

TMC HWCC MGSS

Technical Specifications

1. The MGSS work for HWCC building shall be done as per NFPA 99.
2. The attached typical schematic diagrams shall be followed.
3. The list of accepted makes shall be attached for both imported & Indigenous origin
4. Ground floor to 5th floor are **General Care Rooms**
 The **Critical Care Rooms** are on 6th
 The **Operation theatres** are on 7th Floor
5. The provision in work area shall be as following
 - **Third party shall provide the LOX vessel, Evaporators with CCOE.**
 Connection to evaporator outlet is in scope of this work.
 - MGSS building for HWCC – **By other agency**
 - Risers in the vertical shaft for medical gas
 - Entire MGSS work on Ground to 5th Floor
 - On 6th & 7th floor the gas risers shall terminated on Zone Valve Boxes connected to Area Alarm Panel.
The agencies doing the work on 6th & 7th Floor shall commence their MGSS work in these areas from this battery limit. Their scope of work shall include piping, outlets, LVBs, Valves, Bed head panels, AGSS system etc. shall be provided by 6th & 7th floor agencies.
6. **Scope of work**
 The scope of work of contractor towards **Supply/Installation/Testing/Commissioning** shall include following
 - a. **Medical Oxygen** system comprising
 - Connection to LOX evaporators as primary source
 - 3 source Oxygen control panel
 - 20 cylinder Main Simplex Manifold & 20 cylinder Reserve Simplex Manifold complete
 - 10 cylinder Emergency Manifold
 - Emergency Manifold Control Reserve Assembly
 - b. The **Medical Air Source** system complete with integral Control Panel & comprising
 - Breathing Air Compressors with After coolers
 - Medical Air receivers
 - Medical air desiccant Duplex Twin Dryers, 10⁰ F PDP
 - Medical air filter, regulator etc. assembly
 - c. The **Instrument Air Source** system complete with integral control panel & comprising
 - Instrument Air Compressors with After coolers
 - Instrument Air receivers
 - Instrument air Duplex Twin Desiccant Dryers, -40⁰ F PDP
 - Medical air filters & Regulators etc.
 - d. The **Medical Vacuum** system comprising
 - Vacuum pumps
 - Receivers
 - Bacterial filters

- e. **N2O system** comprising
 - 2x3 Duplex cylinder main manifold complete
 - 1x2 cylinder emergency manifold complete
 - 2x3 Duplex cylinder main manifold control panel
 - 1x2 cylinder emergency manifold reserve control assembly
- f. MGSS Central Alarm Panel
- g. Zone alarm panels
- h. Medical Gas Piping in following areas as per NFPA clause 5.1.10.11 & applicable sub-clauses
 - i.1. All A/G piping in MGSS
 - i.2. All U/G piping with protection as per NFPA 99 between HWCC & MGSS
 - i.3. All A/G Riser piping in HWCC
 - i.4. All A/G Horizontal Lateral & Branch piping in HWCC from ground to 5th floors.
- i. Medical Gas Valves for
 - Source
 - Riser
 - Service isolation
- j. Zone Valve Boxes complete with gauges & transducers to be wired to Zone Alarm Panel
Local Valve boxes complete with gauges but without transducers
- k. Horizontal/Vertical Bed head/Pendants with specified numbers of outlets & switch sockets etc. & matching Dummy runners
- l. Gas specific User Outlets
- m. Vacuum units for General Care Wards & Casualty Wards
- n. Oxygen Flow Meters with Humidifiers for General Care Wards
- o. Hi Pressure & Low Pressure Tubing
- p. Auxiliary services
 - Power Distribution Board for MGSS – By other agency
 - Power Distribution Board for Vacuum Plant – By other agency
 - Power Distribution Board for Air Plant – By other agency
 - Illumination system – By other agency
 - Earthing system – By other agency
 - Power cabling – By other agency
 - Control cabling – By other agency
 - Portable fire extinguishers – By other agency
 - Smoke detection system connected to Loop of HWCC FAS – By other agency

The pressures of MGSS system shall be as follows

Gas	Location - Source	Location - Outlet	Outlet - Alarm	System flow
Medical Oxygen	55 psig	50 psig	48.5 psi	130 CFM
Medical Air	55 psig	50 psig	48.5 psi	72 CFM
Instrument Air	125 psi	101 psi	94 psi	62 CFM
N2O	55 psig	50 psig	48.5 psi	20 CFM
Medical Vacuum	19 " Hg	15 " Hg	14 " Hg	140 CFM

