KERALA MEDICAL SERVICES CORPORATION LTD
(A Government of Kerala Undertaking)
Thycaud P.O, Thiruvananthapuram - 14, Kerala.
Tel: 0471 - 2945600, 2337353, Fax: 0471 - 2945647
Email :ep.kmscl@kerala.gov.in
CIN: U24233KL200TSGC021616, PAN : AADCK4029M, GSTIN : 32AADCK4029M1ZK

Running Contract Details	
Equipment Name	Centralized Medical Gas Supply
Running Contract Valid Till	31-12-2026
Tender Ref No	KMSCL/EP/T497/363/2023
Tendered Quantity	100
Supplier Name	M/s Blaze Systems & Services
GST No	32AFPPA3959N1Z2
Installation & Delivery Period	10 Week(s)
Up-time / PM vist	95% & 4 Visits per year
Warranty period	3 Years

Supplier`s Details		
Address	**Contact Details**	
XVII/503BC Kallanchira Bldgs Changanacherry Kottayam Dt. Kerala-686536 Ph: 096054 56624 Office:0481-2471689	Contact Person	Anto Thomas
	Phone	0484-2424311
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Item-wise Price Details

#	Item Details	Unit Rate (Incl.all taxes & charges)	Service Charges (Through KMSCL)	Grand Total
1	**Centralized Medical Gas Supply**	0 Incl.GST :0%	0	0
2	**Semi auto control panel for oxygen** *Model & Make : OXY Panel/S kumar/GHL/Blaze Systems*	29500 Incl.GST :18%	2065	31565
3	**3x3 manifold for nitrous oxide** *Model & Make : S kumar/Blaze Systems*	21240 Incl.GST :18%	1486.8	22726.8
4	**Semi auto control panel for nitrous oxide** *Model & Make : OXY Panel/S kumar/GHL/Blaze Systems*	41300 Incl.GST :18%	2891	44191
5	**1x1 nitrous oxide emergency reserve manifold** *Model & Make : S kumar/Blaze Systems*	16402 Incl.GST :18%	1148.14	17550.14
6	**Filteration and dryer system**	69620 Incl.GST :18%	4873.4	74493.4
7	**Pressure control 4 bar**	5900 Incl.GST :18%	413	6313

Item-wise Price Details				
8	**Pressure control 7 bar**	2950 Incl.GST :18%	206.5	3156.5
9	**Reservoir**	35400 Incl.GST :18%	2478	37878
10	**Filter & Vaccum pump exhaust**	5900 Incl.GST :18%	413	6313
11	**Oxygen flowmeter with humidifier** *Model & Make : BPC/S. Kumar /Oxygenx*	1062 Incl.GST :18%	74.34	1136.34
12	**Vacuum regulator with suction bottle** *Model & Make : 600 ml/S. Kumar*	2360 Incl.GST :18%	165.2	2525.2
13	**Theater vacuum unit** *Model & Make : 2x 2000 ml/S. Kumar /Aktiv*	3540 Incl.GST :18%	247.8	3787.8
14	**Gas / Vacuum outlet** *Model & Make : S Kumar/S. Kumar/Aktiv/equivalent*	1829 Incl.GST :18%	128.03	1957.03
15	**Copper pipe 42mm** *Model & Make : EN 13348 -LLYODS/Mexflow/Janya*	1829 Incl.GST :18%	128.03	1957.03
16	**Copper pipe 35mm** *Model & Make : EN 13348 -LLYODS /Mexflow/Janya*	2006 Incl.GST :18%	140.42	2146.42
17	**Copper pipe 28mm** *Model & Make : EN 13348 -LLYODS /Mexflow/Janya*	1416 Incl.GST :18%	99.12	1515.12
18	**Copper pipe 22mm** *Model & Make : EN 13348 -LLYODS /Mexflow/Janya*	1097.4 Incl.GST :18%	76.82	1174.22
19	**Copper pipe 15mm** *Model & Make : EN 13348 -LLYODS /Mexflow/Janya*	814.2 Incl.GST :18%	56.99	871.19
20	**Copper pipe 12mm** *Model & Make : EN 13348 -LLYODS /Mexflow/Janya*	354 Incl.GST :18%	24.78	378.78
21	**Valve 42mm** *Model & Make : 12 mm to 108mm/ IBP conex-UK/ Janya*	1770 Incl.GST :18%	123.9	1893.9
22	**Valve 35mm** *Model & Make : 12 mm to 108mm/ IBP conex-UK/ Janya*	2419 Incl.GST :18%	169.33	2588.33
23	**Valve 28mm** *Model & Make : 12 mm to 108mm/ IBP conex-UK/ Janya*	2360 Incl.GST :18%	165.2	2525.2
24	**Valve 22mm** *Model & Make : 12 mm to 108mm/ IBP conex-UK/ Janya*	1888 Incl.GST :18%	132.16	2020.16
25	**Valve 15mm** *Model & Make : 12 mm to 108mm/ IBP conex-UK/ Janya*	1180 Incl.GST :18%	82.6	1262.6
26	**Valve 12mm** *Model & Make : 12 mm to 108mm/ IBP conex-UK/ Janya*	118 Incl.GST :18%	8.26	126.26
27	**Area valve service unit 2 gas** *Model & Make : 2 gas/ Blaze Systems /GHL*	2360 Incl.GST :18%	165.2	2525.2
28	**Area valve service unit 3 gas** *Model & Make : 3 gas/ Blaze Systems /GHL*	7080 Incl.GST :18%	495.6	7575.6

Item-wise Price Details				
29	**Area valve service unit 4 gas** *Model & Make : 4 gas/ Blaze Systems /GHL*	9440 Incl.GST :18%	660.8	10100.8
30	**Area valve service unit 5 gas** *Model & Make : 5 gas/ Blaze Systems /GHL*	4720 Incl.GST :18%	330.4	5050.4
31	**Area line pressure medical gas alarm 2 gas** *Model & Make : 2 gas/ Blaze Systems /GHL*	3540 Incl.GST :18%	247.8	3787.8
32	**Area line pressure medical gas alarm 3 gas** *Model & Make : 3 gas/ Blaze Systems /GHL*	7080 Incl.GST :18%	495.6	7575.6
33	**Area line pressure medical gas alarm 4 gas** *Model & Make : 4 gas/ Blaze Systems /GHL*	7670 Incl.GST :18%	536.9	8206.9
34	**Area line pressure medical gas alarm 5 gas** *Model & Make : 5 gas/ Blaze Systems /GHL*	7080 Incl.GST :18%	495.6	7575.6
35	**Cylinder filled - oxygen** *Model & Make : D type /RAMA cylinders /EKC*	12980 Incl.GST :18%	908.6	13888.6
36	**Cylinder filled - Nitrous oxide** *Model & Make : D type/ RAMA cylinders /EKC*	9440 Incl.GST :18%	660.8	10100.8
37	**Painting** *Model & Make : Metallic /Asian Paints*	11.8 Incl.GST :18%	0.83	12.63
38	**4x 4 manifold** *Model & Make : S kumar/Blaze Systems*	90860 Incl.GST :18%	6360.2	97220.2
39	**2x2 manifold** *Model & Make : S kumar/Blaze Systems*	88500 Incl.GST :18%	6195	94695
40	**Cost of adding additional single cylinder manifold**	10620 Incl.GST :18%	743.4	11363.4
41	**Air dryer, filtration, purge control and dew point monitor**	2950000 Incl.GST :18%	206500	3156500
42	**10 x 10 manifold for oxygen** *Model & Make : S kumar/Blaze Systems*	94400 Incl.GST :18%	6608	101008
43	**3 x 3 oxygen emergency reserve manifold** *Model & Make : S kumar/Blaze Systems*	28320 Incl.GST :18%	1982.4	30302.4
44	**Air receiver 1000 Ltrs**	47200 Incl.GST :18%	3304	50504
45	**Copper pipe 108mm** *Model & Make : EN 13348 -LLYODS /Mexflow/Janya*	3068 Incl.GST :18%	214.76	3282.76
46	**Copper pipe 76mm** *Model & Make : EN 13348 -LLYODS/ Mexflow/Janya*	3009 Incl.GST :18%	210.63	3219.63
47	**Copper pipe 54mm** *Model & Make : EN 13348 -LLYODS/ Mexflow/Janya*	2950 Incl.GST :18%	206.5	3156.5
48	**Valve 108 mm** *Model & Make : 12 mm to 108mm/IBP conex-UK/ Janya*	1180 Incl.GST :18%	82.6	1262.6

