

HINDUSTAN PREFAB LIMITED
JANGPURA, NEW DELHI : 14

Name of work: Supplying, Installation, Testing and Commissioning Of Medical Gas Pipeline System and Equipments for 100 Bedded ESIC Hospital at Raipur, Chhattisgarh .

Subject: Clarifications to the observations made by Agencies during Pre-Bid Meeting-held on dated 22-03-2018 .

S.No	Observations of the agencies	Clarifications given by HPL
A-1	<p>Suggestion is required for the following makes:</p> <p>MDD make for below Indian items:</p> <p>Oxygen Manifold Oxygen Emergency Manifold Oxygen Flow meter with humidifier bottle Nitrous Oxide Manifold N2O Emergency Manifold Ward Vacuum Unit Theatre Vacuum Unit Bed Head Panels</p> <p>Makes for Imported Items - Amico, Canada/ Pneumatech Medical Gas Solutions ,UK(formerly known as penlon):</p> <p>Fully Automatic Control Panel for Oxygen and Nitrous Oxide Gas Outlet points for oxygen, Nitrous Oxide, Compressed Air (4 bar), Vaccum, AGSS Valves with Valve Boxes and pressure Gauge Master Alarm, Area line Pressure Alarms WAGD/AGSS system HP Tubing</p>	<p>Please refer make list</p>
A-2	<p>Ref. Oxygen Manifold —Tender specifications state that the pressure should be tested at 380 Kg/cm2. We suggest it should be tested at maximum 250 Kg/cm2 instead of 380 Kg/cm2 as testing are always double the working pressure as per Indian standard.</p>	<p>250 Kg/cm2 accepted</p>
A-3	<p>Ref. Fully Automatic Control Panel for Oxygen— Tender specifications state that the control box shall be made of 18 guage SS 304 Sheet which is company specific and favor one company only. This must be deleted from tender specifications. The material of cabinet should be as per NEMA-1 or relevant</p>	<p>The material of cabinet should be as per NEMA-1 or relevant HTM 02-01 standards of UK.</p>

	HTM 02-01 standards of UK.	
A-4	Ref. Emergency Oxygen Manifold —Technical Specifications are contradictory. Normally Emergency Manifold has its own pressure regulators and it is not connected to control panel. Please elaborate your requirement or put general indigenous specifications of emergency manifold.	General indigenous specifications of emergency manifold. Emergency manifold will be connected to main line through double stage high flow regulators.
A-5	Ref. Fully Automatic Control Panel for Nitrous Oxide —Tender specifications state that the control box shall be made of 18 guage SS 304 Sheet which is company specific and favor one company only. This must be deleted from tender specifications. The material of cabinet should be as per NEMA-1 or relevant HTM 02-01 standards of UK.	NEMA-1 or relevant HTM 02-01 standards of UK.
A-6	Ref. Emergency Nitrous Oxide Manifold —Technical Specifications are contradictory. Normally Emergency Manifold has its own pressure regulators and it is not connected to control panel. Please elaborate your requirement or put general indigenous specifications of emergency manifold.	General indigenous specifications of emergency manifold. Emergency manifold will be connected to main line through double stage high flow regulators.
A-7	Ref. Air Receiver —Technical Specifications state that capacity of Air Receiver should be 4000 Ltrs while BOQ says 2000 Ltrs. Please amend it to 2000 Ltrs.	2000 ltrs
A-8	Ref. AGSS (Imported) —Please specify the required capacity of the AGSS. You have mentioned the flow required per point but you have not mentioned total capacity required. As per international HTM / NFPA standards, the AGSS System is required to be duplex while your specifications says simplex / duplex, which is not acceptable. Kindly amend it to Duplex Anesthesia Gas Scavenging System.	Duplex Anesthesia Gas Scavenging System. (Plant- 2000 LPM).
A-9	Ref. Valve with Valve Box and Pressure Guage —Please clarify whether you need indigenous or imported as the product specifications are not conforming whether the product is indigenous or imported.	No change, material should be as per required specifications.
A-10	Ref. Bed Head Panel —Please clarify whether you need indigenous or imported as the product specifications are not conforming whether the product is indigenous or imported. Also the makes mentioned in the specifications like, Supreme and Maxon Healthcare is fictitious makes. They don't have any manufacturing units/ facilities. These makes are put just for eye-wash of the bidders.	As per given BOQ item, technical specifications and of approved makes. Length of bed head panels 1.00 Mtr. to 1.20 Mtr.
A-11	Ref. Medical Gas Alarm -Please clarify whether you need indigenous or imported as the product specifications are not conforming whether the product is indigenous or imported.	Material should be as per required specifications and of approved makes as per list of approved makes.
A-12	Ref. Oxygen Flowmeter with Humidifier Bottle —Technical specifications states that flowmeter should be autoclavable at 134 degree centigrade while as per list of approved makes, you had asked indigenous oxygen flowmeter with Humidifier Bottle. Please note that indigenous flow meter are autoclavable at 121	121 degree