TECHNICAL DATA SHEETS

Item	Medical Breathing Air Plant compressor plant
Country of origin	Imported
	Entire system to be built by system manufacturer
Conforming to	NFPA 99
	UL – ETL listing
Configuration	1 set in Duplex / Triplex / Quadruple
	Single point connection
Tender compressor	Oil Free – Scroll/Screw/Tooth
System flow	80 CFM @ 55 psig minimum, PDP 10 ⁰ F (-12 ⁰ C) minimum
Plant flow	Compressor output shall be derived by addition of purge air @ of 15% for Desiccant dryer
Compressor output pressure	100 psig
Duplex	Main-1-100% flow+ Reserve -1-100% flow
Triplex	Main-1& 2-each 50% flow+ Reserve -1-50% flow
Quadruple	Main-1& 2 & 3-each 33% flow+ Reserve -1-33% flow
Location	Indoor
Type	Air cooled
	Modular
System	415 V 3Ph 3W 50 Hz
Drive system	Built in with each compressor
	Of rating to suit the plant configuration TEFC, Continuous rated – no de-rating till 40 ⁰ C
	Pump Starter with thermal protection & circuit breaker, safety door interlock with dry contacts for alarms
Accessories	All necessary accessories including minimum listed below
	Intake air filter for <1μM dust & particle size
	Inlet isolation valve
	Discharge line with isolation valve, check valve & safety relief
	Flex hoses on intake & outlet
	Fan assisted After Air Cooler with drain trap & automatic solenoid drain valve
	Cooling fan
	Fail safe Temperature sensor
	Pressure gauges
	Pressure switches
	Temperature gauges
	Anti-vibration mounts
	All frontal piping with valves, gauges, instruments etc.
	240 gallon receiver

	<ul style="list-style-type: none"> • ASME code stamped • 150 psig design rated • Zero Loss electronic drain valve • Liquid level gauge glass • Safety relief valve • Manual drain valve • Piped 3-valve bypass assembly with flange-fitted valves • Pressure gauge
Plant controller	
	Master controller LCD high resolution touch screen with <ul style="list-style-type: none"> • Service label • Operating condition • PDP • CO Level • Status of all compressors (running/available/off) • Sequence & next to start • Trends & graphs • Service alerts • Alarms & shut down • Settings • Self-diagnostics • Test mode
	Each Unit Controller with <ul style="list-style-type: none"> • Operating mode • Operating status • Unit shutdown audible-visible alarms • Test mode
	Ethernet connection compatible with Master Alarm Panel
	Connection to MGSS Central Alarm Panel
	BMS connectivity through LAN switch

Item	Medical Air Dryer, Filter & Regulator
Conforming to	NFPA 99
	UL-ETC listed
Origin	Imported
	Entire system to be built by system manufacturer
Type	Heatless desiccant adsorption regenerative dryer with internal purge air control Duplex each with Twin column dryers with CO monitor with +/- 2ppm accuracy PDP with +/- 2° F accuracy
System flow	80 CFM @ 55 psig minimum, PDP 10° F (-12° C) minimum
Quality of medical air	Conforming to NFPA 1989
	Oxygen 19.5% to 23.5%

	Nitrogen 75% – 81%
	CO ₂ <1000 ppm
	CO < 5 ppm
	Hydrocarbon content <25 ppm
	H ₂ O - 24 ppm V/V
	Particulate & oil < 2ppm
	Taste & odour free
Location	Indoor
Ambient conditions	July - Max 31 ⁰ C - Min 21 ⁰ C - RH 86%
Enclosure	Pre-packaged
	Wiring/Cabling
	Piping
Features	Twin tower-each 100% rated
Pre-filter	Fully duplexed pre-filters rated for 0.01 micron and capable of removing both aerosols and particulate, mounted and pre-piped with Automatic float drain and Element change indicator.
After filter	Fully duplexed after filters rated for 1 micron particulate removal, mounted and pre piped with element change indicator.
Purge control	Manual & Auto through a selector switch
Control Panel	2 no. power supplies 2 sets of relays to operate dryers LCD Text Display for Dew Point CO level LCD alphanumeric display for Dew Point & CO level Visual & Audible alarm
	System pre-piped & prewired
Power supply	220 V 1Ph 50 Hz

Item	instrument Air Plant compressors
Country of origin	Imported
	Entire system to be built by system manufacturer
Conforming to	NFPA 99
	UL – ETL listing
Configuration	1 set in Duplex / Triplex / Quadruple
	Single point connection
System flow	Output at 63 CFM @ 150 psig, PDP -40 ⁰ F minimum
Plant flow	This shall be after addition of purge air as below Desiccant dryer – 15%
Duplex	Main-1-100% flow+ Reserve -1-100% flow
Triplex	Main-1& 2-each 50% flow+ Reserve -1-50% flow

