

## REQUEST FOR BUGETARY ESTIMATE

Ref.: HSCC/RFQ/SES/2024 dated: 15.02.2024

HSCC (India) Ltd. intends to invite on-line bids from eligible bidders for various Special Services for Reputed Hospital in India;

1. Modular Operation Theatres (MOTs)
2. Normal Operation Theatres (NOTs)
3. Minor Operation Theatres (Minor OTs)
4. Medical Gas Manifold System (MGMS)/Medical Gas Pipeline System (MGPS)
5. Central Sterile Supply Department (CSSD)
6. Pneumatic Tube Transfer System (PTTS)

BOQ and Technical Specifications of proposed Special Services are Annexed herewith.

It is requested to submit the Budgetary Quotations, as per the BOQ format in Hard & Soft Copy within 10 days of issue of this Notice at following address:

Chief General Manager  
Special Engineering Services Department  
HSCC (India) Ltd.,  
E-6(A), Sector-1,  
Noida (U.P.) - 201301.

Soft copy may please be sent to: [ses@hsccltd.co.in](mailto:ses@hsccltd.co.in)

Chief General Manager  
HSCC (India) Ltd.

**Supply, Installation, Testing and Commissioning of CSSD Equipment with one (1) year of Defect Liability**

Sr. No.	Descriptions of Items
1.	<p><b>HORIZONTAL DOUBLE DOOR AUTOCLAVE 500-600 Litres (8 STU or More) WITH ACCESSORIES</b></p> <p>Fully automatic PLC controlled Horizontal Autoclave (Steam Sterilizer), with pre and post-vacuum treatment and with loading equipment.</p> <p>(a) Door: The sterilizer door should be pneumatically (Compressed Air)/ Electrically operated double door with fully automatic vertical sliding movement along with door safety features. Door Safety Systems:</p> <ol style="list-style-type: none"> <li>1. Pressure sensor system should be available in the chamber to monitor the chamber pressure. Chamber should be completely depressurized before the door seal is retracted by vacuum.</li> <li>2. Door chamber should not be opened when chamber is pressurized.</li> <li>3. A mechanical safety edge should stop the door if it is obstructed while closing, thus protecting operator &amp; loading equipment.</li> <li>4. A Cycle should not start if the door is open or not properly locked.</li> <li>5. The door seal should be silicon gasket &amp; on commencement of the process the door gasket should be pressed against the rear face of the door by steam to ensure the door remains closed during the process.</li> <li>6. A Pressure Switch should be there to monitor the door gasket pressure whether it pressed against the door with right pressure during the entire process.</li> <li>7. Double door safety should be implemented through interlocks which shall prevent both doors from being opened simultaneously.</li> <li>8. Door Gasket should be resistant to sterilization temperature and sterilization pressure. It should be sealed through a inflation of the door gasket against the door and should not require any lubrication or maintenance.</li> </ol> <p>(b) Construction:</p> <ol style="list-style-type: none"> <li>1. Chamber &amp; Doors: The chamber and doors should be made of solid, high quality 316L Stainless Steel. The chamber should be resistant to corrosion. The operating thermo mechanical stress should be welded with a robotic system. The chamber should be constructed with a rectangular/quadrangular section made of stainless steel with minimum 6 mm thickness. It should be able to withstand the relative pressure (-1 to 3.5 bar) and operating temperature up to 180deg C. The chamber should be jacketed to ensure the temperature uniformity in chamber. The chamber floor should be slightly sloped towards an internal drain to facilitate drainage. A stainless steel mesh strainer should be provided to protect the</li> </ol>

drain port from blockage by debris. The chamber should be mounted on a stainless steel bearing structure at least 2mm thick tubular stainless steel so that to allow load to be distributed in four corners with height adjustable feet.

2. Surface Treatment: The internal surface should be electro-chemically/mechanically treated for high quality smooth finish to facilitate cleaning. The resultant surface should be polished to less than 0.2-0.8  $\mu\text{m}$  fineness to protect against corrosion (certificate from OEM should be provided along with the bid). The internal corners should be rounded off to facilitate efficient cleaning.
3. Insulation: The chamber should be covered with extra thick insulating material that limits heat dissipation. The insulation should ensure the surface temperature of the sterilizer to be less than 45 Deg C. The insulation should be minimum 50 mm thick . It should have low thermal conductivity and should not release any particles.
4. Jacket: The jacket should be made of quality stainless steel with pressure gauge and it should be minimum 5 mm thickness.
5. Steam Generator: The sterilizer should have inbuilt steam generator of adequate capacity. In built steam Generator should be made of quality stainless steel. The steam generator should have insulation. Steam generator should be fitted with all safety & control devices as Certified Safety valve for: 1) Excess pressure, 2) Resettable Safety Thermostat for over heat protection, 3) Pressure switch to control & regulate the steam pressure in the steam generator, 4) Automatic electronic water level regulator, 5) Automatic Water feed system, 6) Low level and high level water cut off, 7) Automatic periodical self-drain for the steam generator, 8) water level glass gauge inspection device visible on screen inspection device visible from service area, 9) The heating element should be made of Inconel /incolloy /international standard material and should be of sufficient capacity to make the sterilization process faster and it also should be differential protected, 10) It should also have the automatic blow down valve degassing system for feeding water to steam generator.

(c) Pipes, Valves and Components:

1. All the process valves should be stainless steel & should be pneumatically operated piston valves. All the non-standard components should be non-proprietary & should be easily sourced. All the hot pipes should be properly insulated. The safety valves should be made of SS 316/Chrome plated Red Brass/Gun metal quality.
2. Primary piping & fittings should be stainless steel threaded or stainless steel/Chrome plated Brass /copper/ Gun metal triclamp fittings.
3. Primary components: SS 316/Chrome plated Brass/copper/ Gun metal quality quality triclamps or threaded fitting components like – Manual valve, non-return valve, pressure, regulator, pneumatic/Electro-pneumatic valves and steam

trap, etc.

4. Electrical Components: the terminals & contacts should be housed in a water tight cabinet. There should be no external Electrical cabinet for control and should be housed only inside the Sterilizer.

(d) Air Filter: A disposable air filter should be provided by filtering the atmospheric air before entering inside the chamber. The filter separation efficiency should be higher than 99.998% for particle size less than 0.3µm.

(e) Control System: 1. The control system should be dual PLC/micro processor based system specially designed for sterilization application (one to control the main parameters (PLC) and the other to verify the functionality). Control system should have touch sensitive, minimum 7"-10" colour display interface at operator loading side. Apart from main PLC based control system the sterilizer should also have additional independent monitoring & documentation system which constantly cross checks the safety systems & time.

2. Multiple password access levels should be provided to control access/operation of the machine preventing unauthorized access. These access level should be user selectable. The control system should have CPU processor with battery back-up & non-volatile memories, Digital input/output controls, analog measuring inputs & COM ports for printer & PC connectivity/RS 232 port connectivity.

(f) Temperature and Pressure Sensors:

1. The sterilizer should have at least 2 temperature sensors for chamber drain & one for Jacket. It should also have two pressure sensor in chamber and one pressure sensors for Jacket as per EN 285 standards.

2. The sensors should be PT100 sensors to confirm Class A of the IEC 571 standards, with accuracy of + 0.1°C While the pressure sensor should have the accuracy 1% over the range of 0-5 bar. 3. Each sensor circuit should be calibrated with individual constants to correct the deviation in manufacturing and aging.

(g) Alarms: Automatic process checking & failure correction should be possible by the control system. The system should perform a self-diagnosis and check the autoclave for the following alarms and it should be audio/visual:

1. minimum/ maximum sterilization temperature alarm,
2. no supply voltage/Power failure alarm,

3. no generator water alarm,
4. overload relay alarm,
5. no mains water alarm,
6. maximum generator water load time alarm,
7. temperature probe & Pressure Transducer fault alarm,
8. minimum/maximum chamber pressure alarm,
9. door opening residual chamber pressure alarm,
10. chamber vacuum tightness alarm,
11. maximum phase time alarm,
12. air in chamber alarm (calculated),
13. Maximum time steaming,
14. Maximum time vacuum,
15. Maximum time for heating,
16. maximum drying phase alarm.
17. Doors not properly closed alarm,
18. Door open during cycle alarm,

(h) Loading/Unloading system: Sterilizer should have the Internal trolley and External trolley for easy loading of the materials. (i) Cycle Documentation – Printer: The autoclave should be equipped with built in Ink type Printer/ non-fading Thermal Printer and also with a provision for alpha-numeric Laser printer which prints each cycle parameter performed by the sterilizer. The measured values of temperature and pressure should be printed at 30 sec time intervals and also for various phases of the sterilization process.

(j) Vacuum Pump: It should have a High vacuum system consisting of a multi-stage vacuum pump with a liquid ring that ensures removal of the air during the pre-vacuum stage with at least 15 kPa vacuum level and excellent drying during the post-vacuum stage. It should also have low water level alarm to protect it from dry run and should be equipped with overload protection relay.

(l) Available Cycles: The sterilizer should be designed to operate various programs. Apart from standard cycles, special cycle should be programmed by an authorized supervisor code only. Programs include:

1. Wrapped Instruments, Porous load 134°C.
2. Heat Sensitive material, rubber, plastic, porous load 121°C
3. Liquid Cycle-for sterilization of Liquids
4. Heavy load cycle

	<p>5. Bowie &amp; Dick test (7 kg), PCD test. 6. Leak test</p> <p>(n) Directives &amp; Standards: It should meet BIS/EN ISO / IEC directives and product should be BIS/European CE/US FDA Standards. Copy of certificate is to be attached.</p> <p>(o) Should pass a hollow load (A) test (Batch monitoring system).</p> <p>p) Steam Sterilizer should have provision for connecting a ¾” line terminating in the shut off valve, non-return valve, pressure relief valve steam riser, condensate drain and other essential accessories.</p> <p>q) should have at least 5 sterilizers working in India for the last three years. r) Water coming out should not be re used.</p> <p>s) It should have integrated degassing system.</p> <p>t) It should have an integrated discharge cooling device which would not discharge water of more than 70 degree C. The system should ensure that no liquid discharge should be of more than 70 deg C.</p>
<p>2.</p>	<p><b>HORIZONTAL DOUBLE DOOR AUTOCLAVE 840-1000 Litres (12-15 STU or more) WITH ACCESSORIES</b></p> <p>Fully automatic PLC controlled Horizontal Autoclave (Steam Sterilizer), with pre and post-vacuum treatment and with loading equipment.</p> <p>(a) Door: The sterilizer door should be pneumatically (Compressed Air)/Electrically operated double door with fully automatic vertical sliding movement along with door safety features. Door Safety Systems:</p> <ol style="list-style-type: none"> <li>1. Pressure sensor system should be available in the chamber to monitor the chamber pressure. Chamber should be completely depressurized before the door seal is retracted by vacuum.</li> <li>2. Door chamber should not be opened when chamber is pressurized.</li> <li>3. A mechanical safety edge should stop the door if it is obstructed while closing, thus protecting operator &amp; loading equipment.</li> <li>4. A Cycle should not start if the door is open or not properly locked.</li> <li>5. The door seal should be silicon gasket &amp; on commencement of the process the door gasket should be pressed against the rear face of the door by steam to ensure the door remains closed during the process.</li> <li>6. A Pressure Switch should be there to monitor the door gasket pressure whether it pressed against the door with right</li> </ol>

pressure during the entire process.

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Automatic Water feed system, 6) Low level and high level water cut off, 7) Automatic periodical self drain for the steam generator, 8) water level glass gauge inspection device visible on screen inspection device visible from service area, 9) The heating element should be made of Inconel /incolloy /international standard material and should be of sufficient capacity to make the sterilization process faster and it also should be differential protected, 10) It should also have the automatic blow down valve and degassing system for feeding water to steam generator.

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<p><b>3.</b></p>	<p><b>ETHYLENE OXIDE STERILIZER (ETO, 250L)</b></p> <p>I. The ETO gas sterilizer should be fully automatic type for sterilization of heat sensitive goods such as an aesthetic tubing and other plastic disposable materials etc.</p> <p>II. The sterilization chamber should be double walled, corrosion and gas resistant of suitable alloy.</p> <p>III. The inner surface should be smoothly finished to minimize gas deposits.</p> <p>IV. The chamber shall be insulated against heat emission and jacket shall be connected to warm water circulation arrangement.</p> <p>V. The sterilizer door shall have a quick release locking arrangement, with door opening to the sides.</p> <p>VI. Suitable safety interlocking arrangement shall be provided for the door so that the sterilization process does not start unless the door is properly locked in position and during the programme run it should not open.</p> <p>VII. The sterilizer shall be provided with suitable vacuum pump/blower and gas trap to separate and evacuate the gas.</p> <p>VIII. The ETO sterilizer should be able to operate for the minimum essential following cycles programmes:</p> <p>a) Sterilization cycle for heat sensitive objects that ensure temperature from 33-55degree C with subsequent aeration for protection of the operating personnel.</p> <p>b) Aeration cycle/programme to extract residual gas out of the sterilized objects after each sterilization cycle.</p>

	<p>c) Automatic chamber evacuation cycle with subsequent venting before releasing the door lock for opening, thereby prohibiting exposure of the operating personnel by gas dissolving from the chamber walls during shutdown period.</p> <p>d) Gas disposal arrangement/catalytic converter.</p> <p>IX) Capacity: Should have capacity of <b>250 L</b></p> <p>X) The ETO sterilizer shall be equipped with the following accessories:</p> <p>a) <b>Sterilization basket of suitable size: 1 No.</b></p> <p>b) <b>EO gas cartridges: 25 No.</b></p> <p>c) <b>Packaging material with chemical indicator of all sizes, 1 roll each. (Minimum 3 rolls)</b></p> <p>XI) Gas cartridges should be puncturing system/activating system</p> <p>XII). Technical Data</p> <p>a) Sterilization Gas: Ethylene Oxide</p> <p>b) Sterilization method: Cold sterilization of heat sensitive material</p> <p>c) Operating temp. Range: 33 to 55 C</p> <p>d) No. of doors: One Should be provided with Compressor if required.</p>
<p><b>4.</b></p>	<p><b>DOUBLE DOOR WASHER DISINFECTOR 250-300 Litre (10-12 DIN Trays) WITH ACCESSORIES</b></p> <p>1. The washer disinfectant shall be suitable for cleaning and disinfection of surgical instruments/goods. The process shall include pre wash, detergent wash and hot water disinfection, rinse and drying cycles.</p> <p>2. The unit shall be suitable for electrical operation and would be complete with two water circulation pump of minimum 800-1200 litre/minute capacity, two dryer blower pump, necessary valves &amp; fittings.</p> <p>3. Washer Disinfectant Management System: The Management of Washer Disinfectant for cycle process and various other menus and functions should be done through at least a 5” to 8”inch monochrome/multi coloured touch screen display with the password protection ensures control of the operator and the Programmable Logic Controller(Omron PLC). The system should consists of double PLC devices, one to control the main parameters (PLC) and the other to verify the functionality and safety. The programmable electronic controller should be of a well-known company, highly reliable and fitted with a number of safety systems to ensure the Washer/Disinfectant works properly.</p> <p>4. Chamber Capacity: Volume should be 300 L. Should supply 15 Nos of standard DIN trays. The chamber should be made of S.S. AISI 304L/316L quality with electro polished washed surfaces. The chamber edges should not have the pockets &amp; folds so as to avoid bacterial growth. The wash chamber should also be fitted with illuminated light for visibility of the washing process.</p> <p>5. Washer should have following features: a) Should have built-In Boiler for pre-heating the water thus reducing the</p>

cycle time by 45%. It should also have the provision to work with Hospital central Steam Network and option of combining both b) It should use Pneumatic valves since they are durable with long life. c) Cleansable spray arms should be located at the top and bottom of the chamber. d) Wash carts should be equipped with cleansable spray arms between each shelf so as to facilitate water to reach all the surfaces which needs to be cleaned. e) Injection wash carts should be automatically connected to water and drying air in order to clean and dry the inside of the tubular instrument. f) Working Temp should be 60°C-93° C. Should have Pre Programmed cycles for instruments, micro-instruments, anesthesia instruments, containers etc., & variable cycle of parameters for the different utilities in Washing & Disinfection. At least 20 cycles and can be programmed with the assistance of touch screen display. g) The total thermal dissipation should not be more than 1300 watt. h) It should have two temperature probes for both water & air temperatures. i) It should have built-in water recovery device. j) It should have built-in drain cooling device. k) It should have access for maintenance from front only. l) The washer should be equipped with independent temperature monitoring and validation test port. m) It should have provision for barcode tracking/RFID system, remote maintenance system, networking management system, remote connection via RS232 serial plug and data interface RS232 should be available. n) The noise level should be < 65dB. o) Washer should have a built in Fine filter/self-cleaning debris filter. p) Washer should be equipped with audible alarm that alerts if error code occurs. q) Double doors should be made of special tempered & Heat resistant glass contained in a frame of AISI 304L/316L stainless steel. Closure of the doors should be carried out automatically either by Pneumatically driven, Vertical sliding movement with interlocked doors to avoid simultaneous operation.

l) The washer should have 3/4dosing pump (Detergent, Neutralizer, Disinfectant, and/or Lubrication) for process chemicals, instrument lubricants/ enzymatic cleaners, It should be able to measure & display the dosing volume of each chemical in ml and there should be a dedicated compartment with door to keep the chemical canisters (at least 4 nos).