Item-wise Price Details				
49	**Valve 76 mm** *Model & Make : 12 mm to 108mm/ IBP conex-UK/ Janya*	1180 Incl.GST :18%	82.6	1262.6
50	**Valve 54 mm** *Model & Make : 12 mm to 108mm /IBP conex-UK/ Janya*	3776 Incl.GST :18%	264.32	4040.32
51	**8 x 8 oxygen manifold** *Model & Make : S kumar/Blaze Systems*	94400 Incl.GST :18%	6608	101008
52	**6 x 6 manifold** *Model & Make : S kumar/Blaze Systems*	93220 Incl.GST :18%	6525.4	99745.4
53	**5 x 5 manifold** *Model & Make : S kumar/Blaze Systems*	92040 Incl.GST :18%	6442.8	98482.8
54	**3 x 3 manifold** *Model & Make : S kumar/Blaze Systems*	89680 Incl.GST :18%	6277.6	95957.6
55	**2 x 2 Emergency oxygen manifold** *Model & Make : S kumar/Blaze Systems*	53100 Incl.GST :18%	3717	56817
56	**1 x 1 Emergency oxygen manifold** *Model & Make : S kumar/Blaze Systems*	47200 Incl.GST :18%	3304	50504
57	**2 x 2 manifold for N2O** *Model & Make : S kumar/Blaze Systems*	70800 Incl.GST :18%	4956	75756
58	**1 x 1 manifold for N2O** *Model & Make : S kumar/Blaze Systems*	35400 Incl.GST :18%	2478	37878
59	**Single cylinder emergency manifold for N2O**	25960 Incl.GST :18%	1817.2	27777.2
60	**Air receiver 500 Ltrs**	47200 Incl.GST :18%	3304	50504
61	**Air receiver 250 Ltrs**	46020 Incl.GST :18%	3221.4	49241.4
62	**Conversion Kit**	11800 Incl.GST :18%	826	12626
63	**Emergency regulator Conversion Kit**	11800 Incl.GST :18%	826	12626
64	**Gas outlet (High End)** *Model & Make : S Kumar/ S. Kumar/Aktiv/equivalent*	8260 Incl.GST :18%	578.2	8838.2
65	**AGSS duplex system**	1534000 Incl.GST :18%	107380	1641380
66	**Oxygen & N2O control panel (High end)**	885000 Incl.GST :18%	61950	946950
67	**Fully automatic control panel for oxygen** *Model & Make : OXY Panel /S kumar/GHL/Blaze Systems*	100300 Incl.GST :18%	7021	107321
68	**Fully automatic control panel for nitrous oxide**	42480 Incl.GST :18%	2973.6	45453.6
69	**Matching probes for gas terminal units**	649 Incl.GST :18%	45.43	694.43

Item-wise Price Details				
70	**Horizontal / Vertical Bed head panel 1000mm** *Model & Make : B-102/GHL/UMed /S. Kumar /GHL/U med/Medflow*	9322 Incl.GST :18%	652.54	9974.54
71	**Horizontal / Vertical Bed head panel 1200mm** *Model & Make : B-102/GHL/UMed /S. Kumar /GHL/U med/Medflow*	9440 Incl.GST :18%	660.8	10100.8
72	**Horizontal / Vertical Bed head panel 1500mm** *Model & Make : B-102/GHL/UMed /S. Kumar /GHL/U med/Medflow*	9499 Incl.GST :18%	664.93	10163.93
73	**5 A socket**	47.2 Incl.GST :18%	3.3	50.5
74	**5/15 A socket**	236 Incl.GST :18%	16.52	252.52
75	**Switch 5 A**	47.2 Incl.GST :18%	3.3	50.5
76	**Switch 15A**	177 Incl.GST :18%	12.39	189.39
77	**RJ 45 Data outlet**	118 Incl.GST :18%	8.26	126.26
78	**Telephone Socket**	59 Incl.GST :18%	4.13	63.13
79	**Monitor Stand for fixing with bed head panel**	1180 Incl.GST :18%	82.6	1262.6
80	**1 x 1 manifold for CO2**	22420 Incl.GST :18%	1569.4	23989.4
81	**Single cylinder emergency reserve manifold for CO2**	20060 Incl.GST :18%	1404.2	21464.2
82	**Filled CO2 bulk cyliner**	23600 Incl.GST :18%	1652	25252
83	**Semi Automatic control panel** *Model & Make : B-102/GHL/UMed/ S. Kumar /GHL/U med/Medflow*	88500 Incl.GST :18%	6195	94695
84	**Screw / scroll compressor duplex 1000 LPM (type II) with control panel**	1770000 Incl.GST :18%	123900	1893900
85	**Screw / scroll compressor duplex 2000 LPM (type II) with control panel**	1947000 Incl.GST :18%	136290	2083290
86	**Screw / scroll compressor duplex 3000 LPM (type II) with control panel**	2360000 Incl.GST :18%	165200	2525200
87	**Screw / scroll compressor simplex 1000 LPM (type II) with control panel**	1180000 Incl.GST :18%	82600	1262600

Item-wise Price Details				
88	**Screw / scroll compressor simplex 2000 LPM (type II) with control panel**	1416000 Incl.GST :18%	99120	1515120
89	**Screw / scroll compressor simplex 3000 LPM (type II) with control panel**	1746400 Incl.GST :18%	122248	1868648
90	**Vacuum pump duplex 1000 LPM (type II) with control panel** *Model & Make : 305VT/ Frank/ Fs Curtis/Anest Iwata/Indo Air*	1416000 Incl.GST :18%	99120	1515120
91	**Vacuum pump duplex 2000 LPM (type II) with control panel** *Model & Make : 305VT/ Frank/ Fs Curtis/Anest Iwata/Indo Air*	2112200 Incl.GST :18%	147854	2260054
92	**Vacuum pump duplex 3000 LPM (type II) with control panel** *Model & Make : 305VT/ Frank/ Fs Curtis/Anest Iwata/Indo Air*	2596000 Incl.GST :18%	181720	2777720
93	**Vacuum pump simplex 1000 LPM (type II) with control panel** *Model & Make : 305VT/ Frank/ Fs Curtis/Anest Iwata/Indo Air*	1180000 Incl.GST :18%	82600	1262600
94	**Vacuum pump simplex 2000 LPM (type II) with control panel** *Model & Make : 305VT/ Frank/ Fs Curtis/Anest Iwata/Indo Air*	1534000 Incl.GST :18%	107380	1641380
95	**Vacuum pump simplex 3000 LPM (type II) with control panel** *Model & Make : 305VT/ Frank/ Fs Curtis/Anest Iwata/Indo Air*	1770000 Incl.GST :18%	123900	1893900
96	**Vacuum pump Single unit duplex system 1000 LPM (type III) with control panel** *Model & Make : 305VT /Frank/ Fs Curtis/Anest Iwata/Indo Air*	1770000 Incl.GST :18%	123900	1893900
97	**Vacuum pump Single unit duplex system 2000 LPM (type III) with control panel** *Model & Make : 305VT /Frank/ Fs Curtis/Anest Iwata/Indo Air*	2183000 Incl.GST :18%	152810	2335810
98	**Vacuum pump Single unit duplex system 3000 LPM (type III) with control panel** *Model & Make : 305VT/ Frank/ Fs Curtis/Anest Iwata/Indo Air*	2950000 Incl.GST :18%	206500	3156500
99	**Rate for Area Line Pressure Medical Gas Alarm with networking facility and mobile alert facility** *Model & Make : 2 gas, 3 gas,4 gas, 5gas /Blaze Systems /GHL*	236000 Incl.GST :18%	16520	252520
100	**Internal wiring charges for all Power socket with switch (Lumpsum rate)**	6490 Incl.GST :18%	454.3	6944.3
101	**Rigid Pendant**	70800 Incl.GST :18%	4956	75756
102	**Rate for the Vaccum ward unit, imported** *Model & Make : Medical Series /Atlas Copco/Delta P, Italy*	21240 Incl.GST :18%	1486.8	22726.8
103	**Rate for concealing Gas Outlet** *Model & Make : S Kumar /S. Kumar/Aktiv/equivalent*	2360 Incl.GST :18%	165.2	2525.2

