tanda)

Floor/Department	Oxygen	Vacuum	MA4	SA7	N2O	CO2	AGSS
Block -2 (ward)							
First Floor							
Paid Ward & Special Room (28 Nos)	17	17					
Ward -2 (30 Beds)	19	19					
Second Floor							
Paid Ward & Special Room (28 Nos)	17	17					
Ward -2 (30 Beds)	19	19					
Third Floor							
Paid Ward & Special Room (28 Nos)	17	17					
Ward -2 (30 Beds)	19	19					
Fourth Floor							
Paid Ward & Special Room (28 Nos)	17	17					
Ward -2 (30 Beds)	19	19					
Block -3							
Ground Floor							
ICU (5 Bed)	10	10	5				
Wards (28 Beds)	17	17					
Wards (28 Beds)	17	17					
First Floor							
ICU (5 Bed)	10	10	5				
Wards (28 Beds)	17	17					
Wards (28 Beds)	17	17					
Second Floor							
ICU (5 Bed)	10	10	5				
Wards (28 Beds)	17	17					
Wards (28 Beds)	17	17					
Third Floor							
ICU (5 Bed)	10	10	5				
Wards (28 Beds)	17	17					
Wards (28 Beds)	17	17					

Fourth Floor							
ICU (5 Bed)	10	10	5				
Wards (28 Beds)	17	17					
Wards (28 Beds)	17	17					
Block -5 (Treatment)							
Ground Floor							
MRI	1	1	1		1		1
CT Scan	1	1	1				
First Floor							
ICU (11 Beds)	22	22	11				
Isolation Bed (2 Beds)	2	2					
Burn Wards (6 Beds)	4	4					
Second Floor							
OT (4 Nos.)	16	16	8	8	8		8
Minor OT	2	2	1	1	1		1
Pre-operative (2 Beds)	2	2	2				
Post Operative (6 Beds)	6	6	6				
Third Floor							
OT (4 Nos.)	16	16	8	8	8		8
Minor OT	2	2	2	1	1		1
Pre-operative (2 Beds)	2	2	2				
Post Operative (6 Beds)	6	6	6				
Fourth Floor							
ICCUs (12 Nos.)	24	24	12				
Dialysis (4 Nos)	3	3	3				
Isolation Bed (2 Beds)	2	2					
Block -5 (Maternity)							
First Floor							
Wards (6 Nos.)	4	4					
Delivery Room (Septic)- 2 Beds	2	2					
Labour Room (2 Beds)	2	2					
Ward (6 Beds)	4	4					
Neo Natal ICU (10 Beds)	20	20	10				
Nursery (15 Beds)	9	9					
Second Floor							
Post Operative (8 Beds)	8	8	8				
Pre Operation (2 Beds)	2	2	2				

Operation Theatre (2 Nos.)	8	8	4	4	4		4
Block-7 (Casuality)							
Ground Floor							
OT (2 Nos.)	8	8	4	4	4		4
Preparative Room (2 Nos.)	2	2	2				
Treatment Room (7 Beds)	4	4					
Examination & Resucitiation Room (5 Beds	3	3					
First Floor							
ICU (7 Nos.)	14	14	7				
Ward (19 Beds)	11	11					
Total	**576**	**576**	**125**	**26**	**27**	**0**	**27**

Annexure-C

Outlets Disposition Chart (Super Speciality Block, Tanda)

Floor/Department	Oxygen	Vacuum	MA4	SA7	N2O	CO2	AGSS
Ground Floor							
Post Operative (16 Beds)	16	16	16				
Post Operative (10 Beds)	10	10	10				
Day Care (8 Beds)	5	5					
Brachytherapy OT	4	4	2	2	2		2
HDR Brachytherapy	1	1	1				
CT Simulator	1	1	1				
Medical Accelerator (2 Nos.)	2	2	2		2		2
First Floor							
Hall -A (8 Beds)	5	5					
Hall -B (8 Beds)	5	5					
Endoscopy	1	1					
ICU (5 Beds)	10	10	5				
Second Floor							
Cath Lab Observation Room (6 Beds)	4	4	4				
Post Operative (5 Beds)	5	5	5				
CCU (6 Beds)	12	12	6				
Pre Operation /Preparation Ward	2	2	2				
CTVS OTs (2 No.)	8	8	4	4	4		4
Minor OT (1 No.)	2	2	2	1	1		1
Third Floor							
ICU's Post Operative (6 Beds)	6	6	6				
ICU (3 Beds)	6	6	3				
OT (Neuro -2 Nos.)	8	8	4	4	4		4
Pre Operation /Preparation Ward (3 Beds)	3	3	3				
Minor OT (1 No.)	2	2	2	1	1		1
Fourth Floor							

Wards (61 Beds)	41	41					
Fifth Floor (61 Beds)	41	41					
Total	**200**	**200**	**78**	**12**	**14**	**0**	**14**