6. The washer should perform: a) Pre-rinses with cold water. b) Main washes with hot water (60C) and detergent. c) Final rinse with water (55C) d) Disinfection with hot water (93 C) e) Should have Thermal & Chemo-Thermal Washing. Should have validity of the cycle through A0 calculation.

7. The unit should also have an inbuilt-Ink type Printer/non fadeable Ink type Thermal Printer with provision of interface with External printer.

8. The washer disinfectant shall be supplied with universal rack, 5 level racks for instrument tray, rack for anesthesia instruments, full size instrument tray as well as stop valves, anti-suction device and plastic water trap manufactured by the manufacturer of the equipment only or unrestricted air gaps as per EN1717category 5 type AA standards.

9. Should ensure essential washing accessories.

10. Standards & Norms:

11. The device should be a medical device according to Directive BIS/93/42 EEC concerning medical devices. Should be

	<p>US FDA/European CE certified. Manufacturer should be BIS/ISO 13485:2003, ANSI/AAMIST-15883-2 for thermal infection ISO15883-2 and ISO9001. Bidder/Manufacturer should also be ISO9001 and ISO13485 certified.</p> <p>12. Safety Features: The washer disinfector should be provided with the following safety devices: a) device to block the door from opening during the execution of the cycle b) device to block the door from opening when there electric resistors are operating c) device for detecting overheating while running during the washing and disinfecting phase d) device for detecting temperature abnormalities during the washing and disinfecting phase e) device to block the emission of water in the chamber if the door is open or not perfectly closed f) device that inhibits simultaneous opening of the doors g) breakers for the protection of the motors h) fuse and electrical protection on the auxiliary electrical system i) emergency stop button of all of the machine functions (reset in stand-by with rotation and start-up of the cycle functioning with new start command) j) sensor system for the anti-flood level k) differential protection for the electrical system for hot water production (resistance) l) safety thermostat for the resistance of the wash chamber m) safety thermostat for the resistance of the air heating system n) safety thermostat for the pre-heater resistors o) safety thermostat for the washer chamber resistors p) safety thermostat for the air heating system resistors q) device for detecting the internal rack and choosing the relative cycle r) All Electrical components &amp; Panels should be IP55 protected and control panel should be IP22 protected.</p> <p>13. Should have digital display of temperature, time, pressure, cycle time &amp; elapsed time for ease of operation of the cycle and display calculation of A0 values.</p> <p>14. ALARMS: It should be with audio-visual alarms in case of Error(s). All Alarms should be with full explanatory text messages on the Display and the system should perform a self-diagnosis and check the autoclave for all the alarms and these alarms are displayed &amp; printed.</p> <p>15. It also should perform a self-diagnosis and check for the following alarms: a) No supply voltage alarm b) minimum/maximum washing temperature alarm c) No water supply (hot, cold &amp; treated water) alarm d) Overload relay alarm for motors/pumps e) temperature probe fault alarm f) maximum phase time alarm (for all the phases) g) tank temperature probes differences of readings alarm.</p>
<p><b>5.</b></p>	<p><b>ULTRASONIC CLEANER (40 - 45 L)</b></p> <ol style="list-style-type: none"> <li>1. The units should be a compact bench top model, with a built-in tank manufactured from high quality AISI(316/304) stainless steel and a solid-state generator that sends Ultrasonic (25- 40 KHz) impulses through wash water containing detergent and electrical heating; microprocessor controlled display with memory time and temperature functions. It should have digital read out timer and temperature setting (temperature adjustable from 25- 75 deg C or more) monitoring.</li> <li>2. The electrical energy should be transformed into sound waves by transducers, fixed to the bottom of the tank.</li> </ol>

	<ol style="list-style-type: none"> <li>3. The tank should be made of solid stainless steel AISI 304/316.</li> <li>4. The ultrasonic cleaner should have a display and control which could be easily seen and placed above any liquid for safety and reliability.</li> <li>5. It should have digital read out timer and temperature setting (temperature adjustable from 30 to 90 °C) monitoring.</li> <li>6. Capacity should be 40LTRS.</li> <li>7. Should work on 230V, 50 Hz AC Supply.</li> <li>8. Ultrasonic cleaner should be BIS/European CE /US FDA certified.</li> <li>9. Ultrasonic cleaner should be supplied with Wire mesh basket of suitable size &amp; Stainless-steel lid.</li> <li>10. It should be according to EN 61010 11. It should have Sweep &amp; Degassing System.</li> </ol>
<p><b>6.</b></p>	<p><b>AIR COMPRESSOR</b></p> <p>Rotary/Reciprocating Air Compressor coupled with 7.5hp electric motor. Make-ELGI/FUJI/INGERSOLRAND/ATLAS COPCO.</p> <p>It should have digital read out timer and temperature setting (temperature adjustable from 25 - 75°C or more) monitoring.</p>
<p><b>7.</b></p>	<p><b>HEAT SEALING MACHINE</b></p> <ol style="list-style-type: none"> <li>1. Rotary heat sealers should provide validated sealing of sterilization bags and clear-view pouches (paper/plastic laminate).</li> <li>2. It should be microprocessor-controlled.</li> <li>3. The rotary heat sealer should give documentation of process parameters via an integrated printer and could be integrated with documentation system.</li> <li>4. The ergonomically design should be tilted forward for increased user convenience and space saving installation.</li> <li>5. The sealer housing should be powder-coated and the control panel is of the flat-membrane type, for easy cleaning.</li> <li>6. It should be operationally simple. When a bag is fed into one side of the machine, the machine should start automatically or by pushing a button, moving the bag through the machine, and applying pressure and heat to form a perfect seal.</li> <li>7. The warm-up time should not exceed 30 seconds, and the feed speed should be approx. 10 m/min.</li> <li>8. The temperature should be adjustable from 50–200°C with a tolerance of 1% of the set value.</li> <li>9. It should be regulated by a heating element that is highly sensitive to temperature fluctuations, assuring even</li> </ol>

	<p>temperature and perfect seals.</p> <p>10. It should offer a number of additional features, including:</p> <ul style="list-style-type: none"> <li>a) Automatic start-up</li> <li>b) Reverse feed function in case an instrument accidentally enters the sealing area</li> <li>c) Energy-saving stand-by mode</li> <li>d) Pre-set temperatures</li> <li>e) Re-settable counter function</li> </ul> <p>11. Rotary heat sealers come with a port and cable for connection of the sealer to a PC and printer, enabling monitoring and documentation of the entire process.</p> <p>12. Should have a protection mechanism against overheating and start prevention at temperature deviations outside +/- 5° C tolerance.</p> <p>13. Rotary heat sealer should be BIS/CE certified.</p>
<b>8.</b>	<p><b>SPRAY GUN RINSER</b></p> <ul style="list-style-type: none"> <li>1. Spray gun rinse unit should be designed for connection to water or compressed air, to use for assisted cleaning of pipettes, catheters, cannulas, syringes etc.</li> <li>2. The spray-gun should include tubing and different tips and nozzles for the various cleaning purposes, like <ul style="list-style-type: none"> <li>a) Syringes and cannulas with Record cone</li> <li>b) Measuring and blood pipettes</li> <li>c) Catheters and small pipes</li> <li>d) Drainage tubing</li> <li>e) Syringes and cannulas with Lure cone</li> <li>f) Spray jet for rapid instrument cleaning</li> <li>g) Bottles and Erlenmeyer flasks</li> <li>h) Water jet pumps for suction cleaning</li> <li>i) All appliances are stored within easy reach on a special wall-mounted rack (included).</li> </ul> </li> <li>3. A special wall-mounted rack should be a part of standard supply to store all appliances within easy reach.</li> <li>4. All tips should be able to get easily locked to the spray gun by a safety cone.</li> <li>5. The gun grip is heat-insulated. The water/air pressure is released, regulated and fully controlled by the spray-gun trigger (adapted to a 1/2" connection).</li> <li>6. Bidder should provide complete details of sets of standard and optional adapters, nozzles and accessories</li> </ul>
<b>9.</b>	<p><b>DRYING CABINET (275L)</b></p>

	<ol style="list-style-type: none"> <li>1. Should be automatic in operation</li> <li>2. Inner chamber should be made up of stainless steel and outer chamber should be of SS sheets</li> <li>3. Should have heaters of minimum 2.0 KW</li> <li>4. There should be provision for setting the drying temperature and drying time.</li> <li>5. Capacity-<b>275L</b></li> </ol>
<b>10.</b>	<p><b>GAUZE CUTTING MACHINE</b></p> <ol style="list-style-type: none"> <li>1. Should be useful in cutting thickest of cotton gauze material</li> <li>2. Should consist of a cutting unit and a knife sharpening unit</li> <li>3. Blade size should be 200 mm.</li> <li>4. Cutting Capacity should be 165 mm.</li> <li>5. Should work on 230V, 50 Hz power supply.</li> </ol>
<b>11.</b>	<p><b>MULTI-ROLL TAPE DISPENSER</b></p> <ol style="list-style-type: none"> <li>1. Size (LxWxH) 2600x600x1200mm</li> <li>2. This dispenser for sterilizer tape should hold two reels of tape.</li> <li>3. The heavy-duty bottom plate should be fitted with anti-slip rubber to prevent the dispenser from slipping when tape is torn off.</li> <li>4. Should be made of high-quality coated steel for long use.</li> </ol>
<b>12.</b>	<p><b>DOCUMENTATION LABELLER</b></p> <p>The labeller should be 3–line for printing the following information</p> <ol style="list-style-type: none"> <li>a) Person responsible for sterilization</li> <li>b) Load number</li> <li>c) Packaging content</li> <li>d) Sterilizer number</li> <li>e) Production date</li> <li>f) Expiry date</li> </ol> <p>Should have 24 rolls of 750 3-line labels with double adhesives (Steam and ETO) indicator</p>
<b>13.</b>	<p><b>WASH STATIONS WITH 2 SINKS FOR DIRTY AREA</b></p> <ol style="list-style-type: none"> <li>1. Size Approx. (L x W x H): 2000x750x850 mm</li> </ol>



	<ol style="list-style-type: none"> <li>2. The worktop should be made of solid, bright-polished minimum sheet thickness of 1.5 mm stainless steel (304) to withstand heavy-duty work with wet instrument.</li> <li>3. Designed with an integrated 10 mm high edge at the front and sides, and a 60 mm high edge (splash back) at the rear</li> <li>4. The front and side edges are reinforced and widened to 49 mm. Edges are welded together and polished at the corners.</li> <li>5. The worktop should slope to the sink, and reinforced by a full-length support frame.</li> <li>6. The support frame should be a complete assembly with the front, back and ends welded together at the corners.</li> <li>7. The worktop and support frame should be bonded together with double-adhesive tape of a special, age-resistant quality to give rigidity and noise abatement.</li> <li>8. The floor stand should be made of polished stainless steel.</li> <li>9. The table should be available with double sink units preferably at both ends of the table, all with a smooth, polished inside finish made of stainless steel (304) top</li> <li>10. Corners should be curved to a 65 mm radius for easy cleaning.</li> <li>11. The bottom should slope to the drain.</li> <li>12. Sink units should be of sizes that allow processing of the large modular instrument trays</li> <li>13. Sink units should have 650 mm wide and 900 mm high (adjustable <math>\pm 25</math> mm).</li> <li>14. The legs should be able to provide strong support and hold to the entire unit securely.</li> <li>15. The sink should include a drain valve, removable strainer, manually operated drain-valve, overflow drainpipe and water trap. The table also includes a mixing faucet with swivel spout, for cold and hot water connection.</li> <li>16. Should be delivered ready for assembly.</li> </ol>
<p><b>14.</b></p>	<p><b>SS WORK TABLE</b></p> <ol style="list-style-type: none"> <li>1. Size approx. (L x W x H):1200x650x900 mm approximately.</li> <li>2. Stainless steel tables specially designed for working with dry goods and for general purpose prestorage.</li> <li>3. The work tables should have a rigid stainless steel construction which is easy to clean and without sharp edges or corners.</li> <li>4. The table should be ergonomically worked up, should have easy to clean robust matt-finished (to reduce reflection of light from the surface) with minimum sheet thickness of 1.5 mm stainless steel (304) worktop/surface to withstand and carry out heavy work comfortably, either sitting or standing.</li> <li>5. The edges along the front, back and sides should be reinforced and widened to 37 mm, giving a rigid construction.</li> <li>6. They are welded together and polished at all corners for good hygiene, as well as for the comfort and safety of the staff.</li> <li>7. The worktop should be supported by a complete assembly with full-length reinforcements along the front, back and ends, welded together at the corners.</li> </ol>

	<p>8. The worktop and support frame are bonded together with double-adhesive tape of a special, age resistant quality to give rigidity and noise abatement.</p> <p>9. The support frame has to be mounted on a solid, stable floor stand, made of polished stainless steel square tubing, with horizontal braces 300 mm above floor level. An adjustable 10 cm (<math>\pm</math> 25 mm) plastic foot, easy to clean, is mounted on each leg</p> <p>10. The provision is to be made for a sturdy 445 mm-wide stainless steel shelf (optional) can be mounted on the horizontal braces.</p> <p>11. Must be delivered ready for assembly</p> <p>12. All edges should be smooth and the rigid frame should be made up of minimum 1.5 mm sheet thickness stainless steel (304).</p> <p>13. There should be unobstructed access to the working space, since the only supports needed along the front of the table are the corner legs. This also facilitates cleaning of floors.</p>
<p><b>15.</b></p>	<p><b>CONTROL &amp; PACKING TABLE WITH TWO SHELVES FOR CLEAN AREA</b></p> <p>1. Size (LxWxH): 2000x1400 x 1400mm approximately.</p> <p>2. This table should be specially designed for sorting, inspection, functional control and packing of various sets for wards, clinics etc. and for surgical instrument sets in trays. The work could be done comfortably, either sitting or standing.</p> <p>3. The worktop should be made of Stainless steel material. All edges should be smooth. The extended width of the worktop should be designed to facilitate thorough inspection of instrument trays and allow the use of large wrapping material.</p> <p>4. The rigid frame is made of stainless steel (304).</p> <p>5. There should be unobstructed access to the working space, since the only supports needed along the front of the table are the corner legs. This also facilitates cleaning of floors.</p> <p>6. Should have double workspace. One workplace table should have 700 mm wide worktop and other workplace should have 1400 mm worktop.</p> <p>7. The table should include a two-shelf console, mounted on the worktop, for storage of packaging materials. The rigid supporting columns of the console include 3 electrical outlets.</p> <p>8. There should be a free space of 450 mm between the lower shelf and the worktop, and 150 mm between the two shelves.</p> <p>9. The table should have a drawer unit (both sides as double model) mounted under the worktop.</p> <p>10. Each drawer unit should be 400 mm wide and should include a drawer and a sliding plate.</p> <p>11. Fluorescent tube fittings (Inspection lamp) should be available. (Optional)</p>