Item-wise Price Details				
104	**Rate for concealing area Valve box unit / Alarm unit** *Model & Make : 2 gas, 3 gas,4 gas,5 gas /Blaze Systems /GHL*	5900 Incl.GST :18%	413	6313
105	**Rate for concealing pipelines**	1180 Incl.GST :18%	82.6	1262.6
106	**Medical air compressor duplex 10 Hp with Control Panel (type I)** *Model & Make : OF 100 B/ Frank/ Fs Curtis/Anest Iwata/Indo air*	360499.99 Incl.GST :18%	25235	385734.99
107	**Vacuum pump duplex 5 HP with Control Panel (type I)**	222000.01 Incl.GST :18%	15540	237540.01
108	**Ceiling pendant Single Arm** *Model & Make : Single arm /S. Kumar /Aktiv*	64900 Incl.GST :18%	4543	69443
109	**Oxygen Totalizer -2000LPM**	11800 Incl.GST :18%	826	12626
110	**Medical air compressor duplex 15 Hp (type I) with Control Panel**	365800 Incl.GST :18%	25606	391406
111	**Medical air compressor Simplex 15Hp (type I) with control panel**	678500 Incl.GST :18%	47495	725995
112	**Medical air compressor simplex 7.5 Hp (type I) with control panel**	354000 Incl.GST :18%	24780	378780
113	**Medical air compressor duplex 7.5 Hp (type I) with control panel**	356000.01 Incl.GST :18%	24920	380920.01
114	**Medical air compressor simplex 10 Hp (type I) with control panel**	354000 Incl.GST :18%	24780	378780
115	**Medical air compressor simplex 5 Hp (type I) with control panel**	330400 Incl.GST :18%	23128	353528
116	**Medical air compressor duplex 5 Hp (type I) with Control Panel**	351500 Incl.GST :18%	24605	376105
117	**Vacuum pump duplex 15Hp (Type I) with control panel**	1062000 Incl.GST :18%	74340	1136340
118	**Vacuum pump duplex 10Hp (Type I) with control panel**	236000 Incl.GST :18%	16520	252520
119	**Vacuum pump duplex 7.5 Hp (Type I) with control panel**	229000 Incl.GST :18%	16030	245030

Item-wise Price Details				
120	**Vacuum pump duplex 3 Hp (Type I) with control panel**	215000.01 Incl.GST :18%	15050	230050.01
121	**Vacuum pump Simplex 10 Hp (Type I) with control panel**	590000 Incl.GST :18%	41300	631300
122	**Vacuum pump Simplex 7.5Hp (Type I) with control panel**	436600 Incl.GST :18%	30562	467162
123	**Vacuum pump Simplex 5Hp (Type I) with control panel**	230100 Incl.GST :18%	16107	246207
124	**Vacuum pump Simplex 3Hp (Type I) with control panel**	306800 Incl.GST :18%	21476	328276
		42154203.82	**2950794.27**	**45104998.09**

Annual / Comprehensive Maintenance Charges (Exl.Tax)							
Rate	**4th Year**	**5th Year**	**6th Year**	**7th Year**	**8th Year**	**9th Year**	**10th Year**
Centralized Medical Gas Supply							
Labour	2,50,100.00	2,85,828.00	3,57,285.00	3,93,014.00	4,64,471.00	5,00,199.00	5,71,656.00
Comprehensive	4,28,742.00	4,64,471.00	5,35,928.00	5,71,656.00	6,43,113.00	6,78,842.00	7,50,299.00

Other terms & conditions

1. The supplier shall execute an agreement with the purchaser as per tender conditions (agreement format is given in the tender document).

2. The supplier shall submit performance security amounting to 5.00% of the value of the supply order.

3. The labour & comprehensive charges of equipment after the completion of warranty period is finalized by KMSCL as mentioned above.

4. Since discount rate is not applicable for equipment under Running Contract of KMSCL, purchase/supply order can be issued directly to supplier at the given rate with tax & other charges (exclusive of KMSCL service charges).

5. If purchase/supply order is issued directly to the supplier, KMSCL service charge need not be paid. But the copy of the said order may be forwarded to KMSCL for information.

Technical Specification

Equipment :Centralized Medical Gas Supply

Equipment: Medical Gas Pipe Line System

Should comply with the recommendations made in HTM 02-01 wherever stipulated in the detailed technical specifications

OXYGEN SYSTEM	
1	Oxygen Manifold - 2 x 10
1.1	10 + 10 Size Oxygen Manifold should be configured with 2 x 10 nos. of class J (bulk D type) Cylinders and should be suitable to withstand working pressure of 145 Kg/cm2, along with 20 nos. of high-pressure copper annealed tail pipes with end brass adapter suitable for oxygen cylinders and manifold. Brass NRV blocks 20 nos.
1.2	Top frame should comprise of high pressure copper pipes of size 1/2” ID x 15 swg with high pressure brass fittings made of high tensile brass and connections through non- return valves; high pressure copper tail pipes, made of high pressure copper pipe of size 1/4” ID x 15 swg. Middle frame with cylinder holding chains should be provided to hold cylinders safely. The manifold must be tested (hydraulically) at 3500 psig and necessary test certificates should accompany along with the supply. Only Non-halogenated polymer materials are to be used in the Non return valves supplied along with manifold.
1.3	The central gas bank shall comprise two banks of gas cylinders main and reserve, connected to a manifold. Both main and reserve banks shall be connected to the system; in such a way that only one bank will supply the system at any one time.
1.4	The manifold system should conform to IS 12827 standard
1.5	Cylinder manifolds should be modular systems. The components and the accessories should allow an extension even after installation of the cylinder manifolds to meet the Specific requirements. Cost of Adding additional single cylinder Manifold (not taken for evaluation)
1.6	Should have facility for providing oxygen either via cylinder manifolds, liquid gas tanks or from Oxygen generators.
2.	FULLY AUTOMATIC CONTROL PANEL - OXYGEN
2.1	Fully automatic control panel with flow capacity of minimum 1350 LPM for regulating and controlling the central supply with medical gases from cylinder manifolds and liquid gas tanks in hospitals.
2.2	The Gas change-over to the respective other side must occur fully automatic, once the active side of the cylinder manifold runs empty
2.3	For the change-over between the two active cylinder manifolds, the control panel should have a pneumatic/electrical controlled reversing valve and It will continue to function even there will be a failure in the electricity supply
2.4	The control unit, integrated into the control panel should monitor all pressures of the active and passive gas sources, which are necessary for the safe and uninterrupted system operation.
2.5	In addition to the shuttle valve, the cabinet contains the line pressure regulators, the line pressure gauge, indicators, a set of by-pass valves for manual operation in case of malfunction and an electronic control board.
2.6	If a pressure parameter deviates significantly from the respective nominal pressure, an alarm system which is integrated into the control panel is activated immediately and send an audible and visual message, to ensure that disturbances in the system are recognized.
2.7	An alarm panel with pilot lamps indicating the “in use”, ”half empty” and “empty” banks, high/low line supply pressure, test and mute buzzer switch button.
2.8	Control panel should provide following displays. display of system pressure. display of currently active source range calculation for the active source
2.9	GAS CONSUMPTION METER/ TOTALIZER
	Should measure real time gas flow in pipe line and also access total consumption of oxygen on day, week and monthly basis for the entire hospital.
2.9.1	Measuring range 0-2000 Lpm
2.9.2	Real time gas flow is displayed in Lpm and cumulative gas consumption is displayed in cubic meter.
2.9.3	Up to 6 months consumption data is displayed in history log

