

**MINISTRY OF HEALTH & FAMILY WELFARE
(GOVT. OF INDIA)**

ALL INDIA INSTITUTE OF AYURVEDA (AIIA), NEW DELHI

Tender

for

**Supply, Installation, Testing & Commissioning of Medical Gas
Manifold System at All India Institute of Ayurveda (AIIA), Sarita
Vihar, New Delhi**

VOLUME – III

TECHNICAL SPECIFICATION

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(Consultants & Engineers for Mega Hospitals & Laboratories)
E - 6 (A), Sector - I, NOIDA (U.P.) - 201 301 (INDIA)

PHONE : 91-2542436, 2542440 FAX : 91-11-91-2542447
91-2542443, 2542445 E- mail : www.hsccltd.co.in

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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 2 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 (in O.T)

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. CE Certificate should be individual 4 digit CE number for all imported equipment. 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. This supersedes single/multiple standards mentioned at any other places in the tender specification involving item/system/capacity etc.

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 12+12 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 12 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):

- a) The Oxygen Control Panel shall be of microprocessor based and preferably Digital 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.

- 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: Green for Bank in use, Amber for Bank ready and Red 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 one set of Six-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.-13

- 1e. 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 2+2 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 2 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 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: Green for Bank in use, Amber for Bank ready and Red 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 **500 lpm at 55-60 psig.**

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

Emergency system shall have arrangement of One set of Single 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.-13

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

3.0 **Vacuum (Suction) System (Imported)**

- Vacuum system shall be **Duplex (One working & One Standby)** stack mounted **220 cfm capacity (i.e Two pumps together produce vacuum of 220 cfm capacity.)**
- The system shall be of 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.
- Each vacuum pump shall be driven by a suitable HP motor. Each pump shall have a capacity of **110 cfm at 19 " HG.**
- e) 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.-13

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

4.0 Air Compressors_(Imported)

- The package shall include **one set i.e Duplex (One working and one standby) capacity of approx. 100 scfm at 8.5bar** 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.
- Each air compressor shall have a capacity of **50 scfm at 8.5bar**.
- 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 ° 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 **Terminal outlets with probes/adapters**

As per Sl. No.-13

- 4c. 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:

	<u>Outer Dia.</u>	<u>Thickness</u>
1.	12mm	1.0 mm
2.	15mm	1.0 mm
3.	22mm	1.0 mm
4.	28mm	1.0 mm
5.	42mm	1.2mm
6.	54mm	1.2mm
7.	76.1mm	1.5mm

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) Imperial/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 fully comply and meet with the requirement of HTM 02-01. It should be CE marked with notified body number specified. It 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)

- 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& UL listed/CE marked.
- 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 (Oxygen-2 Nos, Vacuum-2 Nos & Medical air-1No)
- 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) Infusion Pump Mounts = 1 No
 - vii) Monitor Tray with Slider = 1 No.
 - viii) Utility Basket = 1 No.

8.0 Valve Boxes (Imported)

- 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.
- 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.
- 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.
- The **window** shall be marked with the following :-
 - "CAUTION: MEDICAL GAS CONTROL VALVE
CLOSE ONLY IN EMERGENCY"
- 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.
- 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.
- 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.
- Valves shall be available with line pressure gauges, as required. Gauges shall be 51 mm (2") diameter, with metal case and ring.
- 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).

9.0 Anesthesia Gas Scavenging System (Imported) :-

a) 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 4 nos. Operation Theatres and 1No. MRI, 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.

9b. Terminal outlets with probes/adapters

As per Sl. No.-13

9c. Hose Assembly

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

Panel shall be wall mounted and fabricated from 16/14 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.

11.0 **Accessories**

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

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

- Control within a range of 0 – 15 Lpm.
- It will meet strict precision and durability standard.
- The flow meter body should be made of brass chrome plated materials.
- The flow tube and shroud components should be made of clear, impact resistant polycarbonate.
- Flow Tube should have large and expanded 0 – 15 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 & Reusable of polycarbonate material and autoclavable at 121 degree centigrade.

11.2 **Ward Vacuum Units (Imported)**

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 600 to 1800ml 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 600 to 1800 ml shatter resistant bottle, each made up of Polycarbonate material and fully autoclavable at 121 degree centigrade.

11.3 Theatre Vacuum Units (Imported)

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 1800 to 2000 ml 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.

12. Low Pressure Tubing

13. Gas Outlets (No. as per table annexed)_ (Imported)

- a) 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.
- b) 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.
- c) There should be a push button release mechanism for disconnecting apparatus accessible from top, bottom and side of outlets.
- d) A large color-coded front plate shall be used for ease of gas identification and aesthetic appeal.

- e) With the back rough in mounted the outlet shall adjust up to 25 mm variation in wall thickness.
- f) The latch valve assembly should accept only corresponding gas specific adaptors.
- g) All outlets shall be cleaned and degreased for medical gas service, factory assembled and tested.

Alternately

Gas Outlet (Imported)

- a) 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.
- b) 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.