<p><b>16.</b></p>	<p><b>WIRE STORAGE SHELF MODULE FOR DIRTY/CLEAN/ STERILE AREA</b></p> <ol style="list-style-type: none"> <li>1. Size (L x W x H): 1500x450x1900 mm approximately.</li> <li>2. Construction should be based on single free-standing shelf modules for storage of clean linen, instruments, and packing material or sterilized goods, including disposables.</li> <li>3. Moreover, two single modules can be placed back to back and combined as a double module unit.</li> <li>4. If two units are to be connected, 10 S-hooks should be supplied.</li> <li>5. The wire construction should allow good air circulation while permitting easy inspection of the goods.</li> <li>6. The wire shelves should be made of special heavy-duty steel (304), chromium-plated and surface treated with clear epoxy varnish to facilitate cleaning.</li> <li>7. The shelf unit should be easy to assemble on site and all parts should fit precisely.</li> <li>8. Shelves should be mounted by means of plastic clamps onto circular rigid posts, with the adjustable height within a range of about 50 mm. Each post should include a height adjustable foot.</li> <li>9. Each unit should include 5 shelves.</li> <li>10. The shelf unit should have optional Ø 125 mm castors for using as a mobile storage unit by replacing the foot with castors.</li> </ol>
<p><b>17.</b></p>	<p><b>PASS BOX</b></p> <ol style="list-style-type: none"> <li>1. Area : Dirty to Clean supply, ETO to Sterile supply &amp; Sterile Issue</li> <li>2. Size : 600x600x600mm, internal</li> <li>3. Should be made up of SS 304 sheets with double wall construction</li> <li>4. Should have UV lights for safe storage of components</li> <li>5. UV light should automatically switch off when any one door is opened</li> <li>6. Pass-through chamber should be based on electrical sliding hatches and should fit all types of standard racks.</li> <li>7. The chamber should consist of two electrically operated sliding hatches.</li> <li>8. Each hatch should have its own 24 DC motor that powers a drive belt and ensures smooth operation, as well as its own convenient push-button control to ensure that both hatches cannot be opened at the same time.</li> <li>9. The control should feature two modes of operation to open or close the hatch with a press button mechanism.</li> <li>10. Should have door interlocking to prevent simultaneous opening of both the doors</li> <li>11. Should have toughened glass panelling for easy visibility.</li> </ol>
<p><b>18.</b></p>	<p><b>CLOSED TRANSPORT TROLLEY FROM STERILE STORE TO OT</b></p> <ol style="list-style-type: none"> <li>1. Size: 1400x750x1260 mm (L x W x H) (External) approximately.</li> </ol>

	<p>2. A Closed Transport trolley is used for sterile goods handling, for which higher protection than normal dust protection is required, e.g. short transports between hospital buildings. Suitable for handling baskets or containers with a total capacity of 9 STU (1 STU = 600 x 300 x 300 mm) on three solid, removable shelves (3 x 3 STU).</p> <p>3. Trolley should be fitted with large stainless steel wheels (Ø 160 mm) for easier manoeuvrability.</p> <p>4. Should have two fixed and two swivel wheels with brakes.</p> <p>5. Should be of fully welded stainless steel construction (minimum 18 gauges, 304).</p> <p>6. The doors should open 270° for easy access and cleaning.</p> <p>7. Trolley should have lockable doors and should include handlebars.</p>
<b>19.</b>	<p><b>TABLE TROLLEY FOR DIRTY/CLEAN /STERILE AREA</b></p> <p>1. Size: 1080x550x800 mm approximately.</p> <p>2. The table trolley is made of all-welded medical grade stainless steel tubing.</p> <p>3. The trolley should have handlebars.</p> <p>4. The solid top and bottom shelves are made of heavy gauge stainless steel (304) with a ground and polished finish, and with a 12 mm raised edge all around.</p> <p>5. The lower shelf is 300 mm above floor level. There are protective buffer rollers on all four corners.</p> <p>6. The table trolley has 4 swivel wheels, mounted in ball bearings, for easy handling even in narrow passages.</p>
<b>20.</b>	<p><b>MODULAR STERILIZING BASKETS BIG</b></p> <p>1. Size: 585x395x195 or 600 x 300 x 290 mm approximately.</p> <p>2. Area: Various movement</p> <p>3. It should be modular design with standard sizes and high precision and should be designed for sterilizing / processing as well as easy handling and management of the supply, storage and distribution of re-circulated sterilized goods.</p> <p>4. It should be self-drying after disinfection in hot water (min.+85°C)</p> <p>5. It should be sturdy, jig-welded trays maintain their size and shape even if handled carelessly.</p> <p>6. It should be both nest able and stackable There should be special wire support to help making baskets both stackable (when the supports are folded into the basket) and nest able (when the supports are folded out)</p> <p>7. The top frame should be designed such that it should serve as a handle grip for easy carrying even when heavily loaded.</p> <p>8. There should be no sharp edges or wires.</p> <p>9. The surfaces should be smooth to assure easy cleaning in a washer-disinfector.</p> <p>10. The baskets should be made of electro-polishes heavy-duty stainless steel (304) and should have a rigid bottom frame that gives space for airing between goods and work surfaces and allow use on roller belt and chain conveyors.</p>

	11. It should be designed and manufactured in accordance with high quality specifications to assure long lifetime.
<b>21.</b>	<p><b>MODULAR STERILIZING BASKETS MEDIUM</b></p> <ol style="list-style-type: none"> <li>1. Size : 585x395x100 or 600 x 300 x 290 mm approximately.</li> <li>2. Area : Various movement</li> <li>3. It should be modular design with standard sizes and high precision and should be designed for sterilizing / processing as well as easy handling and management of the supply, storage and distribution of re-circulated sterilized goods.</li> <li>4. It should be self-drying after disinfection in hot water (min.+85°C)</li> <li>5. It should be sturdy, jig-welded trays maintain their size and shape even if handled carelessly.</li> <li>6. It should be both nest able and stackable There should be special wire support to help making baskets both stackable (when the supports are folded into the basket) and nest able (when the supports are folded out)</li> <li>7. The top frame should be designed such that it should serve as a handle grip for easy carrying even when heavily loaded.</li> <li>8. There should be no sharp edges or wires.</li> <li>9. The surfaces should be smooth to assure easy cleaning in a washer-disinfector.</li> <li>10. The baskets should be made of electro-polishes heavy-duty stainless steel (304) and should have a rigid bottom frame that gives space for airing between goods and work surfaces and allow use on roller belt and chain conveyors.</li> <li>11. It should be designed and manufactured in accordance with high quality specifications to assure long lifetime.</li> </ol>
<b>22.</b>	<p><b>BASKET RACK</b></p> <ol style="list-style-type: none"> <li>1. Should be suitable for keeping 20 Baskets</li> <li>2. Should be mounted on Bullet feet legs</li> <li>3. Should be made up of stainless steel.</li> <li>4. Should be provided with handle for easy transport.</li> </ol>
<b>23.</b>	<p><b>STORAGE RACK</b></p> <p>Size - 1830X535X1830 5 shelves; Made of Stainless Steel-AISI-304, Finished with Polishing with bullet feet</p>
<b>24.</b>	<p><b>STAFF CHAIR</b></p> <ol style="list-style-type: none"> <li>1. Should be medium Back chair</li> </ol>

	<ol style="list-style-type: none"> <li>2. Should rest on high quality 50mm castors on 4 legs with cross reinforcement for sides with arm rest and foot stumps of PVC</li> <li>3. Should have seamlessly upholstered seat and backrest, washable antimicrobial with poly foam cushion.</li> <li>4. Colour of base should be black.</li> <li>5. Should be height adjustable, broad, padded.</li> <li>6. Should have upholstered arm rests and comfortable back rest.</li> </ol>
<b>25.</b>	<p><b>LAB STOOL WITHOUT BACK REST (SS-304)</b></p> <ol style="list-style-type: none"> <li>1. Should have stainless Steel top</li> <li>2. Should be height adjustable from 450mm to 680 mm, through mild steel threaded screws</li> <li>3. Should have four-legged base made of 25mm steel tube mounted on rubber shoes.</li> <li>4. Should have Stainless steel ring for footrest.</li> <li>5. Should be pre-treated Epoxy powder coated frame work.</li> </ol>
<b>26.</b>	<p><b>STORAGE CUPBOARD</b></p> <ol style="list-style-type: none"> <li>1. Should have size 500 mm L x 450 mm H x 400 mm depth approximately.</li> <li>2. Material should be high quality, cold rolled, close annealed (CRCA) steel.</li> <li>3. Should be provided with lockable doors</li> </ol>
<b>27.</b>	<p><b>WASTE BIN PEDAL OPERATED-SS</b></p> <ol style="list-style-type: none"> <li>1. Should be made up of high-quality stainless steel.</li> <li>2. Should have minimum capacity of 5 liters.</li> <li>3. The covering lid should be openable by pressing the plate attached to the bottom.</li> </ol>
<b>28.</b>	<p><b>CHANGE LOCKER -4 COMPARTMENTS</b></p> <ol style="list-style-type: none"> <li>1. Change locker should have 4 compartments.</li> <li>2. Should have 2 lockers at bottom and 2 at top.</li> <li>3. Size of each compartment should be 20cm W x 80cm H x 45 cm D.</li> <li>4. Should be of MS</li> <li>5. Should be pre-treated and epoxy powder coated.</li> </ol>
<b>29.</b>	<p><b>VISITORS CHAIR</b></p> <ol style="list-style-type: none"> <li>1. Visitor's chair should be ergonomically designed, sturdy and of good quality.</li> </ol>

	<ol style="list-style-type: none"> <li>2. Should have comfortable seating and low back support.</li> <li>3. Should have padded seats with anti-microbial upholstery of leather finish.</li> <li>4. Should be with arm rests and fixed height.</li> <li>5. Should have frame of MS tubing, multiple pre-treated and finished with epoxy powder coating.</li> </ol>
<b>30.</b>	<p><b>OPEN STORAGE RACK</b></p> <ol style="list-style-type: none"> <li>1. Open racks should be made of stainless steel -304</li> <li>2. Should be highly durable, and should have narrow holes for allowing ventilation.</li> <li>3. Should be water resistant, disinfectant resistant and rust proof.</li> <li>4. Should be provided with lockable castors</li> <li>5. Approx. Dimensions: 180cm (H) x45 cm (W) x150cm (L) approximately.</li> </ol>
<b>31.</b>	<p><b>OFFICE TABLE</b></p> <ol style="list-style-type: none"> <li>1. Should be wooden executive office table.</li> <li>2. Should be high quality, aesthetic and ergonomic design.</li> <li>3. Top should be made of pre laminated, of high-density pressed wood, properly treated.</li> <li>4. Should be flame and water retardant. Lipped on all sides</li> <li>5. Should have an option for placing keyboard of computer</li> <li>6. Should have one shelf on left side</li> <li>7. Size should be (approx.):1200 mm(L)X800 mm(W)x750 mm(H)</li> </ol>
<b>32.</b>	<p><b>SHOE RACK</b></p> <ol style="list-style-type: none"> <li>1. Shoe rack to keep 12 pair of shoes.</li> <li>2. Should be made up of MS powder coated rack with 4 tiers.</li> <li>3. Should have length, breadth and depth to keeps shoes of all standard sizes.</li> </ol>
<b>33.</b>	<p><b>PAPER DISPENSING TROLLEY</b></p> <ol style="list-style-type: none"> <li>1. Should be movable trolley for storing four different sizes of sterilizing wrapping paper sheets should be made of stainless-steel tube.</li> <li>2. Should have four ball bearing rubber wheels, of which two wheels should be equipped with brakes.</li> </ol>
<b>34.</b>	<p><b>IN ADDITION TO THE ABOVE, FOLLOWING TURNKEY WORKS FOR INSTALLATION AND COMMISSIONING OF CSSD ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR:</b></p>

The works includes all modifications/Patch work to the built-up space provided at the hospital site including Installation of Equipment, civil works, electrical works, plumbing works, furniture and other related works of the CSSD and TSSUs required for the smooth and efficient functioning of the center. These works shall comply with all relevant safety and standards guidelines. The vendor is fully responsible for installation and commissioning of all equipment. The work includes demolition of unwanted walls. Construction of Partition wall for installation of Double door Autoclaves in CSSD. Supply of requisite materials and connection for electrical supply, plumbing line, drain line connection and exhaust of gases/steam inside CSSD and TSSUs. The bidders should include works to cover all the deficiencies/incomplete parts for completion of CSSD. They should make/complete all patch works/ reconstruction/ repair/ replacement works on Civil/ Electrical/ Mechanical/ Ventilation/PHE and any other works necessary for completion of CSSD.

**Floor-**

Packing area-Vitrified tiles

Wash area- Vitrified tiles

Sterile area- 2mm Epoxy with coving and 100 mm skirting

**False ceiling-**

Metallic grid type

**Wall-**

Vitrified tile upto False Ceiling from FFL at Packing area and Wash area. Epoxy/PU/Antibacterial paint upto False Ceiling from FFL.

**Light-**

LED 2' x 2' IP65 cleanroom light fitting at Sterile area

LED 2' x 2' for balance area Single point supply to CSSD for Electrical power supply and water supply and a drainage point will be provided at CSSD by the Civil contractor.

**Fire-fighting-**

FDA as per the norms to be provided in the Sterile area FDA, Sprinkler and portable fire extinguisher shall be provided in Packing area and Wash area.

**Air Conditioning-**

Aluminium ducting inside Sterile area with terminal HEPA filter at the supply air terminals. And GI ducting for Packing area and Wash area to be provided for supply and return air. Ducting to and from AHU to be provided by the HVAC contractor at CSSD.

**Pre-requisites** as water and electricity may be provided on chargeable basis if available at site.



## **TECHNICAL SPECIFICATIONS OF MEDICAL GAS PIPELINE SYSTEM**

**Scope of Work :** Supply, Installation, Testing, Commissioning of Medical Gas Pipeline System on turnkey basis including services of Defect liability period as per contract.

### **1.0 OXYGEN SYSTEM**

#### **1.1 Oxygen Manifold: Main with Middle Frames**

Oxygen Manifold: Emergency with Middle Frames

The Manifold has been configured for 2 x 16 nos. of Oxygen Cylinders and is suitable to withstand a pressure of 145 Kg/cm<sup>2</sup>, along with high-pressure copper annealed tail pipes with end Brass adapter suitable for Oxygen Cylinders and manifold.

Top frame comprising of high pressure copper pipes of size 1/2" NB x 15swg 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" NB x 15 swg. The design of middle and bottom frames has been provided to fit both round and flat bottom cylinders safely. The manifold has been tested (hydraulically) at 3500 psig and necessary test certificates accompany along with the supply.

#### **1.2 AUTOMATIC OXYGEN CONTROL PANEL WITH CHANGEVER ALARM**

- a) The Oxygen Control Panel shall be of microprocessor based and preferably Digital Display/Analogue Type. Pressure reduction shall be in two stages. Panel shall be integrated with pressure gauges inside panel on downstream of pressure regulator. Panel shall be fitted with standby line regulator. Line regulators shall have pressure relief mechanism for testing and servicing purpose.
- b) Panel shall be Fully Automatic and shall switch over from "Bank in Use" to 'Reserve Bank' without fluctuation in delivery line pressure and without the need of external electrical power. After the switch-over, the "Reserve Bank" shall become the "Bank in Use" and the "Bank in Use" shall become the "Reserve Bank". The Control Panel will be powered by a microprocessor.
- c) A Microprocessor circuit board assembly shall provide a relay output to give indication when or just before the manifold switches from one bank of cylinders to another. The switch over shall be mechanically controlled, not electrically.
- d) To avoid excess pressure being supplied to the distribution system, a pneumatically relief valve for the line regulator shall be incorporated. An intermediate pressure relief valve shall be installed between the high-pressure regulators and the line delivery regulators.
- e) The control panel incorporates six coloured LED's, three for the Left Bank and three for the Right Bank: Green for Bank in use, Amber for Bank ready and Red

for Bank empty. Both the Left and Right bank pressures and the main line pressure should be displayed on the front door of the cabinet by means of LED's. All pressure transducers, micro switches, and display LED's shall be pre-wired to an internal microprocessor circuit board.