	degree instead of 134 degree.	
B-1)	Ref. Technical Specification for Medical Gas Pipe line system Clause No: 1, Sub clause no: 1.1 & 1.2. As per the technical specifications Indigenous Oxygen manifold shall be tested at 380 kg/cm2. But as per clause 1.2, technical specification of Fully Automatic control panel for oxygen, the entire manifold shall be tested at 250 kg/cm2. Please confirm at which pressure the manifold shall be tested.	Manifold shall be tested at 250 kg/cm2.
B-2)	Ref. -Technical Specification for Medical Gas Pipe line system) Clause No: 1, Sub clause no: 1.2 As per the technical specifications, Automatic O2 Control Panel is pneumatically operated by the service gas and needs no electrical supply to operate. Please confirm whether electrically solenoid valve operated control panels are acceptable or not.	Both options shall be acceptable.
B-3)	Ref. - Technical Specification for Medical Gas Pipe line system) Clause No: 1, Sub clause no: 1.2 As per the technical specifications the O2 control panel box shall be made of 18 Gauge SS 304 sheet. Please note that the item is an imported one and it is a standard product as per the relevant international standard. Kindly allow to quote the standard product.	The material of cabinet should be as per NEMA-1 or relevant HTM 02-01 standards of UK.
B-4)	Ref. Technical Specification for Medical Gas Pipe line system) Clause No: 1, Sub clause no: 1.2 As per the technical specifications the O2 control panel shall be supplied with sensing facilities to provide visual signals and other ancillary services such as heaters. But heaters are not required in O2 control panel. Please confirm.	Heaters not required in O2 control panel.
B-5)	Ref. Technical Specification for Medical Gas Pipe line system) Clause No: 2, Sub clause no: 1.4 As per the technical specifications Main Nitrous Oxide manifold size has been mentioned 3+3 and also 6+6. Kindly confirm which one to consider.	3+3
B-6)	Ref. Technical Specification for Medical Gas Pipe line system) Clause No: 2, Sub clause no: 1.5 As per the technical specifications, Automatic N2O Control Panel is pneumatically operated by the service gas and needs no	Both options shall be acceptable.