14. IN ADDITION TO THE ABOVE, FOLLOWING TURNKEY WORKS FOR INSTALLATION AND COMMISSIONING OF MEDICAL GAS MANIFOLD SYSTEM FOR ALL INDIA INSTITUTE OF AYURVEDA, NEWDELHI ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR:

- Additional work pertaining to Civil, Electrical, Furniture of Office, Plumbing, Overhead Water Tank, Sanitary, Servo stabilizers/U.P.S etc. and any other protections relevant as per State/Central Govt. regulation/local authority/NDMC, 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 in package on a “turnkey basis”.

- **Electric distribution panel (EDP)** for the above MGMS equipment complete with all switchgears, wiring and controls etc complete as per specifications and drawings. (Switch gears of L&T/ Siemens/ ABB/GE or Schneider make)
- **Electrical cabling** of IS: 1554 standard and wiring as per IS : 732 standard and of adequate capacity to bear total electrical load required for MGMS works from **nearby MDB/Substation in the hospital** to the Electric Distributional Panel(EDP) of MGMS room and from the EDP to the corresponding load points.
- Providing fixing of **Electrical Gadgets** like ELCB, MCB, Light Points, Power points, Fans, Cool air Fans, Exhaust fan etc in the MGMS room. Number of fans, power point, bulbs/tube light. Apart from these supplies to the individual equipments with ELCB & MCB in the MGMS room. Installation of MCB, ACB, ELCB & OCB of Havell/Siemens/L&T/Schneider etc for Control Panel for MGMS.
- Ventilation of Plant Room and Manifold Room of the MGMS and exhaustion of suctioned gases/air from the Vacuum unit.
- Arrangement for requisite **Fire Fighting** for the entire effective zones in the MGMS 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/UNIVERSAL/NATIONAL/RR CABLE
3.	PVC Pipe Class III with Fitting	FINOLEX/ SUPREME/ PRINCE/ ORI-PLAST
4.	G.I. / M.S. Pipe Heavy Class	TATA/ JINDAL/SAIL /SURYA PRAKASH/HSL/ITC
5.	MCCB/Contactor/Relay	L&T/ABB/SIEMENS/SCHNEIDER
6.	Pressure Gauges	H.GURU /FIEBIG
7.	Stainless steel	TATA/SALEM/JINDAL/MUKUND/ BHAYANDER/ AMBICA
8.	Aluminium Sheet	BALCO/NALCO/HINDALCO
9.	Grilles/Diffusers	RAVISTAR/CARYAIRE/ MAPRO/DYNACRAFT
10.	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
- The bidder should quote rates for **operation of manifold system during DLP (2 years)** without which bid shall be rejected.
- The bidder should quote rates for Post-DLP CMC (3 years) of Manifold system without which bid shall be rejected. Agreement for CMC will be done between the hospital authority and the contractor.
- The contractor shall be responsible for the complete works including submission of working drawing and walk through view.
- The contractor should provide complete List of Commonly used Spares, Operation manual, Equipment manual, Service manual and manuals for all systems and subsystems.
- Final electrical and pressure and other safety test, system test and calibration should be done by authorized person with test instruments.
- The contractor should provide all electrical accessories like cable wire, electrical outlets, switches etc, and they should be fire proof of reputed make, certified for electrical safety.
- Wherever makes have not been specified for certain items, the contractor should provide the same as per BIS and as per approval of HSCC.
- Training of personnel of the Institute should be 30 days at least by the contractor.
- The contractor should prepare and submit layout plan for Steam Pipeline, Electrical Wiring, Electrical Distributional Panel, Plumbing, Fire Fighting System, Air Washing and Ventilation and Drain line to HSCC for approval before beginning of supply and installation and As built drawing after installation.
- The contractor should provide test certificate for all materials along with manufacturer's test certificate and equipments used for MGMS.
- The contractor should provide Third party quality certificate of the MGMS equipment from SGS/TUV/Lloyds saying as "Certifies that the MGMS equipment meets the technical specification and BOQ of the Contract".

OUTLET DISPOSITION AYUSH SARITA VIHAR

	Oxygen	Nitrous	MA4	MA7	Vac	AGSS
(Gr. Floor)						
Ward	13				13	
Pre Operative	1		1		1	
Post operative	2		2		2	
Ultrasound	2				2	
CT Scan	1				1	
MRI	1	1	1		1	1
Emergency OT	2	2	2	2	2	2
First floor						
Therapy Area	8				8	
2nd floor						
Ward(Therapy)	22				22	
OT-3 Nos	12	6	6	6	12	6
Pre OT	3		3		3	
Post OT	3		3		3	
ICU-6Beds	12		6		12	
Labour Room	1		1		1	
NICU	2		2		2	
3rd floor						
Ward (Back Annex)	30				30	
Ward (Front Annex)	30				30	
4th floor						
Ward (Back Annex)	32				32	
Ward (Front Annex)	30				30	
5th floor						
Ward	30				30	
Total	237	9	27	8	237	9