- f) All components inside the Control Panel like Pressure Regulators, piping and control switching equipment shall be cleaned for Oxygen Service and installed inside the cabinet to minimize tampering with the regulators or switch settings.
- g) The Control Panel should be made to provide Heavy Duty with a Delivery Flow Capacity of over **1500 LPM at 55-60 psig**.

1.3 **Emergency Oxygen system** has been configured with 10-cylinder oxygen manifold along with a High Pressure Regulator which will be mounted on the Emergency Manifold System for reducing the cylinder pressure suitable to the line pressure.

Note- To reduce the risk of medical oxygen system from contamination due to ignition of fluorinated polymer materials, only Non Halogenated Polymer materials should be used in the Non Return Valves and high pressure side of the pressure regulator of the manifold system.

## 2.0 **NITROUS OXIDE SYSTEM**

2.1 Nitrous Oxide Manifold: Main with Middle Frames  
Nitrous Manifold: Emergency with Middle Frames

Nitrous Oxide Manifold for 4 + 4 nos. of cylinders is suitable to withstand a pressure of 145 Kg/cm<sup>2</sup>, along with high-pressure copper annealed tail pipes with end Brass adapter suitable for N<sub>2</sub>O Cylinders and manifold.

Top frame comprising of high pressure copper pipes of size 1/2" NB x 15swg 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" NB x 15 Swg. The design of middle frames has been provided to fit both round and flat bottom cylinders safely. The manifold has been tested (hydraulically) at 3500 psig and necessary test certificates is accompany along with the supply.

## 2.2 **AUTOMATIC NITROUS OXIDE CONTROL PANEL WITH CHANGEOVER ALARM**

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

- Panel shall be Fully Automatic and shall switch over from “Bank in Use” to ‘Reserve Bank’ without fluctuation in delivery line pressure and without the need of external electrical power. After the switch-over, the “Reserve Bank” shall become the “Bank in Use” and the “Bank in Use” shall become the “Reserve Bank”. The Control Panel will be powered by a microprocessor.
- A Microprocessor circuit board assembly shall provide a relay output to give indication when or just before the manifold switches from one bank of cylinders to another. The switch over shall be mechanically controlled, not electrically.
- To avoid excess pressure being supplied to the distribution system, a pneumatically relief valve for the line regulator shall be incorporated. An intermediate pressure relief valve shall be installed between the high-pressure regulators and the line delivery regulators.
- The control panel incorporates six coloured LED’s, three for the Left Bank and three for the Right Bank: Green for Bank in use, Amber for Bank ready and Red for Bank empty. Both the Left and Right bank pressures and the main line pressure should be displayed on the front door of the cabinet by means of LED's. All pressure transducers, micro switches, and display LED’s shall be pre-wired to an internal microprocessor circuit board.
- All components inside the Control Panel like Pressure Regulators, piping and control switching equipment shall be cleaned for Nitrous Oxide Service and installed inside the cabinet to minimize tampering with the regulators or switch settings.
- The Control Panel will have heaters to prevent ice formation on the regulators at high flow rates.
- The Control Panel should be made to provide Heavy Duty with a Flow Capacity of over **500 Lpm at 55-60 psig.**

2.3 A High Pressure Regulator will be mounted on the single cylinder **Emergency Manifold System** for reducing the cylinder pressure suitable to the line pressure.

### 3.0 CARBON DI OXIDE SYSTEM

#### 3.1 Carbon di Oxide Manifold: Main with Middle Frames

Carbon di Oxide Manifold: Emergency with Middle Frames

The Manifold has been configured for 2 x 2 nos. of Carbon di Oxide Cylinders and is suitable to withstand a pressure of 145 Kg/cm<sup>2</sup>, along with high-pressure copper annealed tail pipes with end Brass adapter suitable for Carbon di Oxide Cylinders and manifold.

Top frame comprising of high pressure copper pipes of size 1/2” NB x 15swg 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" NB x 15 Swg. The design of middle and bottom frames has been provided to fit both round and flat bottom cylinders safely. The manifold has been tested (hydraulically) at 3500 psig and necessary test certificates accompany along with the supply.

### 3.2 **AUTOMATIC CARBON DI OXIDE CONTROL PANEL WITH CHANGEOVER ALARM**

- a) The Carbon di Oxide Control Panel shall be of microprocessor based and preferably Digital Display/Analogue Type. Pressure reduction shall be in two stages. Panel shall be integrated with pressure gauges inside panel on downstream of pressure regulator. Panel shall be fitted with standby line regulator. Line regulators shall have pressure relief mechanism for testing and servicing purpose.
- b) Panel shall be Fully Automatic and shall switch over from "Bank in Use" to 'Reserve Bank' without fluctuation in delivery line pressure and without the need of external electrical power. After the switch-over, the "Reserve Bank" shall become the "Bank in Use" and the "Bank in Use" shall become the "Reserve Bank". The Control Panel will be powered by a microprocessor.
- c) A Microprocessor circuit board assembly shall provide a relay output to give indication when or just before the manifold switches from one bank of cylinders to another. The switch over shall be mechanically controlled, not electrically.
- d) To avoid excess pressure being supplied to the distribution system, a pneumatically relief valve for the line regulator shall be incorporated. An intermediate pressure relief valve shall be installed between the high-pressure regulators and the line delivery regulators.
- e) The control panel incorporates six coloured LED's, three for the Left Bank and three for the Right Bank: Green for Bank in use, Amber for Bank ready and Red for Bank empty. Both the Left and Right bank pressures and the main line pressure should be displayed on the front door of the cabinet by means of LED's. All pressure transducers, micro switches, and display LED's shall be pre-wired to an internal microprocessor circuit board.
- f) All components inside the Control Panel like Pressure Regulators, piping and control switching equipment shall be cleaned for Carbon di Oxide Service and installed inside the cabinet to minimize tampering with the regulators or switch settings.
- g) The Control Panel should be made to provide Heavy Duty with a Delivery Flow Capacity of over **500 LPM at 55-60 psig.**

- 3.3 Emergency Carbon di Oxide system has been configured with 2-cylinder Carbon di Oxide manifold along with a High Pressure Regulator which will be mounted on the Emergency Manifold System for reducing the cylinder pressure suitable to the line pressure.

## 4.0 COMPRESSED AIR SYSTEM

### 4.1 Compressed Air System

Medical compressed air system of minimum **capacity 4500 LPM at 8-10 bar as primary and 1500 LPM as standby** of Oil-free, Air cooled, Scroll/Screw type Compressors and 2000 litres Receiver Tank and Filter, Non-Return Valve, Isolation Valves, Air Dryer and Pressure Reducing Station along with interconnecting piping to take care of the requirement of desired no. of air outlets.

#### **Type of Compressor :**

Air Cooled Oil Free Scroll/Screw type Compressors

#### **Air Dryer Type :**

Heatless Desiccant Type – 1 no. (Having capacity to take care of the hospital demand) suitable for above compressors.

#### **Pressure Reducing System :**

The System should have 2 nos. Pressure Regulators (one in working & one stand-by) to reduce air pressure 4.2 Kg./ cm<sup>2</sup> required for Medical Air pipeline.

4.2 Auto Drain for Air Receiver should be provided.

### 4.3 3-Stage Breathing Air Filters :

The breathing air filters has maximum contaminant removal efficiency with minimum pressure drop. The filtration system conform to breathing air filtration as per ISO 8573 Ch – I Standard.

## 5.0 VACUUM SYSTEM

### 5.1 Vacuum System

Vacuum system of Lubricated, Air-cooled, Rotary vane /Reciprocating Vacuum Pumps of **capacity 5000 LPM as primary and 2500 LPM as standby** with Receiver Tank, Filter, Non-Return Valve, Isolation Valves, Auto Switch Gear to set minimum & maximum operating vacuum and interconnecting piping to take care of the requirements of desired no. of vacuum outlets

### 5.2 Type of Vacuum Pumps :

Lubricated, Air-cooled Rotary vane/Reciprocating Vacuum Pumps

Each Vacuum Pump are complete with Base Plate, Belt Guard, V-Belts, Motor and Starter. The system is of Automatic Start and Stop Type. The Pumps are

connected to a common vertical receiver of 3000 Ltrs capacity. The receiver has a drain valve at the bottom.

#### **Vacuum Bacterial filtration:**

Medical Vacuum filters are used for removal of bacteria & other contamination from the suction side of vacuum pumps, preventing infection of pump and the atmosphere.

These elements are pleated construction giving a high surface area and long operational life. The efficiency exceeds the 0.005% penetration specified for infectious disease unit.- i.e. complete bacterial removal.

Element is fitted in an aluminum housing suitable for various capacities. These are internally protected against corrosion by an alocrom treatment. The inner & outer surfaces of the housing are epoxy coated. Complete assembly is fitted with a sterilisable drain flask with isolation valve for removal of liquid if any. Differential pressure indicators are provided to monitor the status of element.

### **6.0 GAS OUTLETS**

#### **Double Lock Outlet**

Outlets have been manufactured with a 165 mm length, Copper inlet pipe stub which is silver brazed to the outlet body. Body has been of one piece brass construction. For positive pressure gas services, the outlet has been equipped with a primary and secondary check valve and the secondary check valve has been rated at minimum 200 psi in the event the primary check valve is removed for maintenance.

The outlet assembly has separate colour coding for each service and accepts only corresponding gas specific adapters.

All outlets has been cleaned and de-greased for medical gas service, factory assembled and tested.

The medical gas outlets have been of quick connecting and wall mounted modular type.

### **7.0 COPPER PIPE**

Solid drawn, seamless, de-oxidized, non-arsenical, half-hard, tempered and de-greased **copper pipe** conforming to BSEN: 13348:2016.. All medical graded copper pipes are de-greased & delivered capped at both ends. The pipes are accompanied with manufacturers test certificate for the physical properties & chemical composition. Copper pipe also has third party inspection certificate from TUV/SGS/Lloyds.

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

## **INSTALLATION & TESTING**

Installation of piping is carried out with utmost cleanliness. Only pipes, fittings and valves which has been degreased and brought in polythene sealed bags has been used at site. Pipe fixing clamps has been of non ferrous or non-deteriorating plastic suitable for the diameter of the pipe.

All pipe joints have been made using flux less brazing method. All joints of copper to copper and are brazed by silver brazing filler material without flux.

Adequate supports have been provided while laying pipelines to ensure that the pipes do not sag. The spacing of supports not exceed 1.5 meter for any size of pipe. Suitable sleeves has been provided wherever pipes cross through walls / slabs. All pipe clamps has been non-reactive to copper.

After erection, the pipes has been 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 has been rectified and re-tested till the pressure in pipes stands for at least 24 hours.

All the piping system has been tested in the presence of the engineer or his authorized representative.

## **PAINTING**

All exposed pipes is has been painted with two coats of synthetic enamel paint and colour codification is has been as per IS : 2379 of 1963.

### **8.0 ISOLATION VALVES**

The **isolation valves** are Non-Lubricated Ball type, **suitable for oxygen service**. All valves has been pneumatically tested for twice the working pressure and **factory de-greased** for medical gas service before supply.

### **9.0 \_Valve Box Assembly :**

Valve Box are made of Powder Coated Aluminium/M.S. Material.  
Valve Box Assembly consist of the following :

- Lever operated quarter turn valve (i.e. 90 degree shut off ball valve- has been manufactured by ISO 9001 company and factory degreased) with brass body and chrome plated brass ball.
- Brass fittings (Nut, Nipples and extruded brass Adapter) KE Type Seat Brass Block for pressure gauge
- 2" Dial gauges (0 - 10 kg/cm<sup>2</sup>, 0 - 760mm Hg)
- Nylon Bush for copper pipes holding with the valve box
- Beeding for box lead
- Lockable cover with breakable glass so that during normal operation access has been by key. But during emergency operation, access by breaking the glass panel.

## 10.0 ALARM SYSTEM

### 10.1 The Master Alarm

Each Master Alarm should be modular in design and be fitted with required number of master alarm modules. The master alarms should be capable to monitor minimum 30-40 Point. Each point represents an alarm condition that the source equipment might have. When an alarm condition exists, a red light flashes and the audible alarm sounds. If several alarm conditions occur simultaneously, the most recent alarm light should flash, while the other alarm lights should remain lit. When an alarm condition is created, an audible alarm should be actuated. A dry contact module should be available to interface with a building management system. The box material should be of gauge steel of requisite thickness and equipped with mounting brackets. The alarm should have a digital display or as per standard. The emissions from alarms should conform with EMC standards or as per guideline of standard to be followed. Master alarm management system should be designed to display alarm conditions from the source supply units indicating the broad status of the source equipment and manifolds as well as the master distribution status from the source supplies. Depending on the alarm priority, a visual and audible alarm should be initiated to indicate an alarm condition. Each panel shall display and/or input up to 30-40 point alarms.

The master alarm must be able to monitor the following source alarm conditions.

- Oxygen Source Empty/Fault
- Oxygen Cylinder Bank Empty/Fault
- Oxygen Emergency Bank Empty/Fault
- Air Compressor Faulty/Operation
- Vacuum Pump Faulty/Operational
- Vacuum Deficiency Vacuum Reservoir
- And Other MGPS Signals & Alarms

Bidder shall be responsible for all cabling from local alarm panels to master alarm panel. **Master alarm should be integrated with BMS/HIS/HMIS**



## 10.2 Area line pressure alarms

Should be as per required locations. The medical gas alarms should be capable of monitoring up to 6 medical gas services (As specified in BOQ) by means of pressure sensors which detect deviations from the normal operating limits of either pressure or medical vacuum.

The main alarm and area line pressure alarm (Digital) are micro-processor based which monitor the pressures of medical gases like oxygen, nitrous oxide, compressed air and vacuum levels at a specific area of piped gas system in any hospital. The electronic circuitry has been such that if the pressure / vacuum in the gas pipeline drops below the present limit, the equipment is give an audio-visual alarm. Visual alarm remains active even after pressing of "Mute" button. But it comes to normal condition when gas pressure / vacuum return to normal level.