Quadruple	Main-1& 2 & 3-each 33% flow+ Reserve -1-33% flow
Location	Indoor
Type	Air cooled
Compressor	Oil Lubricated Recip. / Scroll Continuously rated
	Single or Two stage
	Body & crankcase – Grey Cast iron Crank shaft – Forged with ball bearings & seal Piston & rings– Cast aluminium, Pins-chrome alloy Connecting rod – one piece
	Air cooled Intercooler between two stages, in case of 2 stage compressor
System	415 V 3Ph 3W 50 Hz
Drive system	Belt driven with sheave & enclosed in OSHA approved totally enclosed belt guard
	Built in with each compressor
	Of rating to suit the plant configuration, Continuous rated – no de-rating till 40°C
	Pump Starter with thermal protection & circuit breaker, manual-off-auto selector switch, safety door interlock with dry contacts for alarms
Accessories	All necessary accessories including minimum listed below
	Intake air filter for <1µM dust & particle size
	Inlet isolation valve
	Discharge line with SS braided flex connection, isolation valve, check valve & safety relief
	Air cooled After Air Cooler with moisture separator & automatic zero loss drain valve
	Discharge air high temperature sensor.
	Four point spring isolation mounts
	All frontal piping with valves, gauges, instruments etc.
Control module	
	200 gallon receiver <ul style="list-style-type: none"> • ASME code stamped • 250 psig design rated • Automatic solenoid drain valve • Liquid level gauge glass • Safety relief valve • Manual drain valve • Piped 3-valve bypass assembly with flange-fitted valves • Pressure gauge
	<ul style="list-style-type: none"> • Duplex fine line filters • Oil indicators • Regulators • Oil/ water separators

	<ul style="list-style-type: none"> Dew Point Monitor with filter & sensor, set at -22°F wire to touch screen controller & accuracy of +/-2°F Air Sampling Port
	Entire module prewired & pre-piped
Controller	LCD high resolution touch screen with <ul style="list-style-type: none"> Service label Operating status PDP High discharge temperature Lead/lag sequencing Automatic activation of reserve unit Run hours Automatic rotation of units on FIFO basis Provision of operation of all units simultaneously Service alerts Visual & audible Alarms & shut down Self-diagnostics Test mode
	Ethernet connection compatible with Master Alarm Panel
	Connection to MGSS Central Alarm Panel

Item	Medical Vacuum Plant
Country of origin	Imported
	Entire system to be built by system manufacturer
Conforming to	NFPA 99
	UL –ETL listing
Configuration	Duplex / Triplex / Quadruple
Quantity Tender	1 System
	Single point connection
System configuration	System on integral skid in modular /stack with receiver
	Including Comp. sets Receiver Controller Frontal piping & valves Gauges & instrument & transducers
Type	Air cooled , Indoor
	Oil lubricated rotary
	Vane type
System Flow	Output at 140 CFM at 482 mm Hg minimum
Plant flow	Shall not be less than system flow
Duplex	Main-1-100% flow+ Reserve -1-100% flow
Triplex	Main-1& 2-each 50% flow+ Reserve -1-50% flow
Quadruple	Main-1& 2 & 3-each 33% flow+ Reserve -1-33% flow

System Vacuum	482 mm Hg vacuum minium
Power System	415 V, 3Ph-4W, 50 Hz
Drive	Of rating to suit the plant configuration TEFC, Continuous rated – no de-rating till 40°C
Pump & drive connection	Direct coupled
Accessories	
Each pump set	Integral circulating oil system with filter
	Discharge high temperature switch
	Manual drain valve with temperature gauge
	Three stage oil filtration system with 99.9% efficacy
	Built in anti-suck back valve on inlet with flex connector & 5 micron filter
	Drip with ball valve & condensate drain-flex hose connected to discharge manifold Discharge manifold with flex hoses
	Intake piping with isolation valve, check valve & flex connector
	Vibration isolator
	Pump Starter with thermal protection & circuit breaker, safety door interlock with dry contacts for alarms
System	240 gallon receiver Vacuum switch as back up to vacuum transducer ASME code stamped 150 psig design rated 3 way bypass valve Manual drain
	All frontal piping & wiring
	1* master controller
	Master controller LCD high resolution touch screen with Service label Operating condition Status of all pumps(running/available/off) Sequence & next to start Trends & graphs Service alerts Alarms & shut down Settings Self-diagnostics Test mode
	Each Unit Controller with Operating mode Operating status Unit shutdown audible-visible alarms Test mode
	Ethernet connection compatible with Master Alarm Panel

Item	Medical Vacuum Bacterial Filter System
Conforming to	NFPA 99
	UL – ETL listed
Origin	Imported
System	1 System of 2 bacterial filters
	Duplex stream filter
Penetration level	0.005% as per BS 3928
Particle size	0.2 to 2 micron
Internal pressure drop	not to exceed 25mm HG at full flow
Accessories	Differential vacuum indicator across each filter to indicate blockage
	Pressure sensors on inlet & outlet of filter to measure the pressure drop across filter
	Transparent Pyrex drain flask for each filter with inside & outside polymer coating The drain flask shall be autoclave able
	Isolation valve for each drain flask