	electrical supply to operate. Please confirm whether electrically solenoid valve operated control panels are acceptable or not.	
B-7)	Ref. Technical Specification for Medical Gas Pipe line system)) Clause No: 2, Sub clause no: 1.5 As per the technical specifications the N2O control panel box shall be made of 18 Gauge SS 304 sheet. Please note that the item is an imported one and it is a standard product as per the relevant international standard. Kindly allow to quote the standard product	Standard Product shall be allowed
B-8)	Ref. Technical Specification for Medical Gas Pipe line system)) Clause No: 2, Sub clause no: 1.6 Please confirm the N2O emergency manifold size. In the Technical specification Double cylinder banks of two no cylinder have been mentioned. But in BOQ, 2 cylinder emergency manifold have been mentioned. Please confirm the size.	2 cylinders
B-9)	Ref.-Technical Specification for Medical Gas Pipe line system Clause No: 3, Sub clause no: 3.1 As per the technical specification of compressed air system 4000 litres air receiver capacity have been mentioned. As per HTM-0201, "receiver water capacity shall be sized at 50% of FAD in 1 minute". As per the tender Two compressors of 57.18 cfm capacity is required. Therefore 2000 litres capacity air receiver is sufficient. Kindly confirm.	2000 litres capacity air receiver is sufficient.
B-10)	Ref. Technical Specification for Medical Gas Pipe line system) Clause No: 3, Sub clause no: 3.2 Please confirm whether Simplex or Duplex arrangement is required for Air dryer, Filter and pressure reducing system	As per medical requirement all systems shall have duplex arrangement.
B-11)	Ref. Technical Specification for Medical Gas Pipe line system) Clause No: 4, Sub clause no: 4.2 Please confirm the Vacuum receiver capacity. Nothing is mentioned in the technical specification.	2000 litre capacity vacuum receiver. (Already mentioned in BOQ)
B-12)	Ref. -Technical Specification for Medical Gas Pipe line system Clause No: 5, Kindly confirm whether the Anesthesia Gas Scavenging system shall have simplex or duplex configuration.	As per medical requirement all systems shall have duplex arrangement.

B-13)	Ref. Technical Specification for Medical Gas Pipe line system) Clause No: 6, As per the technical specification copper pipes shall be conforming to EN 13348, kite marked. Kindly allow us to offer Lloyd certified copper pipes which are widely used in medical field.	Lloyd certified copper pipes will be allowed.
B-14)	Ref. Technical Specification for Medical Gas Pipe line system) Clause No: 6 Kindly check the pipe thicknesses mention in the technical specification. 12 mm pipe having 1mm thickness whereas 15, 22 and 28 mm pipes are having 0.9 mm thickness	Pipe thickness shall be as per EN 13348.
B-15)	Ref. Technical Specification for Medical Gas Pipe line system) Clause No: 1.17 The valve boxes would be made of zinc quoted mild steel and shall be powder quoted”. Please clarify the statement.	Valve boxes shall be made of Mild steel and powder quoted.
B-16)	Ref. Technical Specification for Medical Gas Pipe line system) Clause No: 9 Please provide No of electrical switch socket to be provided with each bed head panels.	2 sets of 5/15
B-17)	Ref. Technical Specification for Medical Gas Pipe line system) Clause No: 13 As per the Technical specification, Oxygen flowmeter with humidifier bottle should be autoclavable at 134 degree centigrade. Please note that the autoclave temperature shall be 121 degree centigrade or below. Please confirm.	Oxygen flowmeter with humidifier bottle should be autoclavable at 121 degree centigrade or below.
B-18)	Ref. Technical Specification for Medical Gas Pipe line system) Clause No: 1, Sub clause no: 1.3 “Emergency O2 manifold shall be connected to the main line through automatic control panel isolating the main control panel to ensure the uninterrupted supply of medical oxygen in case main manifold/control panel is inoperative” Kindly explain the arrangement	General indigenous specifications of emergency manifold. Emergency manifold will be connected to main line through double stage high flow regulators.
B-19)	Ref. Financial Bid (BOQ) No of Nitrous Oxide outlet have not been mentioned. Kindly specify the same.	4 nos
B-20)	Ref. Financial Bid (BOQ	4 Nos