2.9.4	Green LED indication for system ok		
2.9.5	Red LED indication for Alarm condition		
2.9.6	Working pressure 0-7 bar		
2.9.7	Can be mounted in pipe line with 15mm/22mm/28mm connectors		
3	Semi Automatic Oxygen Control Panel		
3.1	Control panel should have two first stage regulators each capable of delivering 100 - 200 psi g outlet pressure. Delivery flow capacity : Approx 1500 l/min at 55-60 psi pressure		
3.2	Both the first stage regulators in the oxygen control panel should have non halogenated polymer in the high pressure side to ensure that there will be no ignition due to adiabatic compression.		
3.3	40 micron filter should be provided at the inlet of each high pressure regulators of the oxygen control panel.		
3.4	The first stage regulators should be connected to a common second stage regulator which will deliver an outlet pressure of 60 psi g.		
3.5	The first two regulators meant for first stage should be capable of switchover system incorporated from “RUNNING” to “RESERVE” bank due to differential pressure.		
3.6	The control panel should be provided for two individual content contact pressure gauges to indicate the cylinder pressure in the two wings of the manifold and common pressure gauge to indicate the delivery / line pressure.		
3.7	The control panel should have built in audio-visual signal lamp indications for bank changeover		
3.8	The control panel will be covered with aesthetically suitable cover for safe operation indicating the respective services.		
3.9	Control panel should have built in transformer to ensure safe operation by low voltage.		
4	Oxygen Emergency Reserve Manifold - 3 X 3 Manifold.		
4.1	Should include 3 cylinder manifold bank as either side complete with 6 nos. pig tail pipes and 6 nos. non return valves.		
4.2	Top frame should comprise of high pressure copper pipes of size 1/2” ID x 15 swg with high pressure brass fittings made of high tensile brass and connections through non- return valves; high pressure copper tail pipes, made of high pressure copper pipe of size 1/4” ID x 15 swg. The manifold must be tested (hydraulically) at 3500 psig and necessary test certificates should accompany along with the supply. Only Non-halogenated polymer materials are to be used in the Non return valves supplied along with manifold.		
4.3	The emergency reserve manifold shall provide an uninterrupted supply of medical oxygen from equally sized high pressure cylinder banks via a suitable arrangement of pressure regulators, providing a constant downstream nominal pipeline gauge pressure of 400 kPa.		
4.4	Cylinder bank shall be fitted with an isolation valve to enable continuity of supply in the vent of primary supply failure.		
4.5	The manifold control panel shall provide a minimum flow of 500 l/min to the nominal 400 kPa medical oxygen pipeline system.		
4.6	There shall be two separate stages of pressure regulation to enable high peak flow rates without a reduction in line pressure.		
4.7	All pressure regulators shall be protected from over-pressurisation by relief valves that are vented to atmosphere.		
4.8	The line pressure relief valve shall be provided with easing gear.		
4.9	A non-return valve shall be provided within a line pressure manifold block and shall provide gas tight isolation in the event of any upstream component failure. The non-return valve shall automatically bring the emergency reserve manifold into service when the primary supply fails.		
4.10	The emergency reserve manifold shall be provided with an isolation valve to enable positive tamperproof isolation for maintenance.		
4.11	The manifold system should conform to IS :12827 standard.		
4.12	Cost of Adding additional single cylinder Manifold (not taken for evaluation)		
NITROUS OXIDE SYSTEM			
5	Nitrous Oxide Manifold - 2 x 3.		

5.1	3 + 3 Size Nitrous oxide Manifold should be configured with 2 x 3 nos. should be suitable to withstand working pressure of 145 Kg/cm2, along with 6 nos. of high-pressure copper annealed tail pipes with end brass adapter suitable for Nitrous oxide cylinders and manifold.
	Cost of Adding additional single cylinder Manifold (not taken for evaluation)
5.2	Top frame should comprise of high pressure copper pipes of size 5/8" ID x 7/8" OD or ½"ID x15 swg with high pressure brass fittings made of high tensile brass and connections through non- return valves; high pressure copper tail pipes, made of high pressure copper pipe of size 3/16" ID x 3/8" OD or ½"ID x15 swg. The manifold should be hydraulically tested to 3500 psig.
5.3	The manifold should be so designed that it should suit easy cylinder changing and positioning. The system should have non-return valves for easy changing of cylinders without closing the bank. The cylinder should be placed with the help of cylinder brackets and fixing chains which shall be zinc plated.
6	FULLY AUTOMATIC CONTROL PANEL – NITROUS OXIDE
6.1	Fully automatic control panel with flow capacity of minimum 1000 LPM for regulating and controlling the central supply with medical gases from cylinder manifolds.
6.2	The Gas change-over to the respective other side must occur fully automatic, once the active side of the cylinder manifold runs empty
6.3	For the change-over between the two active cylinder manifolds, the control panel should have a pneumatic /electrical-controlled reversing valve and it will continue to function even there will be a failure in the electricity supply.
6.4	The control unit, integrated into the control panel should monitor all pressures of the active and passive gas sources, which are necessary for the safe and uninterrupted system operation.
6.5	In addition to the shuttle valve, the cabinet contains the line pressure regulators, the line pressure gauge, indicators, a set of by-pass valves for manual operation in case of malfunction and an electronic control board.
6.6	If a pressure parameter deviates significantly from the respective nominal pressure, an alarm system which is integrated into the control panel is activated immediately and send an audible and visual message, to ensure that disturbances in the system are recognized.
6.7	An alarm panel with pilot lamps indicating the "in use", "half empty" and "empty" banks, high/low line supply pressure, test and mute buzzer switch button.
6.8	It should have the facility for recording of all alarm messages including the date of occurrence for each message.
6.9	Control panel should provide following displays. display of system pressure. display of currently active source range calculation for the active source
7	Semi Automatic Nitrous Oxide Control Panel 500lpm
7.1	Control panel should have two first stage regulators each capable of delivering 100 - 200 psi g outlet pressure.
7.2	Both the first stage regulators in the nitrous oxide control panel should have nonhalogenated polymer in the high pressure side to ensure that there will be no ignition due to adiabatic compression.
7.3	40 micron filter should be provided at the inlet of each high pressure regulators of the nitrous oxide control panel.
7.4	The first stage regulators should be connected to a common second stage regulator which will deliver an outlet pressure of 60 psi g.
7.5	The first two regulators meant for first stage should be capable of switchover system incorporated from "RUNNING" to "RESERVE" bank due to differential pressure.
7.6	The control panel should be provided for two individual content contact pressure gauges to indicate the cylinder pressure in the two wings of the manifold and common pressure gauge to indicate the delivery / line pressure.
7.7	The control panel should have built in audio-visual signal lamp indications for bank changeover
7.8	The control panel will be covered with aesthetically suitable cover for safe operation indicating the respective services.
7.9	Control panel should have built in transformer to ensure safe operation by low voltage.
7.10	Nitrous Oxide control panel should have inbuilt heating arrangement to ensure that there will be no