Item	Compressed Medical Gas Cylinders on Manifold
On Med Ox Main Manifold	20 Cylinders
On Med Ox Reserve Manifold	20 Cylinders
On Med Ox Emergency Manifold	10 Cylinders
On N2O Manifold	3 Cylinders LHS & 3 Cylinders RHS
N2O emergency Manifold	2 Cylinders
Country of Origin	Indian
Water capacity	45 litres
Fill pressure	150 kgf/cm ²
Test pressure	250 kgf/cm ²
Fill ratio	0.85 as per IS 3710
Gas withdrawal rate	15 litres/minute minimum
Gas quantity Oxygen	7 CuM @ 150 bars
Gas quantity N2O	17 CuM @ 150 bars
Outside diameter	232 mm
Wall thickness	5.5 mm
Length	1370 mm
Excess flow shutdown valve	As per IS 5903
Material	Low carbon seam less
Welding	Automatic submerged arc or MIG
Welded cylinder standard	Conforming to IS:3196 Pt.I / Pt.II /Pt. IV, IS 7142
Seamless cylinder standard	Conforming to IS 7285.
Treatment	Heat treatment / Stress relieving / Normalizing
Testing	Visual & Hydraulic & Pneumatic

Surface treatment	Shot blasted & Anti corrosive high gloss painting
Colour – Oxygen	Green-US code, White – ISO code White & Black letters – IS 8198
Colour – N2O	Blue-US code, Blue – ISO code Blue & White letters – IS 8198
Conforms to	DOT – 4BA 240, BS 5045/II/91
Filled capacity	Med. Oxygen-7 CuM./Cylinder, Med. N2O=17 CuM/Cylinder
Accessories	Foot ring
	Discharge valve guard
	Forged brass regulator valve 150 bar WP
	Externally threaded stem
	EPDM O Ring
	Polyamide set
	Hand wheel
	Threaded pressure relief
	Bursting disc with indicator
	Thread sealant
	Discharge port suited to pig tail as per IS 3224
	First filling of Medical Grade Oxygen IP 2010-2018

Item	Medical Oxygen Gas
Country of Origin	Indian
Grade	Medical Grade to IP 2010- 2018
Purity	99% to 100%
CO & CO2	1 ppm max
Moisture	2 ppm max
Argon	5 ppm max
Hydrocarbon	1 ppm max
Acid	Nil
and Sulphur Dioxide	Nil
Phosphine	Nil
Hydrogen Sulphide	Nil
Halogen	To pass test as per IS 309
Oxidizing substance	To pass test as per IS 309
Acidity	To pass test as per IS 309
Alkalinity	To pass test as per IS 309

Item	N2O Gas
Country of Origin	Indian
Grade	Medical Grade to IP 2010-2018
Purity	99% to 100%

Balance	Moisture free from hydrogen sulphide
Shall not damage	Cylinders, pipe lines, anaesthesia machine, ventilators etc.
Test Each Batch for	Phosphates
	Arsenic
	Ammonia
	Alkalinity

Item	Med Oxygen Main & Reserve Manifold
Purpose	Secondary source & Reserve source
Type	Simplex
Assembly	Brazed
Origin	Indigenous
Comprising	20 nos. LHS bank & 20 Nos. RHS bank
Country of Origin	Indian
Operating pressure	150 bars
Test pressure	250 bars
Base frame / columns/ header support	2.5mm HRCA steel
Steel treatment	Zinc Plated & Epoxy coated in black colour
Length	to suit 2 cylinders 45 L capacity in each bank
Header	High pressure copper pipe 1" dia 14 SWG
Component Material	High tensile high pressure brass fittings
Header to pigtail connection	Tee to suit header & pigtail
Master shut off valve	To isolate entire LHS or RHS bank
Cylinder pig tails	High pressure copper pipe 5/16" dia. 16 SWG mm thick complete with end fitting
Cylinder Header & Check valves	Cylinder cut off valve & Spring loaded check with built in filter & metallic seat & suitable for 5/16" pigtail
Cylinder restraint	Cylinder holding secure strap/chain
Conforms to	IS 12827

Item	Med Oxygen Emergency Manifold
Purpose	Tertiary source
Type	Simplex
Assembly	Brazed
Origin	Indigenous
Comprising	10 Cylinders
Country of Origin	Indian
Operating pressure	150 bars
Test pressure	250 bars
Base frame / columns/ header support	2.5mm HRCA steel
Steel treatment	Zinc Plated & Epoxy coated in black colour
Length	to suit 10 cylinders 45 L capacity
Header	High pressure copper pipe 1" dia 14 SWG

Master shut off valve	To isolate entire bank
Component Material	High tensile high pressure brass fittings
Header to pigtail connection	Tee to suit header & pigtail
Cylinder pig tails	High pressure copper pipe 5/16" dia. 16 SWG mm thick complete with end fitting
Cylinder Header & Check valves	Cylinder cut off valve & Spring loaded check with built in filter & metallic seat & suitable for 5/16" pigtail
Cylinder restraint	Cylinder holding secure strap/chain
Conforms to	IS 12827