	Only 4 bar Air outlet have been mentioned in BOQ. Kindly confirm whether there is any requirement of 7 bar outlets. If so then please mention the quantity.	
B-21)	Ref. Financial Bid (BOQ) Six service Valve boxes and 5 service area alarm panels have been mentioned in BOQ. But as per the technical specification/BOQ the hospital have only four services. Kindly confirm.	Maximum 5 Gas services valve box as well as 5 service area alarm panels shall be provided.
B-22)	Ref. Only Dominic Hunter have been mentioned as an approved make for Bacteria filters. We propose Solberg made Bacteria Filters along with Dominic Hunter.	M/S Solberg be included in Make list.
B-23)	Ref. Makes- Medical Gas Pipe line system We propose M/S Karnataka Industries along with other makes mentioned in the make list for Bed Head panels.	As per NIT / Tender document
B-24)	Ref. -Makes- Medical Gas Pipe line system We propose M/S Leader Valves along with other makes mentioned in the make list for Floor Zonal Valves.	“Leader” makes Valves added in list of approved makes Industries maybe included in Make list
B-25)	Ref. Makes- Medical Gas Pipe line system Equivalent make shall be mentioned in the make list for Combined electrical panels.	As per NIT / Tender document
B-26)	Ref. Makes- Medical Gas Pipe line system As per the Technical specification, Valve box and Area line pressure alarms are seems to be indigenous. But in Make list all imported makes are specified. Kindly confirm.	Material should be confirming to tender specifications and should be of approved makes.
B-27)	In E Tendering procedure, if we have already registration at ESIC portal, then also we have to pay the amount mentioned in point d & point f in Tender document. Please confirm.	As per NIT / Tender document
B-28)	Financial arrangement with the Financial Institution like over drafts/loan, Bank Guarantee Limit etc. for carrying out the proposed work. Please refer to Form-A, Financial Information , point no :II-. Please clarify.	Bidder may give the details.
B-29)	Particulars of registration with various Government bodies (attach attested Photocopy) Organization/ Place of registration No.- FORM “E”- Point 4. Please clarify.	Bidder may give the details.
B-30)	In which field of Mechanical Engineering/ Medical Services execution the applicant has specialization and interest? FORM “E”- Point 11. Please clarify.	Bidder to specify.
B-31)	Page No: 8 of Tender document:- Integrity pack submission is	Yes, as per NIT/ Tender

	necessary at the time of submission of Tender. Please explain.	document.
B-32)	In G.C.C, Annexure X, submission is necessary. Please clarify.	Yes, as per NIT/ Tender document.
C-1)	<p>1.2 Fully Automatic Control Panel for Oxygen (Imported) as per NFPA99 / HTM 02-01 , UL Listed where applicable / CE marked with notified no.</p> <ul style="list-style-type: none"> - Fully automatic in operation and requiring no action, Automatic Control Panel is pneumatically operated by the service gas and needs no electrical supply to operate. It will continue to function therefore, should there be a failure in the electricity supply. It takes on automatically from the empty cylinder bank to filled cylinder bank. - The panel is enclosed in a metal cabinet with a hinged front cover. The cover is fitted with a lock to prevent unauthorized access, and can be swung open for maintenance. The Box Shall be made of 18 gauge SS 304 sheet. - A visual indication of the state of the manifold is provided by 3 gauges within the control panel, clearly visible through the transparent cover, these gauges indicate the pressure of the right and left hand banks, and the supply pressure from the control panel to the distribution system. - The panel is supplied with sensing facilities to provide visual signals and other ancillary services such as heaters. A heater block is fitted to the inlet pipes for Nitrous Oxide. - In addition the panel is fitted with audio alarm indication for changeover of empty cylinder bank to filled cylinder bank. <p>The entire manifold will be hydraulically tested at 250 Kg/Cm2 pressure, duly degreased for Nitrous Oxide service, and supplied in sealed cover, ready for assembly at site.</p> <p>NOTE: The above referred system does not comprise the supply of cylinders, which are to be separately arranged by the Hospital.</p> <p>In ESI VARANASI Tender Specification, the asked control panel was also includes:</p> <ol style="list-style-type: none"> a) Digital Display with data logging facilities like consumption, continuous pressure monitoring & recording. b) Flow Capacity not mentioned so supplier can make lower range supply. it may be 50m3/h instead off 175m3/h. <p><u>Benefit:</u> By records keeping in control panel memory, we can check all data i.e. at any time what was pressures, when any alert was generated like flow/pressure fault conditions etc. which is very important when any such incident happen like outage of oxygen</p>	<p>Control panel should be capable with the help of flow meter for the followings:-</p> <ul style="list-style-type: none"> <input type="checkbox"/> Overview of the flow rate statistics <input type="checkbox"/> Current flow rate <input type="checkbox"/> Current consumption <input type="checkbox"/> Monthly consumption <input type="checkbox"/> Setting of the critical flow limit <p>– THE ALARM GOES OFF</p> <ul style="list-style-type: none"> <input type="checkbox"/> All the values remain stored, even in case of an electrical outage