	freezing in the delivery line during high flow requirement.
7.11	Delivery flow capacity : Approx 1000 l/min at 55-60 psi pressure
8	Nitrous Oxide Emergency Reserve Manifold - 1 X 1 Manifold
8.1	Should include 2 cylinder manifold bank as either side complete with 2 nos. pig tail pipes and 2 nos. non return valves.
8.2	Top frame should comprise of high pressure copper pipes of size 5/8" ID x 7/8" OD or ½"ID x15 swg with high pressure brass fittings made of high tensile brass and connections through non- return valves; high pressure copper tail pipes, made of high pressure copper pipe of size 3/16" ID x 3/8" OD or ½"ID x15 swg. The manifold should be hydraulically tested to 3500 psig.
8.3	The emergency reserve manifold shall provide an uninterrupted supply of medical Nitrous oxide from equally sized high pressure cylinder banks via a suitable arrangement of pressure regulators, providing a constant downstream nominal pipeline gauge pressure of 400 kPa.
8.4	Cylinder bank shall be fitted with an isolation valve to enable continuity of supply in the vent of primary supply failure.
8.5	The manifold control panel shall provide a minimum flow of 500 l/min to the nominal 400 kPa medical oxygen pipeline system.
8.6	There shall be two separate stages of pressure regulation to enable high peak flow rates without a reduction in line pressure.
8.7	All pressure regulators shall be protected from over-pressurisation by relief valves that are vented to atmosphere.
8.8	The line pressure relief valve shall be provided with easing gear.
8.9	A non-return valve shall be provided within a line pressure manifold block and shall provide gas tight isolation in the event of any upstream component failure. The non-return valve shall automatically bring the emergency reserve manifold into service when the primary supply fails.
8.10	The emergency reserve manifold shall be provided with an isolation valve to enable positive tamperproof isolation for maintenance.
8.11	The manifold system should conform to IS :12827 standard.
8.12	Cost of Adding additional single cylinder Manifold (not taken for evaluation)
9. MEDICAL AIR PLANT SYSTEM	
9	General
9.1	Should supply, install and commission the compressed air plant (for medical air duplex type). receivers, filters and dryers, regulators, drain taps and relief valves.
9.2	The installed system shall have oil free, non lubricated, dust free. Generating pressure of medical air (7&4 bar). Isolating valve shall be fitted wherever appropriate to enable maintenance of duplex units and without completely shutting down of plant. Safety relief valves shall be fitted at suitable positions to protect plant from damage; and shall vent to a safe place
10	Air Compressor Pumps (Type I)
10.1	The Duplex medical air system package shall include two 15 HP oil-free reciprocating, air cooled, air compressors, each having capacity above 1000 LPM (Free Air Delivery). with common 1000 litres receiver tank along with filter, non-return Valve, isolation valves, dual desiccant air dryer, dual pressure reducing station, etc. Suitable for both continuous and frequent start / stop operation.
10.2	The medical air compressor shall operate in a "Duty" and "standby mode", with each compressor being able to be selected to carry out either role. Each compressor shall be capable of supplying the system design flow rate on its own. An inlet filter shall be fitted to the inlet of each compressor. The contractor shall take all suitable precautions to prevent vibration being transmitted from compressor/motor units to the building structure. Suitable anti vibration mountings shall be provided. Should have individual to each compressor motor starters, ammeter and an hour run meter. Should be supplied with control panel to work with power from an MCB. Should have an auto on/ off pressure

	switch. Should have equal were and tear mode.Should have equal wear and tear mode operation
11	Air Receiver
11.1	Air receiver shall be fitted with a zero loss electronic drain valve. Float type drain valves are not acceptable. The receiver assembly shall be fitted with a pressure safety valve capable of passing the maximum flow output of the compressor at 10% receiver overpressure. The receiver shall be further protected by a safety pressure relief valve and include a pressure gauge. Should have phase sequence relays that prevent unintentional reverse operation of the compressors. Receiver capacity should not be less than 1000 litre (Approx), operating pressure 10bar.
12	Filtration/Dryer System-
12.1	5 stage air filtration unit with filters (Duplex system). And capable of isolating each unit for maintenance purpose.
12.2	The dryers (Duplex system) shall be the double absorber 'heatless' type, fully automatic and use activated alumna desiccant. Re-activation shall be on a time cycle using a bleed of purge air from the in-service dryer assembly. Dust filters &bacteria filter shall be fitted after the dryer to ensure air quality Two separate system each having two towers minimum 50 cfm each
13	Pressure Control
13.1	The compressor shall be supplied with regulator arrangements to with moisture separator, regulate the pressure to: 4 bar +/-0.12 medical air. (Duplex). provision should be made to isolate each regulator separately.
13.2	The compressor shall be supplied with regulator arrangements to with moisture separator, regulate the pressure to: 7 bar +/-0.12 medical air. (Duplex). provision should be made to isolate each regulator separately.
14	OPTIONAL SCREW/SCROLL COMPRESSOR (type II) (not taken for evaluation)
14.1	Should supply, install and commission the compressed air plant (for medical air duplex type), with plant and associated equipment including control equipment, monitoring and alarm instrumentation, receivers, filters and dryers, regulators, drain taps and relief valves. The Air system shall in all respects comply with the recommendation made in HTM 02-01 standards and shall conform to EN ISO 7396-1.
14.2	The installed compressor system shall have oil free/oil less, dust free, breathing medical air, generating pressure of 10 bar (to convert 7 & 4 bar) shall be as per HTM 02-01 standards. Isolating valve shall be fitted wherever appropriate to enable maintenance of duplex units and without completely shutting down of plant. Safety relief valves shall be fitted at suitable positions to protect plant from damage; and shall vent to a safe place
15	MedicalAIR COMPRESSOR (optional) (not taken for evaluation)
15.1	The Duplex medical air system package shall include two 15 HP Rotary screw/scroll type, air cooled, air compressors each having capacity above 1000 LPM (Free Air Delivery), working pressure at 10 bar. Suitable for both continuous and frequent start / stop operation. There should be emergency stop button on each compressor. Should have NRV for each compressor. The control panel of each compressor should be digital type and capable of Monitoring and showing Hrs run, Technical alarms, fault alarms, service menu, low and High pressure set, running pressure, Temperature of the system etc. If Rotary screw compressor is used, there should be in built oil separator and moisture separator. There should be automatic loading and unloading facility for each compressor.

There should be automatic drain valve and manual drain valve for each compressor.

The medical air compressor shall operate in a “Duty” and “standby mode”, with each compressor being able to be selected to carry out either role. Each compressor shall be capable of supplying the system design flow rate on its own. An inlet filter at inlet of each compressor and silencer shall be fitted to the outlets. The contractor shall take all suitable precautions to prevent vibration being transmitted from compressor/motor units to the building structure. Suitable anti vibration mountings shall be provided.

15.2 Compressor should be from high quality internationally approved manufacturer. There should be provision to connect to BMS. All the test certificate should be supplied.

16 AIR DRYER/FILTRATION SYSTEM Duplex ,Class 2 CE certified with 4 digit notification number (not taken for evaluation)

16.1 The manufacturer of air Filtration/Dryer system should be ISO 13485: 2003 certified and Should have safety certificate from a competent authority CE issued by a notified body registered in European Commission as class II medical device and also the equipment should be imported. The copy of certificate should be attached along with technical bid.

Two separate system each having two towers with a Dew point of -46 degree centigrade.

16.2 On leaving the air receiver the air should pass through a 5 stage air purifier unit with moisture separator, dust and oil filter and twin column dryer assembly, each leg shall be capable of passing the full flow of one air compressor. The prefilters shall be in accordance HTM 02-01 standards with an efficiency of 95%. Oil filters shall be of the coalescing absorption type, removing 99% of oil and water particles between 5 and 40 microns.

Filtering should ensure complete oil removal so that only oil free air enter the heatless regenerative desiccant dryer.

Should also have dust/activated carbon filters, hopcolite filters and bacterial filters with autoclavable element. There should be visual indication to replace the cartridge.

Contaminants in the delivered air downstream of the bacterial filters shall be maintained at levels below those shown in the following table:

Contaminant	Threshold
H2O	67 ppm v/v
Dry particulates	Free from visible particulates in a 75 litre sample
Oil (droplet or mist)	0.1 mg/m³
CO	5 ppm v/v
CO2	500 ppm v/v
SO2	1 ppm v/v
NO	2 ppm v/v
NO2	2 ppm v/v

Test Certificate should be provided.

16.3 The dryers shall be the double absorber ‘heatless’ type, fully automatic and use activated alumna desiccant. Dust filters shall be fitted after the dryer to ensure that air quality complies with

HTM 02-01 standards. Each dryer assembly shall incorporate

a dew point alarm to enable automatic changeover to the stand by dryer,

in the event of the dew point rising to above 0ºC at 7.2 bar or - 26ºC at atmospheric pressure.