Item	Medical Oxygen Emergency Regulator Assembly
Purpose	Tertiary source
Origin	Imported
Conforming to	NFPA 99
	UL – ETL listed
Quantity	1 No
Configuration	10 cylinders
Type	High Pressure
Gas	Medical Oxygen
Outlet pressure	5 bar
Outlet flow	1500 LPM
Location	Indoor
Mounting	Wall inclusive of suitable brackets
Provision on assembly	Brackets to secure header to the wall
	Gas specific check valve
	Multi turn high pressure valve to cut off cylinder bank
	In let pressure gauge
	Out let pressure gauge
	Adjustable pressure switch with pressure transducer
	Single stage diaphragm regulator

Item	3 source Oxygen Control System
Country of origin	Imported
Conforming to	NFPA 99
Listed	UL - ETL
Primary Source - LIQ -13 bar	From vaporisers
Secondary Source - HP - 150 bar	Left bank of 20 cylinders
Reserve Sources - HP – 150 bar	Right bank of 20 cylinders
Operation	First LIQ Primary Source shall be used Next HP Left bank shall be automatically used Lastly the reserve HP Right shall be automatically used
Location	Indoor
Mounting	Floor
Outlet pressure	5 bar
Outlet flow	1500-1800 LPM at minimum 175 psi input to panel
Location	Indoor

Mounting	Floor or Wall inclusive of suitable brackets
Provision for each side of bank	¼ turn shut off valve for isolation of each bank
	Check valve for each bank
	Pressure switch for bank
	Pressure gauge for each bank
	First level diaphragm regulator for each bank with bank bleed valve
	Pressure switch connected to each bank
	Pressure transducer connected to each bank
	Intermediate level relief valve
	LED - GREEN - In use
	LED - GREEN - Ready
	LED - Red - Empty
	Line Level diaphragm regulator with pre-mounted gauge & bleed valve
	Service valve with solenoid valve
	Line vent valve tube connected to relief valve
Provision on power box & control board	
System	230 V AC 50 HZ
	Control fuse
	Control board
	Knock outs for Power in- Alarm output-Data
Connectivity	BMS data & Alarm output to Medical Gas Plant Central Alarm Panel

Item	N2O Main Manifold
	Primary source
Comprising	6 Cylinders (3 nos.LHS+3 Nos. RHS)- DUPLEX
Country of Origin	Indian
Quantity	1 set
Operating pressure	150 bars
Test pressure	250 bars
Flow	300 LPM
Base frame / columns/ header support	2.5mm HRCA steel
Steel treatment	Zinc Plated & Epoxy coated in black colour
Length	to suit 6 cylinders 45 L capacity
Header	High pressure copper pipe 1" dia 14 SWG
Fittings	High tensile high pressure brass fittings
Cylinder pig tails	High pressure copper pipe 5/16" dia. 16 SWG mm thick complete with end fitting
Cylinder Check valves	Spring loaded with built in filter & metallic seat & suitable for 5/16" pigtail
Cylinder shut off valve	Wheel valve on cylinder

Cylinder restraint	Cylinder holding secure strap/chain
Conforms to	IS 12827

Item	N2O Emergency Manifold
	Secondary source
Comprising	2 Cylinders - SIMPLEX
Country of Origin	Indian
Quantity	1 set
Operating pressure	150 bars
Test pressure	250 bars
Flow	300 LPM
Base frame / columns/ header support	2.5mm HRCA steel
Steel treatment	Zinc Plated & Epoxy coated in black colour
Length	to suit 2 cylinders 45 L capacity
Header	High pressure copper pipe 1" dia 14 SWG
Fittings	High tensile high pressure brass fittings
Cylinder pig tails	High pressure copper pipe 5/16" dia. 16 SWG mm thick complete with end fitting
Cylinder Check valves	Spring loaded with built in filter & metallic seat & suitable for 5/16" pigtail
Cylinder shut off valve	Wheel valve on cylinder
Cylinder restraint	Cylinder holding secure strap/chain
Conforms to	IS 12827

Item	Fully Automatic N2O Main Manifold Control Panel
Country of origin	Imported
Conforming to	NFPA 99
Listed	UL - ETL
Configuration	2 banks of 3 cylinders each
Type	High Pressure to High Pressure
Gas	N2O
Outlet pressure	5 bar
Outlet flow	300 LPM
Location	Indoor
Mounting	Floor or Wall inclusive of suitable brackets
Provision for each side of bank	¼ turn shut off valve for isolation of each bank
	Check valve for each bank
	Pressure switch for bank
	Pressure gauge for each bank
	First level diaphragm regulator for each bank with bank bleed valve
	Pressure switch connected to each bank
	Pressure transducer connected to each bank