	supply and help department / administrator to find such details.	
C-2)	<p>1.3 Emergency Oxygen Manifold CE Marked.</p> <p>It comprises of Double cylinders bank of 3 (three) number of cylinders each bank which shall be connected to the main line through Automatic Control Panel isolating the main control panel to ensure uninterrupted supply of medical oxygen in case main manifold/control panel is inoperative (supplied without cylinders).</p> <p><u>As per HTM Guidelines:</u> emergency reserve manifold should ability to provide 4 hours' supply at average use.</p> <p>Presuming 200 LPM average consumption for 4hours needs minimum 8 (4+4) cylinders.</p>	<p>Oxygen Emergency Cylinder Manifold System</p> <p>A separate Bank consisting of 4+4 cylinders which shall be connected to the main line through double stage high flow regulators after isolating the control panel to ensure uninterrupted supply of medical oxygen in case of manifold/control panel is in operative. The regulators will have gauge to show the status of standby cylinders and delivered line pressure and have safety valve set to blow at pressure above 70 PSIG.</p>
C-3)	<p>2. NITROUS OXIDE SYSTEM</p> <p>1.4 Nitrous Oxide Manifold CE Marked.</p> <p>The Nitrous Oxide cylinder manifold shall comprise of two cylinder banks which should be extendable type, of size 3 + 3 for Indian type bulk cylinders.</p> <p>The Manifold shall have the following characteristics:</p> <ul style="list-style-type: none"> - Manifold should have high pressure copper annealed tail pipes with one end having brass bull nose suitable for Nitrous Oxide cylinders and other end suitable for Manifold non- return Valves. - Nut nipple fitting of R.H. internal threading suitable for cylinder valves conforming to IS:3224 (Nitrous oxide Service), and cylinder support system. - It should have middle frame of manifold of 6+6 size along with chain for individual bulk oxygen cylinder. - The copper tail pipes are fitted with individual non-return valves to the cylinder manifold for easy removal of cylinders, without any disturbance to system operation. <p>Each manifold will have one terminal header and a NPT connection for the Automatic Control Panel.</p> <p>NOTE: The above referred system does not comprise the supply of cylinders</p> <p>N2O Main Manifold size: 3+3 or 6+6 kindly clarify</p>	N2O manifold system 3 + 3 size