The equipment has following features:

- Four Channel Microprocessor Controlled Alarm for Pneumatic & Vacuum Services has the following features:
- Digital Display of Line Pressure for all the services with factory calibrated pressure sensors.
- Color coded LED Display of Line pressure status (High – Caution – Normal – Caution– Low )
- Audible Alarm for High & Low pressure condition.
- Test and Alarm Acknowledge (Mute) facility. (Alarm acknowledge(Mute) time span is programmable from 1 to 60 min).
- Programming facility of alarm limits from front panel (Password protected, preferably to has been done through supplier's engineer).
- Facility to connect to remote alarm box by potential free contacts provided in the alarm box.
- Small and compact design. Light Weight (3 kg)
- Imported highly sensitive gas pressure sensors & CE marked power supply.
- Mounted on a powder coated MS box.
- Nut & Nipples are provided for connection with Pneumatic supply line.
- Low voltage internal operation with input power supply of 220V AC.
- Wall mounting facility.
- Low voltage operation for safety
- High / Low indication
- Test facility
- Mute / silence facility

## 11.0 AGSS (Anesthesia Gas Scavenging System) DUPLEX

Anaesthetic Gas Scavenging System (AGSS) duplex of **minimum 1000 LPM as primary & 1000 LPM as Standby**. The package should consist of two dry rotary vane/Claw type vacuum pumps (Dry/Oil less) or Blower pump as per guideline of

standard to be followed, a control panel, and mounted on a common base frame. AGSS pump: AGSS pump shall operate completely dry. Each pump should be completely air cooled and have absolutely no water requirements. The suitable wiring from OTs to AGSS plant for remote control/suitable reservoir (as applicable) is the responsibility of the bidder. System in-line non-return valves should allow individual pump servicing. Active anaesthetic gas scavenging systems should be designed to safely remove exhaled anaesthetic agents from the operating environment and dispose of them to atmosphere from the highest point of the hospital building, thus preventing contamination of the operating department and providing a safe and healthy workspace for the personal. AGSS design should

## **12.0 HP A/S TUBING**

High Pressure Tubing for AIR  
High Pressure Tubing for vaccum  
High Pressure Tubing for vaccum  
LP Tubing

## **13.0 HORIZONTAL BED HEAD PANELS -1500mm long**

### **13.1 Bed Head Panel**

- Has been made of High Strength Anodised Aluminium Extrusions with inbuilt single railing.
- The chamber of Medical Gas Outlets has been made of anodized aluminium
- Has been powder coated as per the customer's choice.
- The panel has been designed to has provision to accommodate the following:
  - a). Gas Outlets: Oxygen = 2 Nos., Vacuum = 2 No, Medical Air 4 = 1 No.
  - b) Electrical Sockets / Switches: 06 Nos.
  - c). Audio Unit
  - d). Room Lighting
- The railing has been designed to have the following accessories:
  - a). I V Pole
  - b). Infusion pump / Syringe pump stand
  - c). I V Bottle holder
  - d). Medicine / disposable tray
  - e). Examination lamp
  - f). Reading lamp
  - h) Arrangement for Multipara Monitor.
- Each Bed Head Panel in NICU, shall have additional MCB of 1.5 kW for radiant warmer to prevent short circuit.

## **14.0 ACCESSORIES:**

### **14.1 BPC Flow meter with Humidifier :**

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

- Control within a range of 0 – 15 lpm.
- It meets strict precision and durability standard.
- The flow meter body is made of brass chrome plated materials.
- The flow tube and shroud components are made of clear, impact resistant polycarbonate.
- Flow Tube has large and expanded 0 – 5 lpm range for improved readability at low flows.
- Inlet filter of stainless steel wire mesh to prevent entry of foreign particles.
- The humidifier bottle is made of unbreakable polycarbonate/ Polysulphone material and autoclavable at 121 degree Centigrade temperature.

#### 14.2 Ward Vacuum Units :

Ward Vacuum Unit has been of light weight and compact. The unit consists of-

- A regulator(Digital/Analogue),
- A 1000 - 2000 ml. reusable collection jar, made of unbreakable polycarbonate/Polysulphone material and fully autoclavable at 121 degree centigrade
- A wall bracket for mounting the jar assembly on the wall.

The vacuum regulator (Digital/Analogue) with instant ON / OFF switch has been infinitely adjustable and has vacuum gauge which indicates suction supplied by the regulator. Safety trap has been provided inside the jar to safeguard the regulator from overflowing.

#### 14.3 Theater Vacuum Units :

The unit has been consisting of two reusable 1500 ml or more shatter resistant bottle, each made up of polycarbonate/Polysulphone material and fully autoclavable at 121 degree centigrade.

The vacuum regulator (Digital/Analogue) with instant ON / OFF switch has been infinitely adjustable and has vacuum gauge which indicates suction supplied by the regulator. Safety trap has been provided inside the jar to safeguard the regulator from overflowing.

There are a three way selector switch with an option to operate either

- Left, Right or Both.

All the above items has been mounted on a Metallic Trolley having free moving castor wheels.

**15. ELECTRICAL DISTRIBUTION PANEL :-**

Panel shall be wall mounted and fabricated from 16/14 SWG CRCA Sheet duly powder coated. Panel shall incorporate isolators for the following equipments.

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

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

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

**16. SUPPLY OF O2 CYLINDERS –**

**Class D Type** Should be as per BIS/IS/ASME Standard.

Valve guard should be fitted on all cylinders for the protection of Cylinder valve.

**17. SUPPLY OF N2O CYLINDERS –**

**Class D Type** Should be as per BIS/IS/ASME Standard

Valve guard should be fitted on all cylinders for the protection of Cylinder valve.

**18. SUPPLY OF CO2 CYLINDERS –**

**Class D Type** Should be as per BIS/IS/ASME Standard

Valve guard should be fitted on all cylinders for the protection of Cylinder valve.

**19. IN ADDITION TO THE ABOVE, FOLLOWING TURNKEY WORK FOR INSTALLATION AND COMMISSIONING OF MEDICAL GAS PIPELINE SYSTEM IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR:**

- Bidder must take into consideration in its bid, costs to be incurred for any additional work pertaining to Civil, Electrical, Mechanical and any other protections relevant as per State/Central Govt. regulation/local authority of Punjab, Furniture for Plant & Manifold Room, Servo stabilisers, U.P.S. etc.

required for successful installation testing and commissioning of the system and the offered price should include all such costs, each equipment/system is to be considered a package in itself and **contractor to execute the order package on a “turn key basis” with the following works:**

- Providing fixing of **Electrical Gadgets** like ELCB, MCB, Light Points, Power points, etc in the Medical Gas Pipeline System.
- Installation of MCB, ACB, ELCB & OCB of Havell/Siemens/L&T/Schneider etc for Control Panel for Medical Gas Manifold System.
- Installation of all **electrical cabling** must be of IS: 1554 (As per latest amendment) standard and wiring as per IS: 732 standard and proper earthing of entire Medical Gas Pipeline System and other electrical instruments and accessories in the Medical Gas Pipeline System as per standard guidelines of BIS.
- Arrangement for requisite **Ventilation and Air conditioning (If required) and fire fighting** for Manifold Room & Plant Room of MGPS and its maintenance for the contract period

**In addition to the above mentioned equipment/appliances**, if the contractor thinks it necessary to include any other equipment/appliances, accessories etc. for the MGPS then that may be provided after approval from Engineer in-charge.

The sizes are approximate. Minor variations in sizes shall be acceptable subject to prior approval of the Engineer.

**APPROVED MAKES FOR MEDICAL GAS PIPE LINE SYSTEM**

- |    |                                 |  |
|----|---------------------------------|--|
| 1. | Compressor                      | INGERSOLLRAND/ANESTATA/EQUIVALENT          |
| 2. | Motor                           | CROMPTON/ABB/NGEF/SIEMENS/KIRLOSKAR        |
| 3. | Cable                           | SKYTONE/KEI/UNIVERSAL/NATIONAL/RR CABLE    |
| 4. | Electrical Control Panel        | L & T/ SIEMENS/ SCHNEIDER                  |
| 5. | PVC Pipe Class III with Fitting | FINOLEX/ SUPREME/ PRINCE/ ORI-PLAST        |
| 6. | G.I. / M.S. Pipe Heavy Class    | TATA/ JINDAL(HISSAR)/SAIL /SURYA PRAKASH   |
| 7. | MCCB/Contactor/Relay            | L&T/ABB/SIEMENS/SCHNEIDER                  |
| 8. | Pressure Gauges                 | H.GURU /FIEBIG                             |
| 9. | Stainless Steel                 | TATA/SALEM/JINDAL/MUKUND/BHAYANDER/ AMBICA |

10. Aluminium Sheet BALCO/NALCO/HINDALCO
11. Copper Pipe MEHTA TUBE/RAJCO/PRECISION

**Note :**

- The bidder should attach Technical Compliance item wise with respect to the above technical specifications and turnkey work along with Printed catalogues
- The contractor shall be responsible for the complete works including submission of working drawing and walk through view.
- The contractor should provide complete List of Commonly used Spares, Operation manual, Equipment manual, Service manual and manuals for all systems and subsystems.
- Final electrical and pressure and other safety test, system test and calibration should be done by authorized person with test instruments.
- The contractor should provide all electrical accessories like cable wire, electrical outlets, switches etc, and they should be fire proof of reputed make, certified for electrical safety.
- Wherever makes have not been specified for certain items, the contractor should provide the same as per BIS and as per approval of HSCC.
- Training of personnel of the Institute should be 10 days at least by the contractor.
- The contractor should prepare and submit layout plan for Steam Pipeline, Electrical Wiring, Electrical Distributional Panel, Plumbing, Fire Fighting System, Air Washing and Ventilation and Drain line to HSCC for approval before beginning of supply and installation and As built drawing after installation.
- The contractor should provide test certificate for all materials along with manufacturer's test certificate and equipment used for MGPS.
- **Third party quality certification of the MGPS equipment from SGS/TUV/Lloyds should be submitted as "Certifies that the item (Name of the equipment) meets the technical specification and BOQ of the tender document".**

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## TECHNICAL SPECIFICATION FOR MINOR OT

### SCOPE OF WORK -

**Execution including Plan, Design, Supply construction, and commissioning of Operating Theatre (Minor) in accordance with the specifications, bill of quantities and providing of free spare parts and service during Defect Liability Period.**

### 1. CEILING CONSTRUCTION

The prefabricated construction for Double skinned panel of 0.8mm thick SS 304 Grade Stainless Steel sheet each. The double skinned panel of thickness 30-40 mm shall be sandwiched with core consisting of rigid polyurethane foam[PUF], which has been injected under high pressure, with a minimum density of 40 kg/m<sup>3</sup>. with Silicon sealant/Metallic Putty to provide seamless operating room. The individual wall panels shall use the tongue and groove technology for joining two panels, no welding should be allowed.

The ceiling suspension from concrete ceiling should be as:

Suspension elements : Suspension bracket with tension spring / Threaded Rod.

Suspension Height: Continuously adjustable from 250 to

1100 mm Stability: Permanent and non-stop after adjustment.

Material High quality galvanized steel

Providing and laying Epoxy/Antibacterial painting of 300 microns thickness over smoothly rendered surface. The treatment consists of surface preparation, priming with Primer.

### 2. CEILING FILTRATION SYSTEM / LAMINAR AIR FLOW

#### **SYSTEM (Unidirectional Low Turbulence Laminar Air Flow Plenum Ceiling for each OT)**

Plan air Ceiling System, standard size. PLENUM UNIT - The complete unit shall have factory prepared fine sealing system. It should be perfectly seamless integration of ceiling mounted equipment and OT Ceiling. It should be flexible modular range of solutions, adjustable to the local requirements .It should be made out of high quality and durable materials, filter housings and pressure chamber are made out of Aluminum. It should have a low pressure drop allows for the long-term usage of the HEPA miniplate H14 filters . It should have reliable filter efficiency and filters are guaranteed to remove particles and germs with the usual H14 filters retaining 99.99 % of the particles and germs. It should have minimal pressure drop a low pressure drop ensures the energy saving characteristic of the Laminar Flow Ceiling . Air & light diffuser made out of two layer of mono filament precision woven polyester for the plan air ceiling to give a "LAMINAR FLOW" of filtered air Size-8ft x 8ft. **It also provides a diffused shadow less lighting system with a control on the intensity of luminance by using high frequency electronic**

**fluorescent/LED tubes and ballasts.**

### **3. CORNER COVING**

Extruded Aluminium powder coated/Anodized clip on type coverings for the entire wall to wall and wall to ceiling. R-70, 3D internal/ external corner coves. Covering and coving of Return air ducting lines inside OT. Material to be used for covering should be Powder coated Aluminium.

### **4. WALL PAINTING**

Providing and laying Epoxy/Antibacterial painting of 300 microns thickness over smoothly rendered walls. The treatment consists of surface preparation, priming with Epoxy Primer. Walls should be smoothly rendered with Wall putty.

### **5. HINGE DOOR –Double leaf door- SS-304 Both way opening- Size-2100 x 1500mm**

Both way opening double leaf door of 44 mm thick door shutters made with 0.8mm thick double skinned SS-304 sheets on both sides with PUF as infill, 1.2 mm thick GPSP powder coated door frames totally flush with the wall panels, hardware like push plates, handles, door closure, double glazed view glass of std size, hinges and provision for concealed automatic door bottom Drop seal etc. Supply & Installation of double glazed view panels (1 Square ft. area) with flush design, with 6mm thick float glass fixed in double panel with necessary arrangements. Colour of the door should be as per the requirement of the client.

Amended: 2.5/1.2 mm thick AI/GPSP powder coated door frames.

### **6. HINGED DOOR –Single leaf door-SS-304 - Size-2100 x 1000mm**

Single leaf flushed hinged door of 44 mm thick door shutter made with 0.8mm thick double skinned SS-304 sheets on both sides with PUF as infill, 1.2 mm thick GPSP powder coated door frames totally flush with the wall panels, hardware like push plates, handles, door closure, double glazed view glass of std size, hinges and provision for concealed automatic door bottom Drop seal etc. Supply & Installation of double glazed view panels (1 Square ft. area) with flush design, with 6mm thick float glass fixed in double panel with necessary arrangements. Colour of the door should be as per the requirement of the client.

### **7. PERIPHERAL LIGHT**

It should be fitted outside the air ceiling system area and flush with the ceiling in the



operation theatre suitable to required illumination of OT. Peripheral lights and clean room luminaries fitted in the frame should be 8 Nos/As suitable to the required illumination (500 Lux) in numbers for each OT. The LED lamp of size 2ft.x 2ft with highly spectacular anodized Aluminum reflectors and optical antiglare system for adjustable light distribution. Luminaries cover made of highly resistant, disinfectant proof laminated safety glass with fine grained surface, glass pane with white powder coated steel frame. Luminary's body made of sheet steel, white, powder coated supplied ready for connection. The reflectors should be of high quality, cleanable and non deteriorating. Dimmable ballasts of reputed companies to be used and diffuser should be constructed with opaque acrylic diffuser material in aluminum frames/ SS frames. It should have flicker less design with color. Recess frames should be gas tight. The fitting should be flush with the ceiling and should be removable from top or bottom. Lighting units should be properly sealed with the ceiling by means of fillers and beadings so that all lighting units are airtight with ceiling panels. The light fitting should be uniformly and aesthetically distributed on the ceiling to provide uniform illumination in the OR. Peripheral lighting should be done according to IP 65 protocol. Light should not interfere when green mode of Endoscopy is performed.

Amended: Dimmable ballasts / Driver of reputed companies to be used as per approval of Engineer In-charge.

## **8. DISTRIBUTION BOARD, ELECTRICAL WIRING, CONDUITING WITH FIXTURES INSIDE THE OPERATION THEATRE**

Electrical Distribution Board along with all high voltage equipment should be installed in a separate enclosure. Mains, Relays, Circuit protective equipment, for all circuits of Operation theatre shall be installed in the remote cabinet.

All electrical wiring should be terminated to the connectors mounted on rail and labeled with indelible labels. Individual fuse and miniature circuit breakers should protect all internal circuits. Complete schematic diagram drawing description should be enclosed with the equipment.

Laying of PVC conduits, Modular Switch Boxes, Modular Switches-sockets, Power and Light wiring including Earthing wire for all the lighting controls, Pendant and other equipment fixtures and fittings inside the theatre Wiring with low leakage current wires of FRLS wires should be as per requirements. 5/15 Amps **antibacterial switch** and socket outlet set -3 Nos shall be flushed equidistant in each wall at 325mm height from FFL of OT. Wiring for 250 volts single phase and neutral 5/15 Amps switched socket outlet with 4 sq.mm and 2.5 sq.mm PVC insulated copper conductor 1100 volts stranded flexible wires should be concealed with conduit. Installation of all electrical cabling must be of IS: 1554 (As per latest amendment) standard and wiring as per IS: 732 standard and proper earthing of OT and other accessories in the OT room as per standard guidelines of BIS. Fittings should be sealed on accordance with the standard IP54. Earthed equipotent bonding of all exposed metal work should be provided.