	Intermediate level relief valve
	LED - GREEN - In use
	LED - GREEN - Ready
	LED - Red - Empty
	Line Level diaphragm regulator with pre-mounted gauge & bleed valve
	Service valve with solenoid valve
	Line vent valve tube connected to relief valve
Provision on power box & control board	
System	230 V AC 50 HZ
	Control fuse
	Control board
	Knock outs for Power in- Alarm output-Data
Connectivity	BMS data & Alarm output to Medical Gas Plant Central Alarm Panel

Item	N2O High Pressure Emergency reserve assembly
Country of origin	Imported
Conforming to	NFPA 99
Listed	UL - ETL
Quantity	1 No
Configuration	2 cylinders - SIMPLEX
Type	High Pressure
Gas	N2O
Outlet pressure	5 bar
Outlet flow	300 LPM
Location	Indoor
Mounting	Wall inclusive of suitable brackets
Provision on assembly	Brackets to secure header to the wall
	Gas specific check valve
	Multi turn high pressure valve to cut off cylinder bank
	In let pressure gauge
	Out let pressure gauge
	Adjustable pressure switch with pressure transducer
	Single stage diaphragm regulator

Item	Medical Gas distribution Piping
Country of origin	India
Certification	Lloyd /TUV /SGS certified
Executed as per	NFPA 99 – Clause 5.1.10.11 & sub-clauses
Certified	Level 6020
Sizes	12 mm OD x 0.7 mm thick
	15 mm OD x 0.9 mm thick
	22mm OD x 0.9 mm thick
	28 mm OD x 0.9 mm thick

	35 mm OD x 0.9 mm thick
	42 mm OD x 1.2 mm thick
	54 mm OD x 1.2 mm thick
	76 mm OD x 1.5 mm thick
	108 mm OD x 1.5 mm thick
MOC	Phosphorous Deoxidized Non-Arsenical Copper BS EN 1412:1996
	Half hard up to 54 mm -BS EN 13348:2008-R250 & above to BS EN 13348:2008-R290
Fittings	INCLUSIVE of in same grade as pipe line material with required tee/ elbow/ crossover/ wall sleeves/End caps to BS EN 1254-1:1998 Part 1.
Supports	INCLUSIVE of required vertical & horizontal supports and termination at both ends, etc. to suit 2/3/4/5 gases
Pipe outside diameter (in mm)	Maximum interval between support (in meter)
Up to 15	1.5
22 to 28	2
35 to 54	2.5
>54	3
Pipe clamps	Nonferrous / Non deteriorating plastic
Laying	in readymade built up trenches or buries underground as per NFPA provisions, open execution on internal / external walls, in vertical shafts, above false ceilings as also inside removable trunking, in walls by chasing cutting as per the relevant standard
Pipe line Joining	
Pipe to pipe	On site Copper to copper joints shall be using a silver-copper-phosphorous brazing alloy to BS 1845 using oxygen free nitrogen inert gas shield and no flux.
	Filler metal for brazing shall nominally cadmium free (less than 0.025% mass fraction).
	The penetration of the brazing alloy at any point must be 3 times the wall thickness of the tube of the thickness of the tube or 3mm whichever is higher
	Pipeline shall be bonded to an earth terminal as near as possible to the point at which the pipeline enters the building
Tests	After erection, all the new pipes cleaned or purged with the help of dry nitrogen gas & complete existing and new system will be tested with dry nitrogen 1.5 times of working pressure for 24 hrs. & the process shall be in line with requirements of NFPA -6010
	· Integrity
	· Leakage
	· Obstruction flow,

	· Particulate contamination
	· Pressure relief valve

Item	Valve Box
Country of origin	Imported
Conforming to	Requirements of NFPA 99
	UL – ETL listed
Used for	Zone isolation with Transducers for Zone Alarm Panel
	Area isolation without Transducers
	Isolation of Ward for emergency repair, maintenance, testing, expansion
Types	Zone valve boxes with gauges & transducers
	For 5 service to suit piping sizes
	For 3 service to suit piping sizes
	For 2 service to suit piping sizes
	Area valve boxes with gauges & without transducers
	For 3 service to suit piping sizes
	For 2 service to suit piping sizes
Mounting	Wall
Entry	Vertical or Horizontal
Suitable for pipe sizes	15 mm to 72 mm copper pipes
Enclosure	Compartmentalized
Body	16 SWG (1.6 mm)
Door	18 SWG (1.2mm), Flush, Hinged, Temper proof
	Locked with pull ring
Gas transducers	4-20 mA Gas specific
Pressure gauges	Analogue type
Labels	For all gases in the boxes
Surface treatment	Primer coat of PU compatible primer
	2x PU paint marine grade, Heat resistant
To be fitted with	Imported ball valves as per site requirement

Item	Dual Port Medical Gas Shut off Valve
Country of origin	Imported
Conforming to	NFPA 99
Listed	UL -ETL
Sizes	1/2" (for 15mm OD Tube)
	3/4" (for 22mm OD Tube)
	1" (for 28 mm OD Tube)
	1.1/4" (for 35 mm OD Tube)
	1.1/2" (for 42 mm OD Tube)
	2" (for 54 mm OD Tube)
	3" (for 76 mm OD Tube)
	4" (for 108 mm OD Tube)