Dryer Purge Control

	There should be purge control for dryer. The dryer control system shall incorporate a Purge Saver Energy Management system that freezes the regeneration of the desiccant once adequate dew point is reached in the inactive tower. Only when the dew point level in the active tower deteriorates to an unacceptable level, will the intelligent controller switch towers. This shall be achieved by including an additional dew point sensor and associated software in the dryer controller to effectively manage the system as well as providing on screen measurements of purge savings. Dew Point Monitoring The dryer shall incorporate a ceramic dew point hygrometer with an accuracy of ±10C in the range -20 to -80 degreeCentigrade atmospheric dew point and 4-20mA analogue output. An alarm condition shall trigger on the dryer control panel if the dew point decreases till-26degree atmospheric set point. The plant control unit shall incorporate a multifunctional LCD displaying, amongst other things, the dew point of the delivered air to enable monitoring of the air quality by the hospital department. Volt free contacts shall be included to enable the dew point alarm signal to be connected to a central medical gas alarm system. To enable periodic calibration of the dew point sensor element, the hygrometer shall be remotely connected downstream of the dryer via a micro-bore tube. It is not acceptable to install the sensor directly into the medical air supply pipeline. Air validation test should be conducted to ensure the system gives Air as per Europeanpharmacopeiawith calibrated test equipment at site and certificate should be provided.
VACUUM PLANT	
17	General
17.1	Shall supply, install and commission the vacuum plant and associated equipment. This shall include a packaged duplex pump and reservoir(s) system complete with all necessary controls, drainage traps, filters and individual exhaust lines.
17.2	The medical vacuum pipeline system should be designed to maintain a vacuum of at least 300 mm Hg (40 kPa) at each terminal unit during the system design flow tests. The filtration system shall be duplexed such that each filter can be isolated for replacement of the filter cartridge.
18	Vacuum Pump Units (Type I)
18.1	The pump installation shall be duplex system consisting of two 10 HP Dry type vacuum pump each of which shall be capable of independently producing designed systems flow rate. Each pump should have capacity of minimum 130 cfm. Pump should be capable of providing a vacuum of not less than 650 mm Hg (87 kPa). The pumps should be fixed with duplex bacteria filter sodium flame tested. Each vacuum pump shall have an oil separator to ensure a virtually oil-free exhaust. Should have individual to each compressor motor starters, ammeter and an hour run meter. Should be supplied with control panel to work with power from an MCB. The pump should have automatic operation with equal were and tear mode
19	Optional Vacuum Pump Single unit type Imported (type II) (not taken for evaluation)
19.1	Shall supply, install and commission the vacuum plant and associated equipment. This shall include a packaged duplex / triplex pump and reservoir(s) system complete with all necessary controls, drainage traps, filters and individual exhaust lines. The vacuum system shall in all respects comply with the recommendation made in HTM 02-01 standards and shall conform to EN ISO 7396-1. Shall supply, install, test and commission a complete and fully operational medical vacuum plant as per recommendation of HTM 02 -01 standard. The capacity should be greater than or equal to 1000 LPM / 2000 LPM / 3000 LPM per unit in the duplex system at 450 mm hg. Should have individual to each compressor motor starters, ammeter and an hour run meter. Should be supplied with control panel to work with power from an MCB. The pumps should have automatic

	operation with equal wear and tear mode. Should offer the rate of the 1000 LPM, 2000 LPM, 3000 LPM systems in the BOQ.
19.2	The medical vacuum pipeline system should be designed to maintain a vacuum of at least 450 mm Hg (45 kPa) at each terminal unit during the system design flow tests. The filtration system shall be duplexed such that each filter can be isolated for replacement of the filter cartridge. The filters should be bacteria filter – sodium flame tested.
20	The manufacturer of vacuum pump should be ISO 13485: 2003 certified. The copy of certificate should be attached along with technical bid.
20.1	Each pump shall have a non-return valve and pressure switch such that inadvertent reversal of the motor will not pressurize the reservoir or the distribution system. Pump should be of reputed make as per international standards.
21	Reservoir Vacuum
21.1	The reservoir shall be provided with a manual drain valve. Reservoir capacity should not be less than 1000 liters. There should be vacuum gauge. The reservoir should be internally galvanized.
22	Bacteria Filters
22.1	A filter shall be fitted between each pump and the reservoir, which shall have replaceable elements and each shall be capable of passing the total design flow. The filters shall be arranged such that one filter can be taken out for servicing without interrupting or restricting the vacuum service as a whole. Should provide bacteria filters for patient safety.
23	Vacuum Pump Exhaust
23.1	The exhaust gas shall be discharged outdoors above the roof level of the plant room, and not in the building in the immediate vicinity, windows and air intakes in order to ensure that the discharge does not constitute a health hazard. Each pump shall have its own exhaust line and each shall be fitted with suitable drain valves and transparent jars at the lowest points. The outlets shall be suitably protected to prevent the ingress of rain, and wind pressure. A weatherproof notice shall be provided at the discharge points which states:“Medical Vacuum Discharge Point – DO NOT OBSTRUCT.” The exhaust system shall be designed so that the back pressure does not exceed 80 mm Hg (1.0 psi) at the design flow rate. A length of flexible pipe work shall be included before the exhaust passes through a wall in order to isolate the building structure from pump vibration. Anti-vibration mountings shall be used for the pumps.
24. Oxygen flow meter with Humidifier Bottle	
24.1	Back Pressure Compensated flow meter should be of accurate gas flow measurement with following feature .
24.2	Control within a range of 0 – 15 LPM. (calibration within ±10%)
24.3	It should meet strict precision and durability standard.
24.4	The flow meter body should be made of brass chrome plated materials.
24.5	The flow tube and shroud components should be made of clear, impact resistant polycarbonate.
24.6	The flow tube should have large and expanded 0-5 lpm range for improved readability at low flows.
24.7	Inlet filters of stainless steel wire mesh to prevent entry of foreign particles.
24.8	The humidifier bottle should be made of unbreakable polycarbonate material and autoclavable at 1210/ 1340 Centigrade temperature
24.9	Should be supplied with suitable connector probe to match with Oxygen outlets.
25. Vacuum regulator with Suction bottle (ward)	
25.1	Should be of light weight and compact.
25.2	Should have a regulator with 0 – 760 mm gauge.
25.3	Should have a 600 ml. reusable collection jar, made of unbreakable poly carbonate /poly sulfone material and fully autoclavable at 1210/ 1340 Centigrade temperature.
25.4	Should have wall bracket for mounting the jar assembly on the wall.

25.5	The vacuum regulator with instant ON / OFF switch should be infinitely adjustable and with vacuum gauge which will indicate suction supplied by the regulator. Safety trap must be provided inside the jar to safeguard the regulator from overflowing.
25.6	Should be supplied with suitable connector probe to match with Vacuum outlets.
25.7	Should be provided with secretion trap and bacteria filters
26.Theater vacuum units	
26.1	The unit should consist of two reusable 2000ml shatter resistant bottle, each made of polycarbonate material and fully autoclavable at 121o Centigrade
26.2	A vacuum regulator with instant ON/OFF switch and a three way selector switch with facility to operate either left, right or both
26.3	All the above items should be mounted on a trolley having free moving castor wheels.
26.4	Should be supplied with suitable connector probe to match with Vacuum outlets.
27.Gas/Vacuum Outlets	
27.1	Front loading type terminal outlets should be designed to dispense medical gases (or an inlet for medical vacuum) to the secondary equipment (flow meters, Surgical Tools, Suction regulators, etc.) at the point of use and it should be gas specific so that secondary devices cannot be “attached” to the wrong gas.
27.2	When not in use, the gas should be in a non-flowing state within the Outlet (Terminal unit) sealed by “O” ring. The adapter when inserted pushes the poppet inside and the gas starts flowing and sealing is ensured by the “O” ring or a seat.
27.3	The outlets should Quick Connect Type and gas specificity is accomplished by "Diametric indexing." / Geometric indexing/ BS/ DIN/ NFPA.
27.4	Should have Push to insert and press-to-release mechanism for probes.
27.5	Allows plugging of probes from front.
27.6	Parking Type probe / connector/ (wherever applicable).
27.7	Self-sealing valve on disengaging the probe (Quick disconnect)
27.8	Smooth quite action
27.9	Non return valve for on line servicing/ repairing
27.10	Indexed to eliminate inter-changeability of gas services
27.11	Color-coded gas specific front plate
27.12	Flow rate exceeds the requirements of ISO 9170 – 1.
27.13	Totally leak proof, safe & easy to operate
27.14	Configurations possible: surface, flush & Bead-head.
27.15	Body shall be of one piece brass construction.
28. Copper Pipes	
28.1	The copper pipes shall be manufactured from phosphorous de-oxidised non-arsenical copper of grade CW024A (Cu-DHP), manufactured EN 13348:2008 to metric outside diameters and having mechanical properties, pipes shall be of R250 (half hard)temper. Pipes shall be degreased suitable for oxygen use and cleanliness is to be maintained by filling each pipe with dry, clean, oil and oxygen free nitrogen, fitting suitable end caps and protectively wrapping. Solid drawn, seamless, deoxidised, non- arsenical, half hard, tempered and degreased copper tubes manufactured to metric outside diameters and should have mechanical properties in accordance with HTM 02-01 and conforming to EN13348:2008.
28.2	All indigenous copper pipes should be inspected and certified by Third Party Inspecting Agency Lloyds' Register Services before dispatch and the pipes should be delivered capped at both ends. Imported Copper pipe should have equivalent certification. The pipes should also be accompanied with manufacturer’s test certificate for the physical and chemical composition. Copper Fittings should be as per HTM 02-01. All plastic saddles should have brass screws. The pipe sizes to be used are from among as under: 108mm OD x 1.5 mm thick 76mm OD x 1.5 mm thick