## 9. OPERATION THEATRE FLOORING (ANTISTATIC CONDUCTIVE ROLL)

The Operation theatre floor finish should be laid with 2 mm antistatic seamless conductive PVC Roll on a semi-conductive adhesive base. The floor should be scratch resistant, fire resistant, chemical resistant, non-corrosive, slip resistant, smooth, anti fungi, antimicrobial impervious material conductive enough to dissipate static electricity but not conductive enough to endanger personnel from electric shock. The joints in the flooring should be sealed by using a PVC welding bar of matching colour and hot air gun for fusion of welding bar with flooring to provide a continuous sealed surface. The conductive material should be uniformly impregnated as grains. The floor should be inert to body fluids, chemicals, detergents and disinfectants and it should not be affected by temperature variation within the OT. Colour should be uniform, pleasant and matching with ambience and should be approved by client/HSCC. **The floor finish should pass over a concealed cove former and continue up the wall for 100mm.** The floor should be provided flat to within a tolerance of  $\pm 3$ mm over any 30 Sq.mtr area. Copper grounding strip (0.05 thick, 50 mm width) should be laid flat on the floor in the conductive adhesive and connect to copper wire of grounding. The connection from copper grid should be brought out uniformly at places to form equi-potential grid. A self-leveling compound should be laid prior to laying of the floor finish. One earthing lead should be brought out of from every 150 Sq.ft. area and attaching it to main earthing strip/ground. The floor should have electrical resistance(Point to ground) within  $2.5 \times 10^6$  to

$2.5 \times 10^6$  Ohms as per NFPA-99/ DIN 51953/ATMF-150 B1 class of fire resistance. The floor should efficiently discharge electric charges upto 2 KV. The floor should not allow building up of electrical charge beyond 100 volts due to antistatic effect. It should fulfill product requirements as per EN649. The corner should not be terminated sharply and concealed cove-former (Aluminum) upto 100mm from FFL and should be used overlap to a height of 25mm approx. and sealed perfectly and uniformly. Self-leveling compounds should be used for this purpose. Radius for corner coving- 60-70R

## 10. INTERNAL HVAC DUCTING AND EXHAUSTION SYSTEM

- a) All the ducting inside the MOT shall be scope of the MOT bidder
- b) All necessary HVAC interconnection for supply and return air shall be the scope of bidder (the institute will provide the duct upto outside of the MOT)
- c) All the ducting should be as per industry standard and sheet should be Aluminium of appropriate thickness and insulated as per industry standard. The return air duct should be SS-304/Al.
- d) Return air exhaust grill should be provided in the OT
- e) The exhaust cabinets should be cleanable
- f) These cabinets should have suction from bottom and top also.
- g) Designed flow rate should not be less than 1000 m<sup>3</sup>/hr. Distribution of exhaust air volume should be divided between fluff strainers to maintain the required pressure within the theatre without causing turbulence.
- h) Return air exhaust cabinet should be made from Aluminium/ SS 304. Also it should match perfectly with ceiling system aesthetically.

## 11. MEDICAL GAS LINE INSTALLATION

Oxygen, Air(Medical & Surgical), Vacuum, Nitrous Oxide and AGSS supply to Operation Theatres from the existing manifold system should be provided. The medical gas alarm system shall be installed which fully satisfies the principles of HTM

2022/

NFPA.

Medical graded Copper pipes shall be solid drawn, tempered, seamless, phosphorous deoxidized, non-arsenic and degreased for oxygen service. Copper to Copper joints shall be made on site using silver-copper-phosphorous brazing alloy to BS-1845. Copper to brass or gunmetal joints shall not be made on site. Except for mechanical joints used for components, all metallic pipeline joints shall be brazed or welded. All pipelines shall be routed in such a way that their not exposed to a temperature less than 5 deg Celsius above the dew point of the gas distribution pressure. The chemical composition shall be as per BS-6017: 1981 Table 2, Cu-DHP grade. Distribution Copper Pipe manufactured as per **BSEN:13348:2008**. Each pipe shall be capped at both ends before supply. Pipeline shall be supported at interval to prevent sagging.

The supply of pipes shall accompany with manufacturers test certificates for physical properties and chemical composition. The supply of pipes shall be further substantiated with inspection certificates from third party inspectors like SGS/Lloyds/Bureau Veritas.

Medical graded Copper Piping should be laid down from Pendant/Bed Head Panel/Gas Outlets of OT to the nearby Valve Box outside the Operation Theatre via Surgeon Control Panel. **Gas Outlets for each Minor OT shall be provided as : Oxygen-4 Nos, Vacuum-4 Nos, Medical Air(4 Bar) -4 Nos, Surgical Air(7 Bar) -2 Nos, CO2-1 Nos & AGSS-1. Copper pipes shall be concealed to the wall.**

## 12. SCRUB STATION

Compact Surgical Scrub sink -2 Bay should be designed for use in Operation theatre complex providing surgeons with a convenient sink for pre-OT scrub up. The Scrub Sink should be made of 1.5mm thick AISI-304 Stainless Steel and top surface(Counter) should be made of one piece and polished to seamless satin finish. The scrub sink should be provided with a front access panel which should be easily removed for access to the water controlled valve, waste connections, stoppers and strainers. Hands free operation should include infra-red sensors with built-in range of adjustment. Thermostatic mixing, valve control should be located behind the access panel and maintain constant water temperature. User defined time 1, 3,5,10 min. are available. This timing should be

adjustable to meet individual application requirements, provided with infrared sensors, thermostatic control taps with fail-safe temperature controls. All units

should have reduced anti splash front. It should have manual foot and operation mode. Knee operated switch should be provided additionally. The station should also have inbuilt soap dispensers. Scrub station should be equipped with 10L Geysers for supply of hot water.

Knee / Foot operated switch should be provided additionally.

### **13. X-RAY FILM VIEWER**

The Two (2) plate viewing LED type/ high frequency fluorescent lamps X-Ray Viewing Screen should be designed to provide flicker free luminance for clear film viewing. Each plate should be able to illuminate films up to 14"x17" size. 'Dimming is controlled using dimming ballast and PCB mounted inside the box. The mounting of the Screen should be installed flushed with Operation theatre wall to avoid dust accumulation and microbial growth and ease of cleaning. The diffuser should diffuse the light evenly and to provide adequate luminance for film viewing. Body should be of extruded aluminum powder coated black with bacteria and disinfectant resistant finish. Proper spring loaded film clip with rollers should be provided to hold the films firmly and to remove the film without scratches. The X-Ray Film viewer should comply with relevant Electrical Safety Codes for High and Low voltage system.

Amended: Dimming is controlled using dimming Driver/Ballast and PCB mounted inside the box.

### **14. OT LIGHT -**

**Description:** Dual Dome LED Surgical Lighting System

#### **i) OT Light**

Operating Room Surgical Lighting System should provide an ideal combination of brightness, Maneuverability, and shadow resolution without sacrificing color accuracy through a consistent LED technology with a unique faceted reflector design technology.

Such Lighting System should have the following technical specifications:

- Number of Light heads : : Two per suspension
- Number of LEDs : Should be adequate enough for following minimum illumination level
- Color Temperature : 3800 - 5000 K( $\pm 10\%$ ) - Variable colour temperature.
- 
- Field Size Diameter : 20 to 28cm (+/- 10%)
- Depth of Field : 750 to 1100mm (+/- 10%)
- Illumination Level : minimum 160,000 Lux each

- Controls : Wall Control Touch Panel
- Rotation : 330- 360 degrees
- Vertical Adjustment Range : + 20 inch – 25 inch
  - Sterilizable Handle : 2 Nos
  - Light head Diameter : 30-35/800mm×720mm of size
  - Mounting Type : Ceiling
  - Supply Voltage : 230 VAC 50 Hz
  - Bulb Type : LED
  - Dimming Range : 30% - 80%
  - Operating/Storage Humidity : 10 – 95%
  - Life of Light Source : > 40,000 Hrs.
  - European CE certified with 4 digit notified body number /US FDA/BIS certified

**15 . IN ADDITION TO THE ABOVE, FOLLOWING TURNKEY WORKS FOR INSTALLATION AND COMMISSIONING OF MINOR OT ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR :**

The turnkey work includes all modifications to the built up space provided at the hospital site including civil modifications, electrical works, plumbing works, all cable trenches and railings wherever required, interior decoration, air conditioning duct, furniture and other related works of the Operation Theatre required for the smooth and efficient functioning of the centre. These works shall comply with all relevant safety and standards guidelines. The vendor is fully responsible for installation and commissioning of all equipment mentioned in the tender. Bidders are strongly advised to visit the site for assessment before the submission of tender offer.

- **Electrical cabling** of IS : 1554 standard(Latest) and wiring as per IS : 732 standard from MDB(Single point source) to Electric Distributional Panel and to the corresponding load points
- Providing fixing of **Electrical Gadgets** like ELCB, MCB, Light Points, Power points, in the MINOR OT room. • Number of fans, power point, bulbs/tube light. Apart from these supplies to the individual equipments with ELCB & MCB for MINOR OT • Installation of MCB, ACB, ELCB & OCB of Havell/Siemens/L&T/Schneider etc for Control Panel for MINOR OT.

In addition to the above mentioned equipment/appliances, if the contractor thinks it necessary to include any other equipment/appliances, accessories etc. for the MINOR OT then that may be provided and any other necessary work required for satisfactory working of the Mid-End MINOR OT and not mentioned

**In addition to the above mentioned equipment/appliances**, if the contractor thinks it necessary to include any other equipment/appliances, accessories etc. for the MINOR OT then that may be provided after approval from Engineer in-charge.

The sizes are approximate. Minor variations in sizes shall be acceptable subject to prior approval of the Engineer.

**Note: The bidder should attach Technical Compliance item wise with respect to the**

- above technical specifications and turnkey work along with Printed catalogues
- All electrical accessories like cable wire, electrical outlets, switches etc supplied by the contractor should be fire proof of reputed make, certified for electrical safety.
  - Wherever makes have not been specified for certain items, the same shall be as per  
BIS and as per approval of HSCC.
  - The contractor should provide test certificate for all material used for construction of pre-fabricated OT
  - The contractor shall be responsible for the complete works including submission of working drawing and walk through view.
  - The contractor should provide complete Operation manual/Parts manual/Service manuals for all systems and subsystems.
  - The contractor shall bear the cost of Final electrical safety test, system test and calibration to be done by authorized person with test instruments.
  - Training for seven working days should be provided by the contractor.
  - The contractor should prepare and submit to HSCC the layout plan before beginning of supply as well as As-built drawing for installed equipment and component, Electrical Wiring for approval after installation.
  - Third party quality certification of the OT equipment from SGS/Lloyds/Bureau Veritas should be submitted as “Certifies that the item (Name of the equipment) meets the technical specification and BOQ of the tender document”.

Responsibility of bidder:

1. The bidder must ensure that they have Authorization from the Manufacturers for the following equipment/ items:
  - a) OT Light
2. The contractor (after award of work) will coordinate with other contractors for the related works/services like Civil, Electrical, MGMS, IT etc. for proper integration of all the services and timely completion of the works.
3. **It should have import/manufacturing license from Central licensing Authority or State licensing authority of CDSCO for the product and copy of valid license should be submitted, if applicable.**

## TECHNICAL SPECIFICATION FOR NORMAL OT

### SCOPE OF WORK -

**Plan, Design, Supply construction, and commissioning of Operating Theatre in accordance with the specifications, bill of quantities and providing of free spare parts and service during Defect Liability Period.**

#### 1. CEILING CONSTRUCTION

The prefabricated construction for Double skinned panel of 0.8mm thick SS 304 Grade Stainless Steel sheet each. The double skinned panel of thickness 30-40 mm shall be sandwiched with core consisting of rigid polyurethane foam[PUF], which has been injected under high pressure, with a minimum density of 40 kg/m<sup>3</sup>. with Silicon sealant to provide seamless operating room. The individual wall panels shall use the tongue and groove technology for joining two panels, no welding should be allowed.

The ceiling suspension from concrete ceiling should be as:

Suspension elements : Suspension bracket with tension spring

Suspension Height: Continuously adjustable from 250 to 1100 mm

Stability: Permanent and non-stop after adjustment.

Material High quality galvanized steel

Providing and laying Epoxy/Antibacterial painting of 300 microns thickness over smoothly rendered surface. The treatment consists of surface preparation, priming with Primer.

Ceiling

#### 2. CEILING FILTRATION SYSTEM / LAMINAR AIR FLOW SYSTEM

**(Unidirectional Low Turbulence Laminar Air Flow Plenum Ceiling for each OT)**

Plan air Ceiling System, standard size. PLENUM UNIT - The complete unit shall have factory prepared fine sealing system. It should be perfectly seamless integration of ceiling mounted equipment and OT Ceiling. It should be flexible modular range of solutions, adjustable to the local requirements .It should be made out of high quality and durable materials, filter housings and pressure chamber are made out of Aluminum. It should have a low pressure drop allows for the long-term usage of the HEPA miniplate H14 filters . It should have reliable filter efficiency and filters are guaranteed to remove particles and germs with the usual H14 filters retaining 99.99 % of the particles and germs. It should have minimal pressure drop a low pressure drop ensures the energy saving characteristic of the Laminar Flow Ceiling . Air & light diffuser made out of two layer of mono filament precision woven polyester for the plan air ceiling to give a "LAMINAR FLOW" of filtered air Size-8ft x 8ft. **It also provides a diffused shadow less lighting system with a control on the intensity of luminance by using high frequency electronic fluorescent/LED tubes and ballasts.**

#### 3. CORNER COVING

Extruded Aluminium powder coated/Anodized clip on type coverings for the entire wall to wall and wall to ceiling. R-70, 3D internal/ external corner coves. Covering and coving of Return air ducting lines inside OT. Material to be used for covering should be Powder coated Aluminium.

#### **4. WALL PAINTING**

Providing and laying PU/Epoxy/Antibacterial painting of 300 microns thickness over smoothly rendered walls. The treatment consists of surface preparation, priming with Epoxy Primer. Walls should be smoothly rendered with Wall putty.

#### **5. HERMETICALLY SEALED SLIDING DOOR**

- a) The door should be a hermetically sealed of HPL material, single sliding of size a. A - Door of 2.1 (H) X 1.5 m (W)
- b) The controller should be capable of being operated by elbow switches/foot switches as well as touch less sensor.
- c) The track should be of stainless steel/Aluminum and the running surface for the top rollers should be suitably angled to reduce resistance to movement
- d) The door leaf should be hung by means of hard plastic rollers of high quality with double bearing at the top. Rollers should be provided under the stainless steel/Aluminium track to enable smooth and noiseless movement.
- e) Opening and closing of the door should be microprocessor controlled electromechanical movement.
- f) The door material should be of HPL Color should match the interior and care should be taken to make the leaf strong and light weight.
- g) One should be able to open and close the door effortlessly in case of failure of automatic mechanism.
- h) Door opening handle should be strong and sturdy. Material should be of SS (glossy/Matt finish). Should be provided with high quality cylindrical/ESPg lock.
- i) Door leaf should have high quality synthetic rubber gasket with long life to ensure hermetic sealing (to maintain air pressure differential). Air tightness 99.99% at a pressure of 100Pa.



- j) The finished floor on either side of the door should be perfectly level (maximum permissible difference+1mm).
- k) The overall thickness of the finished door should be 40 to 60mm. The inner part of the door should be filled with CFC free polyurethane foam thickness of 48mm or nearby. (Sealed airtight to prevent further ingress of any microbial organism).
- l) The door and controls should comply with BIS/IEE regulation/EU Directives. All motors used should be DC brushless/PMDC motors with essential isolation from mains.
- m) Door should be with vision window 300 mm x 300 mm with double glazed panels and hermetically sealed.
- n) Door movement should have minimum noise.
- o) The starting time after receiving the signal should be adjustable between 0.5 to 20 seconds.
- p) The door controller should be BIS/CE marked.
- q) Test certificate for hermetically sealed door frame (factory test certificate) should be enclosed with the pre dispatch documents.