C-4)	1.5 Nitrous Oxide Automatic Control Panel (Imported) as per NFPA99 / HTM 02-01 , UL Listed where applicable / CE marked with notified no.	Automatic Control Panel (Nitrous Oxide)
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	<p>- Fully automatic in operation and requiring no action, Automatic Control Panel is pneumatically operated by the service gas and needs no electrical supply to operate. It will continue to function therefore, should there be a failure in the electricity supply. It takes on automatically from the empty cylinder bank to filled cylinder bank.</p> <p>- The panel is enclosed in a metal cabinet with a hinged front cover. The cover is fitted with a lock to prevent unauthorized access, and can be swung open for maintenance. The Box Shall be made of 18 gauge SS 304 sheet.</p> <p>- A visual indication of the state of the manifold is provided by 3 gauges within the control panel, clearly visible through the transparent cover, these gauges indicate the pressure of the right and left hand banks, and the supply pressure from the control panel to the distribution system.</p> <p>- The panel is supplied with sensing facilities to provide visual signals and other ancillary services such as heaters. A heater block is fitted to the inlet pipes for Nitrous Oxide.</p> <p>- In addition the panel is fitted with audio alarm indication for changeover of empty cylinder bank to filled cylinder bank. The entire manifold will be hydraulically tested at 250 Kg/Cm² pressure, duly degreased for Nitrous Oxide service, and supplied in sealed cover, ready for assembly at site</p> <p>Nitrous Oxide Automatic Control Panel (Imported) In ESI VARANASI Tender Specification, the asked control panel was also includes:</p> <ol style="list-style-type: none"> Digital Display with data logging facilities like consumption, continuous pressure monitoring & recording. Flow Capacity not mentioned so supplier can make lower range supply. it may be 50m³/h instead off 175m³/h. <p><u>Benefit:</u> By records keeping in control panel memory, we can check all data i.e. at any time what was pressures, when any alert was generated like flow/pressure fault conditions etc. which is very important when any such incident happen like outage of oxygen supply and help department / administrator to find such details.</p>	<p>Same as specification of oxygen reduction box.</p> <p>The capacity of reduction box at 4 bar outlet pressure is 50 m³/h and should have two working reduction valve.</p> <p>The Control Panel will be made to provide Heavy Duty with gas heater and have a Flow meter with measuring range 0 – 50 Nm³/min. The safety cover of reduction box is lifted with the help of two dampers.</p> <p>Unit must have UL Listing/CE notified number on it. System Comply HTM 02-01/NFPA 99C/ ISO 7396. It must be come with serial number, warranty and test certificate from European / American manufacture only.</p>
C-5)	<p>1.6 Emergency Nitrous Oxide Manifold CE Marked. The emergency stand by manifold should provide a stand by nitrous oxide gas supply from Double cylinders bank of 2 (two) number of cylinders each bank which shall be connected with copper tail pipes, safety valves, NRV's. Each bank shall be</p>	As per NIT /Tender document.

	<p>connected with main line, through Automatic Control Panel isolating the main control panel to ensure uninterrupted supply of medical Nitrous Oxide in case main manifold/control panel is inoperative (supplied without cylinders).</p> <p>N2O Emergency manifold Size: 2+2 Is oversized</p> <p><u>As per HTM Guidelines:</u> emergency reserve manifold should ability to provide 4 hours' supply at average use</p> <p>and one N2O full cylinder lasts in days where OT/terminals are under 10 nos.</p>	
C-6)	<p>7. VALVES WITH VALVE BOX AND PRESSURE GAUGE CE Marked. Area service unit module should consist of 1 to 5 AVSU(Area Valve Service Units). It should incorporate a valve with NIST connection at either side. The valve boxes would be made of Zinc coated Mild Steel and shall be powder coated for housing area/zonal valves. The valve box would be lockable having glass cover, the valve will be complete with stub pipes that extend to the outside of the box to enable easy connection to the MGPS. The valve box should be equipped with gauge for the gases.</p> <p>10. MEDICAL GAS ALARM CE Marked. 1. Area alarm and Main Alarm/ Master Alarm</p> <p>The Medical Gas alarm should be capable of monitoring up to 6 medical gas services by mean of pressure sensors which detect deviation from the normal operating limits of either pressure or medical vacuum. The area alarms should have a digital display of pressure and should be displayed by standardized coloured LED's. It should have audible Alarm for high – caution – normal – caution – Low). It should have programming facility from front panel. Facility to connect to remote alarm box by potential free contacts provided in the alarm box. Operated by 230V ac power supply.</p> <p>The alarm limits: High, caution, Normal, Caution, Low limits are set as below at factory testing: FOR 1,2,3 Channels: (PSI) HIGH :75 RED CAUTION(nH) :70 Yellow NORMAL (n) :60 Green CAUTION (nL) :50 Yellow LOW (L) :45 Red For Vacuum Channel : (mmHg) NORMAL (n) :450 Green</p>	<p>Please refer Technical specifications</p>