	54mm OD x 1.2 mm thick 42mm OD x 1.2 mm thick 35 mm OD x 1.2 mm thick 28mm OD x 0.9 mm thick 22mm OD x 0.9 mm thick 15mm OD x 0.9mm thick 12mm OD x 0.7 mm thick
28.3	Rates of above mentioned copper pipes should be mentioned in the price bid so that variable quantity can be calculated and paid accordingly. Valves and lines additional sizes if required may be quoted as optional.
28.4	Medical Gas Pipeline Fittings shall be end feed type, manufactured from the same grade of copper as the pipes and be in accordance with the requirements of BS EN 1254-1:1998 Part 1. The manufacturing company should comply with BS EN ISO 9001:2000. Fittings should be factory degreased suitable for oxygen use. Fittings should be certified for medical use and accompany with oil analysis certificate and conformity certificate indicating suitability for medical use. Copper fittings shall be made of copper and suitable for a steam working Pressure of 17 bar and especially made for brazed socket type connections.
VALVES – LINE VALVES	
29.1	Line Valves shall be provided for use in plant rooms and to facilitate the isolation of areas or areas where area zone valve are unnecessary. These shall be of the ball valve type and shall be constructed of a nickel plated brass body, PTFE seats and brass chrome plated ball. The valve shall be operated by a manual operating lever by 90º turn. All medical gas line ball valves shall provide a full bore flow and shall be cleaned for oxygen service and fully tested. The valve assembly shall terminate in copper stub pipes to enable brazing directly into the distribution system using the flux less brazing technique. Line valves shall be located in readily accessible areas of ducts and shafts, however care should to ensure safety to prevent danger from leakage. Line valve installation should be carried out as per HTM 02-01 standards. Valve Size are indicated 12mm Ball Valve 15mm Ball Valve 22mm Ball Valve 28mm Ball Valve 35 mm Ball Valve 42 mm Ball valve 54mm Ball valve 76mm Ball valve 108mm Ball valve
AREA VALVE SERVICE UNITS (AVSU)-	
30.1	The Area Valve Service Unit (AVSU) shall provide area isolation facility for use either in an emergency or for maintenance purposes. The area valve service unit shall be labeled to identify the Medical gas service

30.2	The assembly shall be housed in a valve box which shall be capable of both surface or concealed mounting incorporate a hinged lid which opens through 180 degree, to provide maximum access. The hinged door shall be fitted with a glass panel to enable a visual check on the line valve selected position and for access in an emergency.
30.3	Area or Zone identification facilities shall be provided. The hinged doorshall normally be locked closed and area zone valves installed adjacent to each other shall be operated by different key lock combinations.
30.4	Area/Zone service units shall be fitted in readily accessible locations adjacent to the area which they serve and shall be clearly labeled to indicate function, valve position and area.
30.5	Scope: The tenderer of Medical gas shall supply, install, test and commission all safety required for the medical gas system safety relief valves as specified in HTM 02-01/ NFPA standards. b. The tenderer of Medical Gas supply shall install test and commission all area valve and service unit AVSU in the hospital as per requirement as specified in HTM 02-01, to all necessary equipment, pipe work fittings, boxes, accessories, connectors pressure gauges, switches including the zone pressure alarm panel and all related electrical works to have complete and full operational AVSU unit. c. The tenderer of Medical Gas shall supply, install, test and commission all required valves, check valves for the medical gases and vacuum system.
30.6	Rate to be offered for 2, 3, 4 and 5 gas units
31. Area Line Pressure Medical Gas Alarm- Digital	
31.1	Four channel microprocessor controlled alarm for pneumatic & vacuum services.
31.2	7 inch or 5 inch Colour LCD/LED touch display of line pressure for all the services with factory calibrated pressure transducers.
31.3	Color coded display of line pressure status and programmable
31.4	Audible Alarm for High & Low pressure conditionwith audible and visual indications.
31.5	Test and Alarm Acknowledge (Mute) facility. (Alarm knowledge (mute) time span is programmable from 1 to 60 minutes). Protected programming facility of alarm limits.
31.6	The electronic circuitry should be such that if the pressure / vacuum in the gas pipeline drops below the present limit, the equipment should give an audio-visual alarm. Visual alarm should remain active even after pressing of “Mute” button. It should come to normal condition only when gas pressure / vacuum return to normal level.
31.7	Small and compact designwith memory of alarm events for minimum 24 hours.
31.8	Mounted on a powder coated MS box.
31.9	Nut & Nipples should be provided for connection with Pneumatic supply line.
31.10	Low voltage internal operation for safety with input power supply of 230 V,50 Hz AC.
31.11	Wall mounting facility.
31.12	Facility to connect to remote alarm display .Upgradable for networking
31.13	Rate to be offered for 2, 3, 4 and 5 gas units
31.14	Rate for Area Line Pressure Medical Gas Alarm with networking facility wire /wireless including all cabling works and mobile alert facility shall be offered in the BOQ which will not be taken for evaluation.
32. Horizontal / vertical Bed Head Panel	
32.1	Minimum length 1/1.2/1.5 metres
32.2	It should be made of High Strength Anodised Aluminium Profiles with integrated rail system for mounting accessories.
32.3	Should be powder coated (color as per user choice). Should provide back side cover
32.4	The panel should be designed to have provision to accommodate the following: Supplying and fixing following modular switch/ socket on the existing modular plate & switch box including connections but excluding modular plate etc. as required (for one bed head panel).

	The rate for the following shall be offered in the BOQ and will be taken for evaluation. 5A socket 5/15 A socket Switch 15A Switch 5A RJ 45 Data outlet Telephone socket Rate for internal wiring of bed head panel, Lumpsum rate shall be offered – Not taken for evaluation. Supplying and fixing following Modular base & cover plate on existing modular metal boxes etc. as required. a. 6 Module 3 No's b. 1 or 2 Module 2 No's Gas Outlets – Provision for Two Oxygen, 2 Vacuum and One air Syringe Infusion pump mounting pole with adapters for mounting at least two pumps
32.5	Segregation of services i.e low voltage supplies, high voltage supplies and medical gases should be maintained throughout.
33. Ceiling Pendents	
33.1	Heavy duty Anesthesia Pendent Systems should have the facility to provide convenient positioning of medical equipment, medical gas terminal units, electrical and specialty services in operation theatre.
33.2	Pendant shall be single arm, movable, ceiling mounted and have modular head. Column length to be fabricated for the specified ceiling height. Arm length should be minimum 1000 mm and vertical length of pendant column should be at least 1 meter
33.3	Should have aluminium powder coated rectangular body with one monitor mounting facility.
33.4	Shall be provided with electrical 5 & 15A / 230V power socket with indicator -8 nos with internal wiring.
33.5	Should have provision for gas outlets oxygen-2nos., Medical Air (4 Bar)- 2nos.,Vaccum – 2nos., Nitrous oxide -1nos. complete with hose assemblies can be accommodate within the pendant
33.6	Shall be provided with 2nos. of I.V pole with bracket
33.7	Carrying capacity of the arm should be not less than 150kgs
33.8	Each pivot point should rotate up to 330degree
33.9	Should have complete separation between gas outlets and electrical sockets with equipotential points.
33.10	Monitor stand should be provided as per the following specification and the rate shall be quoted separately. a. Monitor stand - extruded Aluminum, powder coated. b. Load bearing capacity 20 kgs approximately. c. Should have provision to store ECG cables, SPO2 probes, NIBP Cuffs and other accessories of monitor.
33.11	Rate for the Rigid pendant shall be offered in BOQ which will not be taken for evaluation.
33.12	In all the pendants the electrical sockets, data socket and the wiring shall be done by the bidder.
34. MATCHING PROBES FOR GAS TERMINAL UNITS – O2, Mair, N2O, and Vac	
34.1	The probe should comply with BS 5682:1998 for gases & Vacuum.
34.2	Matching probes with one end suitable for hose/ flow meter and other end suitable for Imported &