## **6. HINGED DOOR –Single leaf door-SS-304 - Size-2100 x 1000mm**

Single leaf flushed hinged door of 44 mm thick door shutter made with 0.8mm thick double skinned SS-304 sheets on both sides with PUF as infill, 1.2 mm thick GPSP powder coated door frames totally flush with the wall panels, hardware like push plates, handles, door closure, double glazed view glass of std size, hinges and provision for concealed automatic door bottom Drop seal etc. Supply & Installation of double glazed view panels (1 Square ft. area) with flush design, with 6mm thick float glass fixed in double panel with necessary arrangements. Colour of the door should be as per the requirement of the client.

## **7. PERIPHERAL LIGHT**

It should be fitted outside the air ceiling system area and flush with the ceiling in the operation theatre suitable to required illumination of OT. Peripheral lights and clean room luminaries fitted in the frame should be 8 Nos/As suitable to the required illumination (500 Lux) in numbers for each OT. The LED lamp of size 2ft.x 2ft with highly spectacular anodized Aluminum reflectors and optical antiglare system for adjustable light distribution. Luminaries cover made of highly resistant, disinfectant proof laminated safety glass with fine grained surface, glass pane with white powder coated steel frame. Luminary's body made of sheet steel, white, powder coated supplied ready for connection. The reflectors should be of high quality, cleanable and non deteriorating. Dimmable ballasts of reputed companies to be used and diffuser should be constructed with opaque acrylic diffuser material in aluminum frames/ SS frames. It should have

flicker less design with color. Recess frames should be gas tight. The fitting should be flush with the ceiling and should be removable from top or bottom. Lighting units should be properly sealed with the ceiling by means of fillers and beadings so that all lighting units are airtight with ceiling panels. The light fitting should be uniformly and aesthetically distributed on the ceiling to provide uniform illumination in the OR. Peripheral lighting should be done according to IP 65 protocol. Light should not interfere when green mode of Endoscopy is performed.

## **8. DISTRIBUTION BOARD, ELECTRICAL WIRING, CONDUITING WITH FIXTURES INSIDE THE OPERATION THEATRE**

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All electrical wiring should be terminated to the connectors mounted on rail and labeled with indelible labels. Individual fuse and miniature circuit breakers should protect all internal circuits. Complete schematic diagram drawing description should be enclosed with the equipment.

Laying of PVC conduits, Modular Switch Boxes, Modular Switches-sockets, Power and Light wiring including Earthing wire for all the lighting controls, Pendant and other equipment fixtures and fittings inside the theatre Wiring with low leakage current wires of FRLS wires should be as per requirements. 5/15 Amps **antibacterial switch** and socket outlet set -3 Nos shall be flushed equidistant in each wall at 325mm height from FFL of OT. Wiring for 250 volts single phase and neutral 5/15 Amps switched socket outlet with 4 sq.mm and 2.5 sq.mm PVC insulated copper conductor 1100 volts stranded flexible wires should be concealed with conduit. Installation of all electrical cabling must be of IS: 1554 (As per latest amendment) standard and wiring as per IS: 732 standard and proper earthing of OT and other accessories in the OT room as per standard guidelines of BIS. Fittings should be sealed on accordance with the standard IP54. Earthed equipotent bonding of all exposed metal work should be provided.

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**over a concealed cove former and continue up the wall for 100mm.** The floor should be provided flat to within a tolerance of  $\pm 3\text{mm}$  over any 30 Sq.mtr area. Copper grounding strip (0.05 thick, 50 mm width) should be laid flat on the floor in the conductive adhesive and connect to copper wire of grounding. The connection from copper grid should be brought out uniformly at places to form equi-potential grid. A self-leveling compound should be laid prior to laying of the floor finish. One earthing lead should be brought out of from every 150 Sq.ft. area and attaching it to main earthing strip/ground. The floor should have electrical resistance(Point to ground) within  $2.5 \times 10^4$  to  $2.5 \times 10^6$  Ohms as per NFPA-99/ DIN 51953/ATMF-150 B1 class of fire resistance. The floor should efficiently discharge electric charges upto 2 KV. The floor should not allow building up of electrical charge beyond 100 volts due to antistatic effect. It should fulfill product requirements as per EN649. The corner should not be terminated sharply and concealed cove-former (Aluminum) upto 100mm from FFL and should be used overlap to a height of 25mm approx. and sealed perfectly and uniformly. Self-leveling compounds should be used for this purpose. Radius for corner coving- 60-70R

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- a) All the ducting inside the MOT shall be scope of the NOT bidder
- b) All necessary HVAC interconnection for supply and return air shall be the scope of bidder (the institute will provide the duct upto outside of the NOT)
- c) All the ducting should be as per industry standard and sheet should be Aluminum of appropriate thickness and insulated as per industry standard.
- d) Return air exhaust grill should be provided in the OT

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Oxygen, Air(Medical & Surgical), Vacuum, Nitrous Oxide and AGSS supply to Operation Theatres from the existing manifold system should be provided. The medical gas alarm system shall be installed which fully satisfies the principles of HTM 2022/NFPA. Medical graded Copper pipes shall be solid drawn, tempered, seamless, phosphorous deoxidized, non-arsenic and degreased for oxygen service. Copper to Copper joints shall be made on site using silver-copper-phosphorous brazing alloy to BS-1845. Copper to brass or gunmetal joints shall not be made on site. Except for mechanical joints used for components, all metallic pipeline joints shall be brazed or welded. All pipelines shall be routed in such a way that their not exposed to a temperature less than 5 deg Celsius above the dew point of the gas distribution pressure. The chemical composition shall be as per BS-6017: 1981 Table 2, Cu-DHP grade. Distribution Copper Pipe manufactured as per **BSEN:13348:2008**. Each pipe shall be capped at both ends before supply. Pipeline shall be supported at interval to prevent sagging.

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## **12. SCRUB STATION**

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## **14. SURGICAL OT LIGHT -**

**Description:** Dual Dome **LED** Surgical Lighting System

Operating Room Surgical Lighting System should provide an ideal combination of brightness, Maneuverability, and shadow resolution without sacrificing color accuracy through a consistent LED technology with a unique faceted reflector design technology.

Such Lighting System should have the following technical specifications:

- Number of Light heads : : Two per suspension
- Number of LEDs : Should be adequate enough for following minimum illumination level
- Color Temperature : 3800 - 5000 K( $\pm 10\%$ ) - Variable colour temperature.
- Field Size Diameter : 20 to 28cm (+/- 10%)
- Depth of Field : 750 to 1100mm (+/- 10%)
- Illumination Level : minimum 160,000 Lux each
- Controls : Wall Control Touch Panel
- Rotation : 330- 360 degrees
- Vertical Adjustment Range : + 20 inch – 25 inch
- Sterilizable Handle : 2 Nos
- Light head Diameter : 30-35/800mm $\times$ 720mm of size
- Mounting Type : Ceiling
- Supply Voltage : 230 VAC 50 Hz
- Bulb Type : LED
- Dimming Range : 30% - 80%
- Operating/Storage Humidity : 10 – 95%
- Life of Light Source : > 40,000 Hrs.
- European CE /US FDA certified

**15. TOUCH SCREEN CONTROL PANEL 20” or more**

- a) The control panel should be touch screen panel. This control panel should work as the central control panel for the HVAC controls, instruction board, light control, gas alarms, etc. It should be BIS/US FDA/European CE/UL/ETL.
- b) The touch screen should be wall mounted, stationed in the visibility line of the surgeon and OT staff. The access height should be convenient for the nurse to operate and help/assistant when in need.
- c) The panel should accommodate digital clock and the elapsed time indicator.
- d) The medical gas alarm should indicate high and low gas pressures for each gas service present in the OT and normal/low indication for vacuum. This should be supported by audible alarm also. The panel should have an alarm mute(fault annunciation) facility. The sensors (pressure switches) should be at the nearest isolation valve.
- e) Control for general lighting: On-Off to be provided.
- f) Control of the operating light (major and satellite On-Off operations to be provided

- g) Hand free telephone set with memory should be located at one side.
- h) Temperature and humidity control for the room connected to the AHU. (Adjustable from the panel) The controller should be capable of adjusting the temp adjustment of +/- 5 Deg with in 5Minutes wherever separate AHU is provided for each OT . "
- i) Digital room pressure indicator in cm of H2O or equivalent (signal from pressure sensor shall be provided to indicate pressure differential between OT and outside)
- j) HEPA filter bank differential pressure indicator.
- k) The Control Panel should be able to be integrated with HMIS/BMS/HIS
- l) The Control Panel should be able to display the Isolation Panel Alarm Conditions along with MGPS Alarm

## **16. HATCH BOX**

- a) A hatch should be provided in each operation theatre to remove waste materials from the operation theatre to dirty linen area/corridor just adjacent to Operation Theatre.
- b) Each hatch box should be equipped with two doors and the door should be operated electrically/motorized.
- c) The hatch should be designed in such a way that only one door should be opened at one time ie doors shall be interlocked.
- d) The UV light should be so installed that it is kept on while both the doors are closed. This UV light has to be automatically turned off in case of opening of either of the doors.
- e) Indicators should be provided on both sides of the OT so that door open / close status can be monitored from both sides.
- f) Hatch Box material should be of SS304.
- g) Size of the Hatch box minimum: 600mm x 600mm.

## **17. VIEW WINDOW (WITH MOTORIZED BLINDS)**

(1.5m x 1m /2m x 1.5m/1.2mx1m)

- a) View window with motorized horizontal Venetian blinds sandwiched in two parallel tempered glasses of thickness 5/6 mm should be complete with FHP Motor Control for 90° rotation.
- b) The Window frame should be powder coated Aluminum of approved shape flush mounted to wall panelling material with proper sealing.
- c) The entire assembly should be completely sealed and fitted with proper Aluminum/SMS profile.
- d) The assembled thickness of the Window should be minimum 33-40 mm. The window blinds should be operated with Remote Control/manually.

#### **18. OPERATING LIST BOARD**

- a) One operating list board should be provided in each operating theatre.
- b) It should be made of ceramic having magnetic properties and should be flushed to the wall of the operating room.

#### **19. PRESSURE RELIEF DAMPERS**

- a) Pressure relief dampers or over flow ports should be provided in each room to prevent contamination of air from clean and dirty areas.
- b) Suitably sized air pressure relief damper should be strategically placed, enabling differential room pressure to be maintained and ensure that when doors are opened between clean and dirty areas.
- c) Counter- weight balancing system should be provided in the PRD to maintain positive pressure inside the operation room.
- d) Air pressure stabilizers should have unique capability of controlling differential pressure to close tolerance. The PRD should remain closed at pressure below the set pressure and should open fully at a pressure only fractionally above the threshold pressure.
- e) The frame, body and blade should be of SS304 stainless steel.

#### **20. DOUBLE ARM MOVEABLE PENDANT FOR ANESTHETIST**

- a) The Pendants should comply with NFPA 99C/HTM 02-01/ISO 7396-1/DIN. The support arms should be extremely robust and revolve on high quality bearings, so that the pendant head glides smoothly and quickly to any desired position
- b) Double moveable arms (any combination) with total coverage of min 1800mm and 330 deg. Horizontal movements for each arm. Vertical movement should be motorized and the arm height should remain to a height greater than 6.5 feet above floor level
- c) Weight carrying capacity of the arm should not be less than 150-180 Kgs. should have electromagnetic/pneumatic brakes
- a) Each arm should be capable of 300-340 degrees of rotation, which can be easily adjusted to suit the desired mode of operation.
- f) The Pendant Service Heads should be modular with 600-800mm head or more and pendants must accommodate all the fittings, all gases outlets, electrical switch & sockets and shelves. The heads should be capable of accepting a range of shelves, and infusion poles, electrical switches & sockets, gas outlets other accessories. The Pendant Heads should support the range of Physiological Monitor Mounting Solutions.
- g) The Pendant Service Heads should be supplied with medical gas terminal units and 5/15 or 6/16 Amps antibacterial hybrid sockets with switches.
- h) Double arm pendant anesthesiologist : Each pendant should be supplied with outlets and probes as mentioned below :
  - Oxygen Outlets – 2 nos., Vacuum Outlets – 2 nos., Nitrous oxide –1 nos., Air(4 bar) Outlets - 2 nos., Surgical Air Outlets-1 No, CO2 Outlets-1 no., AGSS outlet - 1 no
  - Electrical switch & sockets(Antibacterial) -8 nos.
  - Shelf with two rails one on each side – 2 nos. or more IV Fluid Pole with 4 hooks – 1No. Data socket RJ-45 -2 nos.
- i) The pendants should be BIS/European CE certified with 4 digit notified body number/ USFDA/UL/ETL approved.
- j) Pendant supplier should provide cut outs for Patch Panels in Integrated OTs. (only for integrated OT)
- k) For Safety reasons, Pendant should have NIST Connection for Individual Gases, Manometer for each gas.
- l) Pendant should be supplied with Ceiling Flange Tube, Ceiling Plate from OEM along with shipment. It should not be fabricated in India.



- m) Pendant should have IV Pole with IV Hooks on both side required for operation.
- n) Shelf of Pendant should be made of High quality Bio- Clean Material.
- n) Pendant should have Anti-microbial Coating/Powder coating.
- o) For Safety reasons, all the Electrical Sockets should have Earthing Points

**21 . IN ADDITION TO THE ABOVE, FOLLOWING TURNKEY WORKS FOR INSTALLATION AND COMMISSIONING OF NORMAL OT ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR :**

The turnkey work includes all modifications to the built up space provided at the hospital site including civil modifications, electrical works, plumbing works, all cable trenches and railings wherever required, interior decoration, air conditioning duct, furniture and other related works of the Operation Theatre required for the smooth and efficient functioning of the centre. These works shall comply with all relevant safety and standards guidelines. The vendor is fully responsible for installation and commissioning of all equipment mentioned in the tender. Bidders are strongly advised to visit the site for assessment before the submission of tender offer.

- **Electrical cabling** of IS : 1554 standard(Latest) and wiring as per IS : 732 standard from MDB(Single point source) with MS Conduit to Electric Distributional Panel and to the corresponding load points
- Providing fixing of **Electrical Gadgets** like ELCB, MCB, Light Points, Power points, in the OT room. • Number of fans, power point, bulbs/tube light. Apart from these supplies to the individual equipments with ELCB & MCB for OT • Installation of MCB, ACB, ELCB & OCB of Havell/Siemens/L&T/Schneider etc for Control Panel for OT.

In addition to the above mentioned equipment/appliances, if the contractor thinks it necessary to include any other equipment/appliances, accessories etc. for the OT then that may be provided and any other necessary work required for satisfactory working of the Mid-End OT and not mentioned

**In addition to the above mentioned equipment/appliances**, if the contractor thinks it necessary to include any other equipment/appliances, accessories etc. for the OT then that may be provided after approval from Engineer in-charge.

The sizes are approximate. Minor variations in sizes shall be acceptable subject to prior approval of the Engineer.

**Note: The bidder should attach Technical Compliance item wise with respect to the above technical specifications and turnkey work along with Printed catalogues**

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

- Wherever makes have not been specified for certain items, the same shall be as per BIS and as per approval of HSCC.
- The contractor should provide test certificate for all material used for construction of pre-fabricated OT
- The contractor shall be responsible for the complete works including submission of working drawing and walk through view.
- The contractor should provide complete Operation manual/Parts manual/Service manuals for all systems and subsystems.
- The contractor shall bear the cost of Final electrical safety test, system test and calibration to be done by authorized person with test instruments.
- Training for seven working days should be provided by the contractor.
- The contractor should prepare and submit to HSCC the layout plan before beginning of supply as well as As-built drawing for installed equipment and component, Electrical Wiring for approval after installation.
- Third party quality certification of the OT equipment from SGS/TUV/Lloyds should be submitted as “Certifies that the item (Name of the equipment) meets the technical specification and BOQ of the tender document”.