Used in	3 Piece Ball Valve
Provision	2 ports – 1 for purging -2 nd for connecting sensor.
Type	High strength Brass (15mm-TP-55bar to 42mm-TP-35 bars)
MOC	Manual, Lever operated, 1/4 turn Open to Close
Handle	Hard Chrome
Ball valve	Full Bore
	PTFE ball seat & stem seat
	Blow out proof with packing ring & O seal
	Gas identification label
Copper stubs	K type copper tube extensions

Item	Central Alarm Panel in Touch screen
Country of origin	Imported
Conforming to	NFPA 99
Listed	UL – ETL
Location	In MGSS Building
Mounting	Wall
Inputs from Locations	Shall connect to <ul style="list-style-type: none"> • Lox vessel • Evaporators • 3 Source control • All manifolds • Vacuum plant • Air Plant
Gas Sensors	Remote mounted in associated Zone Valve Box & wired up to Alarm Panel.
Inclusive	Input power 230V AC & Internal Power Source of 24 V DC
Input signal	Dry contacts
Panel Door	<ul style="list-style-type: none"> • Power On & Normal – Green • System fault –Red Flashing • Each service - Red Flashing • Illuminated Mute button • Self-test button • 80dBA @1M Horn
Alphanumeric display	20 character 2 line alpha numeric displays to provide alarm status & descriptions.
Display	Field programmable using panel front keys for 5 gases <ul style="list-style-type: none"> • Colour coded Service name • Service parameter with units • Each service with relay contacts <ul style="list-style-type: none"> Normal –Green Low – Red High - Red • Scroll button for value setting
	BMS over Bacnet over RJ45, each panel has a unique IP address

Treatment	User accessible overlay material on the front panel shall include a silver antimicrobial additive for inherent antimicrobial protection. Efficiency of the additive according to ISO 22196 shall be >99% for sample of species such as E coli and MRSA.
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Item	Zone Alarm Panel in Touch Screen
Country of origin	Imported
Conforming to	NFPA 99
Listed	UL – ETL
Location	On each of each floor
Mounting	Wall
Services	5 gas panel for 6 th & 7 th Floor & 3 gas service on ground to 5 th floor
Actuated	From gas transducers located in Zone Valve boxes
Gas Sensors	Remote mounted in associated Zone Valve Box & wired up to Alarm Panel.
Inclusive	Input power 230V AC & Internal Power Source of 24 V DC
Input signal	Dry contacts
Panel	<ul style="list-style-type: none"> • Power On & Normal – Green • System fault warning–Red Flashing • Illuminated Mute button • Self-test button • 80dBA @1M Horn
Gas badge display	<ul style="list-style-type: none"> • Colour coded Service name • Location • Service parameter with units • Each service with relay contacts Normal –Green Low – Red High - Red
Navigation tool bar	For field programming
Treatment	User accessible overlay material on the front panel shall include a silver antimicrobial additive for inherent antimicrobial protection. Efficiency of the additive according to ISO 22196 shall be >99% for sample of species such as E coli and MRSA.

Item	Medical Gas Outlet
Country of origin	Imported
Conforming to except AGSS	NFPA 99
Listing	UL / ETL
Type	Geometric Index Quick connect
Probes	Conforming to standard

	Bed head panel- rotatable straight stub or rear stub as the case may be
Rough-in assembly	Modular 16 SWG steel mounting plate 9.5mm high metal flange around outlet Machined brass outlet box attached to rough in plate Type K copper in let Rotatable in 360° Gas service identification plate on inlet tube Secondary valve in outlet box Double seal to prevent gas leakage
Latch valve assembly	Indexed to rough in assembly & gas specific with latched adapters for gas specific adapters for hose & apparatus
Anti-microbial additive	Silver based for accessible parts
Accessory	Temporary transparent cover
	Die cast epoxy coated
	Gas specific probe

Item	Bed Head Panel
Country of origin	India
Conforming to	MDD 93/42/EEC & CE certified
Provision on	Ground to 5 th floor
Category of IPD	General care + Private + Isolation
Configuration	Horizontal or Vertical or Pendent to suit site condition
Provisions	Outlets for 2xMedical Oxygen & 2x Medical Vacuum in
	All General Care beds
	4Gas / 5 Gas / 3 Gas / 2 Gas as per area allocation-Horizontal
	4Gas as per area allocation-Vertical
	Private rooms- 5 th floor & all Isolation Rooms
	3 Module NCS Call + 2 Module NCS Call Relay
	1* RJ 45 socket
	1* RJ 11 socket
	SS Mounting rail
	Document basket
	Monitor stand/Tray
	IV Pole
	LED Luminaire with switch
	switch socket 4x5/15 A-Raw & 2x5/15 A-UPS
	MCB
Mounting type	Surface
Type	Vertical – 4 nos. Recovery rooms – 2 nd & 3 rd floor
	Horizontal – All Others
MOC	3 mm thick extruded aluminium shell
End cap	Polycarbonate
Grade	ALU 6063 T5