	Indigenous Medical Gas terminal units which complies and fully meets with the latest standard HTM02-01 and C11
35. INSTALLATION & TESTING	
35.1	Installation of piping shall be carried out with utmost cleanliness. Only pipes, fittings and valves, which have been degreased and brought in polythene sealed bags, shall be used at site. Pipe fixing clamps shall be of non-ferrous or non-deteriorating plastic suitable for the diameter of the pipe.
35.2	Where pipes are cut on site, the wheel cutter should be used (avoid using hacksaw blade) and should be cut square and de-burred, re-rounded and cleaned off before use.
35.3	All pipe joints shall be made using flux less brazing method. Heat/Flame Source: Brazing shall be carried out using Oxy-acetylene/ Diluted Acetylene flame source capable of achieving brazing temperatures of above 600 degrees and below the melting point of the base metal. Liquid Petroleum Gas (LPG) should not be used for brazing of copper pipes. Copper to Copper Brazing – should be made using a silver-copper-phosphorous brazing alloy CP104 (5% Silver Brazing Filler metals Rod) to BS EN 1044-1999, no flux to be used. Copper to Brass Brazing – should be carried out using AG 203 (43% Brazing Filler metal Rod) to EN 1044 with an appropriate flux. Brazing of Copper to brass should not be carried on site and the flux residue should be chemically removed and if necessary the complete assembly is cleaned and degreased for oxygen service. Oxygen Free Nitrogen (Inert Gas Shield) Purging – Brazing should be carried out using Oxygen free Nitrogen as an internal inert gas shield to prevent the formation of oxides on the inside of the pipes and fittings. Oxygen free nitrogen should be supplied to the inside of the pre-assembled, un-brazed pipe work while brazing through a pressure regulator and flow controller of flow regulating device. This method leaves a bright, clean bore. A slight burnishing may occur in some cases; however purging is still required to remove internal shield gas and the other particulate matter not associated with Brazing operation. Nitrogen purging is not required for AGS disposal systems. Capping – Sections of pipeline should be capped as soon as they are completed so as to prevent the ingress of debris.
35.4	Adequate supports shall be provided while laying pipelines to ensure that the pipes do not sag. The spacing of supports shall not exceed 1.5 meter for any size of pipe. Suitable sleeves shall be provided wherever pipes cross through walls / slabs. All pipe clamps shall be non-reactive to copper.
35.5	After erection, the pipes should be flushed with dry nitrogen gas and then pressure tested with dry nitrogen / Medical Air at a pressure equal to twice the working pressure for a period of not less than 24 hours. All leaks and joints revealed during testing should be rectified and re-tested till the pressure in pipes stands for at least 24 hours.
35.6	Installation, Testing and Commissioning of Medical gas pipelines should be carried out as per HTM 0201 standards.
35.7	All the piping system should be tested in the presence of authorized representative of the user institute or tender inviting authority.
36. COLOUR CODING	
36.1	All exposed pipes should be painted with two coats of synthetic enamel paint and colour codification should be as per ISO standards. Oxygen Line – White Nitrous oxide – Blue

	Air Line- Black and White Vacuum Line – Yellow
37. Cylinders	
37.1	Bulk ‘D’ type cylinders for oxygen and nitrous oxide
37.2	Should be supplied with key.
37.3	Cylinder should have ISI mark.
37.4	Cylinder should have explosive safety certificate and should be provided along with each cylinder during installation.
37.5	Gas filled cylinder should be supplied
38	Two laminated copies of “ as fitted “ schematic shall be provided
39. Conversion kit	
39.1	Conversion kit for anaesthesia machine / workstation from wall gas outlet. Outlet probe with 5 meters high pressure hose.
40. Emergency regulator conversion kit	
40.1	Conversion kit for anaesthesia machine / workstation direct from bulk oxygen cylinder. Connector with regulator and 5 meters high pressure hose.
41. Gas Outlet (Highend) (optional) (not taken for evaluation)	
41.1	NFPA/ DIN/ BS/ ISO Standard, Quick connect, Metalic, Double locking, parking, Geometric indexed gas specific safety, Imported, It Should have safety certificate from a competent authority CE issued by a notified body registered in European Commission.
42. AGSS Duplex System (optional) (not taken for evaluation)	
42.1	1560 L/M capacity, Duplex System, Imported Active System, remote switch.
43. Oxygen and Nitrous oxide control panel (High end) Imported (optional) (not taken for evaluation)	
43.1	Fully automatic control panel with flow capacity of minimum 1500 LPM for regulating and controlling the central supply with medical gases from cylinder manifolds and liquid gas tanks in hospitals.
43.2	The Gas change-over to the respective other side must occur fully automatic, once the active side of the cylinder manifold runs empty
43.3	For the change-over between the two active cylinder manifolds, the control panel should have a pneumatic-controlled reversing valve and It will continue to function even there will be a failure in the electricity supply.
43.4	The control unit, integrated into the control panel should monitor all pressures of the active and passive gas sources, which are necessary for the safe and uninterrupted system operation.
43.5	In addition to the shuttle valve, the cabinet contains the line pressure regulators, the line pressure gauge, indicators, a set of by-pass valves for manual operation in case of malfunction and an electronic control board.
43.6	If a pressure parameter deviates significantly from the respective nominal pressure, an alarm system which is integrated into the control panel is activated immediately and send an audible and visual message, to ensure that disturbances in the system are recognized.
43.7	An alarm panel with pilot lamps indicating the “in use”, ”half empty” and “empty” banks, high/low line supply pressure, test and mute buzzer switch button
43.8	It should have the facility for recording of all alarm messages including the date of occurrence for each message.
43.9	Control panel should provide following displays. display of system pressure. display of gas flow display of currently active source range calculation for the active source
43.10	Pressure reducers should be flame proofed by an authorized certification agency and specially certified for medical gases such as oxygen and nitrous oxide. It Should have safety certificate from a competent authority CE issued by a notified body registered in European Commission and all the regulators should be adiabatic certified.
43.11	The control panel should fulfil all requirements of EN ISO 7396 – 1: 2007/ HTM-02-01 and have and other relevant international standards.
44	The bidders should have Authorised Person (Medical gas as per HTM) with valid certificate. The

	Authorised Person shall sign completion certificate and submit to KMSCL
45	Rate for the Vacuum ward unit, imported, autoclavable shall be offered in the BOQ and will not be taken for evaluation.

NOTE :

1. The installation shall be done strictly as per the conditions mentioned above.
2. Optional rate shall be provided for items as per the specification mentioned above. Rate will not be taken for evaluation.
3. Optional rate shall be provided for fully automatic control panel as per the specification mentioned above. Rate will not be taken for evaluation.
4. Optional rate shall be provided for type II air and vacuum system as per the specification mentioned above.
5. Rates were also requested for civil works required for construction of manifold room. If required the work will be entrusted with the L1 bidder and the rate is not taken for evaluation.
6. The AMC / CMC rates offered in percentage and the. This percentage will be applicable for executing AMC/ CAMC by the hospital authorities for the desired items. **i.e AMC / CAMC value to be paid = The total unit cost (without GST) of the supply/ work order X percentage of repective year**
7. If order for any of the optional item is given then the CMC rate for the same shall be calculated based on the percentage of CMC rate offered for the item taken for evaluation.
8. Warranty exclusions if any shall be discussed at the time of prebid meeting else the tender condition as per clause 6.31.20 shall prevail