	<p>CAUTION (nL) :300 Yellow LOW (L) :250 RED ALARMS ACKNOWLEDGE RESETTIME: Factory setting 10 minute. Pneumatic Service Selection: Factory setting all 4 Pneumatic are activated (unless specification mentioned in the order). Pressure switch for High & Low pressure signals: Pressure switches as sensing devices in audio visual alarms for Oxygen, Nitrous Oxide & Compressed Air System. Pressure switches are equipped with NO/NC contacts. These are properly cleaned & fit for use with medical gases. These would be used with 220V Ac electric supply & have a rating upto 15 Amps, tested with 100 & 200 PSIG pressures. The pressure switch constructed of a rugged cast, weather proof housing with mounting bracket, and a ¼” BSP gas service line connection at the bottom of the assembly. Vacuum Switch: Vacuum switches used to make cut in or out connections on either increasing or decreasing vacuum. These would be cleaned for use with medical gases & have a adjustable range upto 29” of mercury vacuum. It has both NO & NC contacts & fit for use with 230V electric supply. The vacuum switch constructed of a rugged cast, weather proof housing with mounting bracket, and a 3/8” BSP gas service line connection at the bottom of the assembly. In ESI Varanasi tender AVSU/Control Closing Boxes Integrated Area Alarm was used because:</p> <ul style="list-style-type: none"> a) it is less wall space required to install than a separate valve box unit and alarm unit. b) Emergency gas feeding available in AVSU/CCB c) Access is easy In Emergency and not required to break any glass. d) Data logging facility available by which error reporting possible. <p>All above features not available in current tender specification as mentioned left side.</p>	
C-7)	<p>5. WAGD / ANESTHESIA GAS SCAVENGING SYSTEM (IMPORTED) The Anesthesia Gas Scavenging (AGS) System shall comply with NFPA 99 / HTM 02-01. the WAGD / AGSS system shall be a dedicated. Specifically designed active extraction and disposal</p>	<p>AGSS Remote Control indicator should be provided for each OT</p>

	<p>system for waste anesthetic gas. It shall provide a maximum flow rate of 130 l/min with a 1 kPa resistance to flow. and a minimum of 80 l/min with a 4 kPa resistance to flow at each terminal unit. irrespective of the number of terminal units in use the AGS system shall use dedicated radial blowers in a simplex or duplex configuration. The AGS pump assemblies shall be skid mounted and included on the skid shall be the simplex or duplex pump. (s), motor control unit(s) with starter/isolator, moisture drain flask and flexible connector(s) to connect the plant to the pipeline, Each pump shall include an electric motor and directly coupled impeller assembly, Impeller bearings in the pump(s) shall not require lubrication. The pump(s) shall be air cooled and rated for continuous</p> <p>There is no any provision of remote control in each OTs for monitoring/control/</p>	with the system
C-8)	<p>6. COPPER PIPE WITH REQUIRED COPPER FITTINGS 6.1 Medical Grade Copper Pipe (as per NFPA 99/LATEST HTM/CE MARKED AS APPLICABLE)</p> <p>All pipes shall be drawn half hard temp., solid drawn, seamless, phosphorous deoxidized, non-arsenic and degreased copper pipe conforming to EN 13348 Kite Marked</p> <p>The supplies of copper pipe would be accompanied with manufacturers test certificate for the physical properties of copper pipes and their Chemical composition. The supply of pipes be further substantiated with inspection certificate from the third party like KITE.</p> <p>The Pipeline will be laid as per NFPA 99. Kite Mark is not only third party inspector The supply of pipes be further accompany with inspection certificates from manufacturers as well as from third part inspection like Lloyds/SGS/TUV etc.</p>	Lloyd certified copper pipes will be allowed.
C-9)	<p>12. MEDICAL GAS OUTLET POINTS/ TERMINAL UNIT FOR OXYGEN, N2O, COMPRESSED AIR AND VACUUM, WAGD (IMPORTED) as per NFPA 99 /HTM 02-01 , UL Listed /CE Marked with notified body No.</p> <p>The outlets shall be modular singles, and shall incorporate nameplate color-coding in accordance with NFPA 99./ HTM 02-01 The single modular outlets shall be of a design that provides for ganging of rough-in plates in the field to form multiples. The gas services shall be sequentially arranged and located as shown on the plans with a minimum centerline spacing of 5 inches (12.5 cm) between outlets. The outlets shall be capable of supporting dispensing equipment without the use of slide brackets.</p> <p>The medical gas outlets shall be designed so that, once installed, routine service of both the primary and secondary check valves can be accomplished without</p>	Outlets as per International standards HTM 02-01/ ISO 7396/ NFPA 99 of approved makes are allowed.