Treatment	Aluminium-PVDF (Fluorocarbon)coated for chemical/UV/Corrosion/Pollution protection
Colour	Off white or to suit interior as per User
Entry - Electrical	Side/Rear-Top/Bottom as per site condition
Entry - Gas	Side or top/bottom as per site condition
Barrier	Between Gas & Electrical section
Fixing	To be fixed on wall
Overall size	Length to vary as per fitment Generally 235mm x56mm x1500mm Generally Vertical 235mm x56mm x1200mm

Item	Pendent
Country of origin	India
Conforming to	MDD 93/42/EEC & CE certified
Provision on	Ground to 5 th floor
Category of IPD	Treatment rooms
Configuration	Pendent to suit site condition
Arm	Single arm
	1000 mm long
	Rotation through 330° C
Pendent	Single pendent with all fitments on one face or services on one face & gases on reverse side
	Rotation through 330° C
Provisions	4 Gas outlets
	3 Module NCS Call + 2 Module NCS Call Relay
	1* RJ 45 socket
	1* RJ 11 socket
	SS Mounting rail
	Document basket
	Monitor stand/Tray
	IV Pole
	LED Luminaire with switch
	switch socket 4x5/15 A-Raw & 2x5/15 A-UPS
	MCB
Mounting type	Surface
MOC	3 mm thick extruded aluminium shell
End cap	Polycarbonate
Grade	ALU 6063 T5
Treatment	Aluminium-PVDF (Fluorocarbon)coated for chemical/UV/Corrosion/Pollution protection
Colour	Off white or to suit interior as per User
Entry - Electrical	Side/Rear-Top/Bottom as per site condition
Entry - Gas	Side or top/bottom as per site condition
Barrier	Between Gas & Electrical section

Fixing	To be fixed on wall
Overall size	Length to vary as per fitment Generally 235mm x56mm x1500mm Generally Vertical 235mm x56mm x1200mm

Item	Dummy runners for surface gas piping
Country of origin	India
Purpose	To conceal surface run of gas pipes
MOC	Extruded aluminium
Grade	ALU 6063 T5
Treatment	Powder coated
Size	Generally 235mmx56mm
To suit	Profile of Bedhead panel
Colour	To match bed head panel
Length	Customized to suit size
Type	Modular
Fixing	Housing to fixed on dado tiles
Cover	Removable to suit access to gas piping

Item	Ward Vacuum Unit
Country of origin	Indian
Conforming to	MDD 93/42/EEC & CE certified
Mounting	Direct type
Vacuum Regulator	Knob type Step less 0-760 mm Hg in ISO Yellow colour
	Vacuum gauge on regulator
	On/Off switch on regulator
	100 mL safety jar
Vacuum Filter	Antibacterial disposable plastic filter on safety jar Outlet fitting for LP tube connection from collection jar to patient
Vacuum Jar	1x1000 mL -for Ward & 1x1750 mL – Casualty with handle & overflow safety trap
Vacuum Jar Material	Fittings for connection to a) safety trap b) safety jar Polycarbonate / Polysulphone Unbreakable & reusable Autoclave-able
Complete with	Probe Compatible with Vacuum outlet as also Vacuum regulator

Item	Medical Oxygen Flow Meters
Country of origin	Indian
Conforming to	MDD 93/42/EEC & CE Certified
Mounting type	Direct

Oxygen flow meter	Back pressure compensated
Flow range	0-15 LPM - Adult - adjustable-Increment 1LPM
Float	AISI 316
Body Filter	Brass Chrome plated AISI 316 wire mesh
Calibration	60 psig at 21 ⁰ C
Humidifier bottle	200 mL - Adult - with safety valve Unbreakable Autoclave-able
Humidifier Valve setting	3 - 5 psig, Auto reset after bleeding
Complete with	Probe Compatible with Oxygen outlet as also Flow regulator

Item	Low Pressure hoses for medical gases
Country of origin	Indian
Conforming to	ISO 100793: 2000, MDD 93/42/ECC, BS EN 739 :1998
Used for	Air, Oxygen, Anaesthetic & emergency equipment
Colours	
Oxygen	White
Air	Black
Vacuum	Yellow
N2O	Blue
Conforming to	ISO 100793: 2000
Internal diameter	6.3 mm
MOC	Hoses - reinforced PVC with an anti-static core as per BS EN 739:1998 - 5.3 Materials.
Bursting pressure	BS EN 739:1998-5.4.2
Resistant to	Kinking, Crushing, Traction
Minimum bursting pressure	The minimum bursting pressure of the hoses exceeds the requirements of BS EN 739:1998 - 5.4.2 Mechanical Strength.
Socket	Gas specific