	<p>removing the nameplate or gas specific portions. The primary check valve shall be unitized and of the cartridge type. So that the primary check valve can be removed for service without shutting off the gas supply to the outlet, the secondary check valve shall operate automatically to stop the free flow of the pressure gas. There shall be no secondary check for vacuum or gas evacuation service. Medical gas outlets that require the removal of the nameplate or gas specific components for routine service shall not be acceptable. The outlets shall incorporate the following features:</p> <ul style="list-style-type: none"> · UL Listed to UL 1331 and CSA Z9170-1. · Conforms to NFPA 99 and CGA standards · Accepts DISS gas specific nut & nipple adapters · Ease of maintenance without removing the faceplate using a cartridge insertion tool. · Compensates for variation in wall thicknesses from ½” to 1 ¼” · Modular design · All outlets are 100% tested for flow and leaks · Nameplate color coding per NFPA 99 · 5” centers · 360° swivel inlet tube · Metal back and nameplate · Strength of connections provides support for dispensing equipment without the use of additional brackets · Made in the U.S.A. <p>The outlet nameplate shall be permanently color coded with a durable scratch-resistant and protective label. The outlet trim plate shall be durable plastic or powder coated aluminum, attached with the nameplate to the rough-in assembly, and provide automatic plaster adjustment from 1/2 to 1-1/4 of an inch (1.3 to 3 cm). The outlet’s rough-in supply tube shall be a 7 inch (18 cm) length of 1/2” O.D. copper Type K for all gas services and labeled with the name of the gas service.</p> <p>Medical gas outlets shall be cleaned for oxygen service in accordance with the current Compressed Gas Association (CGA) Pamphlet G-4.1, capped and placed in a protective container for shipment. The outlets shall be installed in strict accordance with manufacturer’s instructions, and tested before use in conformance with local and federal codes</p> <p>The specification match to only American standard.</p>	
C-10)	<p>13.1Oxygen Flow Meter with humidifier bottle CE Marked.</p> <p>The flow meter must be constructed with chromium plated brass body, extremely robust, to take care of the day to day usage demand. Flow meter cartridge type knob : easy to maintain, offers optimum adjustment quality and superior designing and</p>	121 ⁰ C accepted.

	<p>engineering to provide high level of accuracy, with no significant affect from restrictions caused by down-stream equipments. The flow meters should be 0-15 LPM range for oxygen. Humidifier bottle should be unbreakable, reusable to disinfectants and complements. It should be autoclavable at 134 degree centigrade</p> <p>Polycarbonate can't achieve 134 degree centigrade</p>	
C-11)	<p>13.2 Ward Vacuum Unit with Regulator</p> <p>CE Marked.</p> <p>Consisting of one no. Suction Regulator connected with 1000/600 CC pot of collection. The jar and the lid are made of polycarbonate which are autoclavable and unbreakable. The jar is fitted with an overflow safety trap & the regulator fitted with an ON/OFF valve and a knob to regulate the online suction</p> <p>In tender specs there is</p> <ul style="list-style-type: none"> ➤ no any safety jar ➤ no hydrophobic filter 	<p>Unit should be equipped with an additional minimum 120 ml polycarbonate safety jar with safety trap filtration system of hydrophobic filter.</p>