# **TECHNICAL SPECIFICATIONS OF MODULAR OPERATION THEATRE**

## **SCOPE OF WORK**

The turnkey work includes all modifications to the built-up space provided at the hospital site including Installation of Medical Equipment, Communication Systems, civil modifications, electrical works, plumbing works, interior decoration, air conditioning ducting inside MOT, Medical Gas Pipe Lines & interconnection with HVAC and other related works of the Operation Theatre required for the smooth and efficient functioning of the centre. These works shall comply with all relevant safety and standards guidelines. The vendor is fully responsible for installation, testing and commissioning of all equipment mentioned in the tender. Bidders are strongly advised to visit the site for assessment before the submission of tender offer.

## **MODULAR OT**

### **1. WALL PANEL SYSTEM :**

The prefabricated construction for Double skinned panel of thickness 50-60 mm and skinned thickness of 0.8mm thick 304 Grade Stainless Steel sheet each. The double skinned panel shall be sandwiched with core consisting of rigid polyurethane foam, which has been injected under high pressure, with a minimum density of 40 kg/m<sup>3</sup>. with Silicon sealant to provide seamless operating room. The individual wall panels shall use the tongue and groove technology for joining two panels, no welding should be allowed.

The external wall of the room shall be constructed with solid brick and mortar by the hospital authority. Clearance between inner panel and outer wall preferably should be 40-55 cm to allow the maintenance personnel for service. This closed space should be flushed continuously to eliminate dust and bacterial accumulation. In order to create a smooth uninterrupted surface between adjacent panels, thereby preventing the risk of the accumulation of dust and bacteria in gaps, the panel should be produced in a single full height floor-to ceiling piece. The total distance between inside and outside surfaces of the operating room should be sufficient for flush mounting of the equipment. All the sharp edges and corners of the OT room should be rounded /coved to avoid bacterial contamination. The wall panel design and construction should be strong enough to allow for the installation and support of all equipment and should have provision of opening required for the installations without affecting rigidity and strength. Access Boxes should be fitted to the rear of all wall-mounted equipment to enable maintenance to be carried out from outside the operating room. Wall paneling should be of fire protection or Reaction to fire class-1 norm. The individual panels except those at the edges should be removable individually. The Walls should be hermetically sealed. All the four corners should have return air duct outlets and grill for the same made of SS with the color choice to suit the hospital's choice. The system should afford the maximum versatility at the planning stage and flexibility during erection, ensuring openness to future alternations and trouble-free maintenance. During the installation of first the structural parts and subsequently the finishing elements, the system should ensure perfect integration of technical networks and allow

ample operational flexibility at the construction site. The clean, dry installation method should enable optimum programming of the various work phases, allowing optimization of the installation of technical systems and any necessary alterations to be made – right up to checking and final testing of the installed systems – before the modules are sealed.

The cavity between the inner and outer walls should be left with minimum obstructions for the possible addition of equipment at a later date and to enable services, pipes, conduits etc, to be run within the cavity. The wall panel should be fixed to the brick wall with supports/sub-frame on which individual wall panels will be mounted. The wall panel should be fixed to the brick wall with supports. All joints and cavities should be filled with Metallic Epoxy sealer and sanded flush to provide seamless finish.

The internal surfaces of the walls of Operation theatre should be sprayed with anti-bacterial paint (Factory Internal test report to be submitted) to a minimum dry film thickness of 300 microns with primer and putty. The anti-bacterial paint coating should overlap the floor coving, and door frames by 25 microns to provide a continuous sealed surface. The anti-bacterial paint coating should be non-reflective type, highly resistant to abrasives, water, detergents and weak acids and alkali used in cleaning area. The coatings should have no loss of performance or adhesion to the substrate in the case of regular steam cleaning. Anti-bacterial paint applied should not leach out in order to maintain anti- microbial system throughout the life of the product.

A Galvanized steel cover plate shall be installed between the inner and outer wall panels, sealing and protecting the cavity from the ingress of vermin and contaminants, whilst allowing the removal at a later date for upgrading, disassembly, enlargement, or relocation.

Internal colour of the wall shall be as suggested by the Institute/HSCC.

## **2. CEILING PANEL SYSTEM**

The prefabricated ceiling plates /cassettes should be made up of SS 304 panels with sheet thickness of at least 0.8 mm sandwich (both side 0.8 mm sheet) panel of PUF with minimum density 40kg/m<sup>3</sup> with matt finish and should be coated with antibacterial paint. It should be from the same manufacturer of wall panel. Total thickness should be 30-40mm.

The ceiling suspension should be as follows.

Support elements: Suspension bracket with tension spring.

Material: High quality galvanized or powder coated steel.

Room lighting, air supply inlet, ceiling service units, return air outlets, etc should be integrated with SS metal ceiling system.

The individual panels except those at the edges should be removable individually.

The anti-bacterial paint coating on the ceiling should be non-reflective type

Off white colour of the ceiling panel shall be used

## **3. PVC FLOORING**

- a) It should be with 2mm antistatic seamless PVC flooring
- b) Floor should be smooth, non-slip, impervious material conductive enough to dissipate static electricity but not conductive enough to endanger personnel from electric shock.

- c) Electrostatic charge dissipation combat PVC seamless flooring of very high quality should be provided.
- d) Thickness not less than 2 mm. Continuous roll should be used and joints should be welded by special PVC thermal welding units using PVC welding bars of same colour.
- e) The sheets should be highly durable with resistance to shock and indentation. It should be scratch proof also. The conductive material should be uniformly impregnated as grains.
- f) It should be inert to body fluids, chemicals and disinfectants. Should not be affected by temperature variation within the OT.
- g) The floor should efficiently discharge electric charges up to 2 kV
- h) Flooring should be done by skilled workers of accredited agencies authorized by the supplier of PVC sheets. The electrical resistance (point to ground) should be within  $2.5 \times 10^4$  to  $5 \times 10^6$  ohms. The floor should not allow building up of electrical charge beyond 100 volts due to antistatic effect. The corners should not be terminated sharply and concealed cove-former (aluminum) should be used to overlap the wall panel to a height of approx.25mm and sealed perfectly and uniformly. Self-levelling compounds should be used.
- i) The conductive copper grid laid underneath the PVC sheet should be supported by liquid epoxy compounds allowed to set as a uniform and level surface. The copper strips to be made visible by grinding and no copper strip should project more than 0.5mm above level surface to avoid damage to the PVC sheet. One earthing lead should be brought out from every 150sq.ft area and attaching it to the main earthing strip/ground.
- j) Copper grounding strips (0.05 mm thick, 50 mm width) should be laid flat on the floor in the conductive adhesive and connected to copper strip of grounding. The connection from copper grid should be brought out uniformly at places to form equipotential grid.
- k) Flooring should be mechanically shock proof, scratch proof, flame retardant and anti-microbial
- l) Corners should be uniformly curved
- m) Final surface should be non-corrosive to biological fluids and detergents. n) Colour should be uniform pleasant and matching with ambience
- o) Suitable self-levelling should be done before PVC flooring to avoid undulation with the MOT.

#### **4. LAMINAR AIR FLOW SYSTEM**

- a) The ceiling filtration system should be designed to ensure unidirectional distribution of sterile air of the surgical theatre to ensure the cleanliness of all the area covered by the air flow.

- b) The Laminar flow system should comprise of thick extruded aluminum profiles frame and sealed gasket. The filters installed in the plenum should be suitable for application for laminar flow and clean rooms.

These filters should meet following specification -Separators : continuous thermo plastic chord Sealant : Polyurethane

Gasket : One piece polyurethane MPPS average efficiency: > 99.95% 3

Micron DOP efficiency > 99.99% Final Pressure drop : 600 pa (max)

Maximum Operating Temp: 60 degree Celsius Maximum RH : 40-50 %

- c) The ceiling system should be equipped with “H 14” class HEPA filters position in the ceiling to achieve 0.25m/sec flow at the diffuser.
- d) Filtration Ceiling System holding structure, Filter frames and top plenum should be made of Aluminium/Stainless Steel.
- e) The filtration ceiling system should have diffuser/flow equalizer to achieve uniform & constant air distribution over the whole surface.
- f) The air management system should be designed to achieve class 100 with the following parameters:
- Bacteriological class =B (5 CFU/m<sup>3</sup>) Particle decontamination kinetics CP =5 min ISO 14644/1 classification = ISO 5
- g) The positive pressure should be maintained inside the OT to prevent contamination due to air from outside the OT.
- h) The supplier should provide test certificate for HEPA filter and laminar air flow systems from the original manufactures.
- i) Size of laminar airflow system minimum 8 feet X 8 feet or more.
- J) Note: Prospective bidders are advised to collect the information regarding CFM and AHU capacity from the respective institute site. Total flow rate of filter bank shall match the CFM of AHU.

## 5. INTERNAL HVAC DUCTING AND EXHAUSTION SYSTEM

- a) All the ducting inside the MOT shall be scope of the MOT bidder
- b) All necessary HVAC interconnection for supply and return air shall be the scope of bidder (the institute will provide the duct upto outside of the MOT)
- c) All the ducting should be as per industry standard and sheet should be Aluminum of appropriate thickness and insulated as per industry standard.
- d) Return air exhaust grill should be provided in the OT
- e) The exhaust cabinets should be cleanable
- f) These cabinets should have suction from bottom and top also.

- g) Designed flow rate should not be less than 1000 m<sup>3</sup>/hr. Distribution of exhaust air volume should be divided between fluff strainers to maintain the required pressure within the theatre without causing turbulence.
- h) Return air exhaust cabinet should be made from SS-304 and should be from the same manufactured of wall panel. Also it should match perfectly with ceiling system aesthetically.

## 6. PERIPHERAL LIGHTING AND CLEAN ROOM LUMINARIES

- a) To provide peripheral lighting and clean room luminaries with intensity min 500 Lux, it should be 10 in numbers for each OT. Luminaries cover should be made of highly resistant, disinfectant proof laminated safety glass/polycarbonate diffuser with stylish fine grained surface, glass pane with white coated steel frame.
- b) The white luminaries body should be made of sheet steel/ perfectly powder coated, supplied ready for connection optionally for individual or series circuit with digital electronic control gear.
- c) Recess frames should be gas tight. The fitting should be flush with the ceiling and should be removable from top or bottom. The light fitting should be uniformly and aesthetically distributed on the ceiling to provide uniform illumination in the OT. Light should not interfere when green mode endoscopy is performed
- d) Peripheral lighting should be done according to IP65 (international protection rating 65).
- e) Control equipment for the general lighting and the light dimming should be provided in the theatre control panel
- f) Size of Peripheral light shall be 2' x 2' or 3' x 1' or 581mm x 581mm

## 7. TOUCH SCREEN CONTROL PANEL 20" or more

- a) The control panel should be touch screen panel. This control panel should work as the central control panel for the HVAC controls, instruction board, light control, gas alarms, etc. It should be BIS/US FDA/European CE/UL/ETL.
- b) The touch screen should be wall mounted, stationed in the visibility line of the surgeon and OT staff. The access height should be convenient for the nurse to operate and help/assistant when in need.
- c) The panel should accommodate digital clock and the elapsed time indicator.
- d) The medical gas alarm should indicate high and low gas pressures for each gas service present in the OT and normal/low indication for vacuum. This should be supported by audible alarm also. The panel should have an alarm mute(fault annunciation) facility. The sensors (pressure switches) should be at the nearest isolation valve.
- e) Control for general lighting: On-Off to be provided.
- f) Control of the operating light (major and satellite On-Off operations to be provided

- g) Hand free telephone set with memory should be located at one side.
- h) Temperature and humidity control for the room connected to the AHU. (Adjustable from the panel) The controller should be capable of adjusting the temp adjustment of +/- 5 Deg with in 5Minutes wherever separate AHU is provided for each OT . "
- i) Digital room pressure indicator in cm of H2O or equivalent (signal from pressure sensor shall be provided to indicate pressure differential between OT and outside)
- j) HEPA filter bank differential pressure indicator.
- k) The Control Panel should be able to be integrated with HMIS/BMS/HIS
- l) The Control Panel should be able to display the Isolation Panel Alarm Conditions along with MGPS Alarm

## 8. X RAY FILM VIEWER

- a) LED type flat panel X-ray viewing panel should be supplied.
- b) This should comply with relevant electrical safety codes.
- c) Total 2 Nos Plates. Each panel should be able to illuminate films up to 14"x17" size. It may be One integrated wall Panel or adjacent.
- d) Mounting should be flush with the wall to avoid dust accumulation and growth of organisms between wall and panel.
- e) Body should be of extruded Aluminum powder coated with bacteria resistant and disinfectant resistant finish.
- f) The diffuser on the front panel should be a uniformly lit screen.
- g) Dimming electronic control should be enclosed at the bottom of the cabinet.
- h) Proper spring loaded film clip with rollers should be provided to hold the films firmly and to remove the film without scratches.

## 9. STORAGE UNIT

- a) The storage unit should be made with minimum 0.8-1.0 mm thick Stainless Steel panels material.
- b) The shelves should be of SS-304 with 2 or more. 25mm dia holes on each shelf for air circulation inside the Storage unit.
- c) The storage unit should be divided 2 or more parts and each part should have individual glass doors . Each glass door shall be with 6mm dia 2 or more holes on each half of storage unit. Storage unit shall be with high quality locking system. Bidder should provide suitable arrangement for continuous air circulation inside the Storage Unit to blow off stagnant air to prevent microbial growth.
- d) The overall size should be approx 200 cm X 120 cm X 40 cm / 210cmx120cmx35cm
- e) Should be flush mounted/built-in to MOT panel with same finish.



## 10. HATCH BOX

- a) A hatch should be provided in each operation theatre to remove waste materials from the operation theatre to dirty linen area/corridor just adjacent to Operation Theatre.
- b) Each hatch box should be equipped with two doors and the door should be operated electrically/motorized.
- c) The hatch should be designed in such a way that only one door should be opened at one time i.e. doors shall be interlocked.
- d) The UV light should be so installed that it is kept on while both the doors are closed. This UV light has to be automatically turned off in case of opening of either of the doors.
- e) Indicators should be provided on both sides of the OT so that door open / close status can be monitored from both sides.
- f) Hatch Box material should be of SS304.
- g) Size of the Hatch box minimum: 600mm x 600mm.

## 11. PRESSURE RELIEF DAMPERS

- a) Pressure relief dampers or over flow ports should be provided in each room to prevent contamination of air from clean and dirty areas.
- b) Suitably sized air pressure relief damper should be strategically placed, enabling differential room pressure to be maintained and ensure that when doors are opened between clean and dirty areas.
- c) Counter- weight balancing system should be provided in the PRD to maintain positive pressure inside the operation room.
- d) Air pressure stabilizers should have unique capability of controlling differential pressure to close tolerance. The PRD should remain closed at pressure below the set pressure and should open fully at a pressure only fractionally above the threshold pressure.
- e) The frame, body and blade should be of SS304 stainless steel.

## 12. HERMETICALLY SEALED SLIDING DOOR

- a) The door should be a hermetically sealed of HPL material, single sliding of size a. A - Door of 2.1 (H) X 1.5 m (W)
- b) The controller should be capable of being operated by elbow switches/foot switches as well as touch less sensor.
- c) The track should be of stainless steel/Aluminum and the running surface for the top rollers should be suitably angled to reduce resistance to movement
- d) The door leaf should be hung by means of hard plastic rollers of high quality with double bearing at the top. Rollers should be provided under the stainless steel/Aluminium track to enable smooth and noiseless movement.
- e) Opening and closing of the door should be microprocessor controlled electromechanical movement.
- f) The door material should be of HPL Colour should match the interior and care should be taken to make the leaf strong and light weight.

- g) One should be able to open and close the door effortlessly in case of failure of automatic mechanism.
- h) Door opening handle should be strong and sturdy. Material should be of SS (glossy/Matt finish). Should be provided with high quality cylindrical/ESPg lock.
- i) Door leaf should have high quality synthetic rubber gasket with long life to ensure hermetic sealing (to maintain air pressure differential). Air tightness 99.99% at a pressure of 100Pa.
- j) The finished floor on either side of the door should be perfectly level (maximum permissible difference+1mm).
- k) The overall thickness of the finished door should be 40 to 60mm. The inner part of the door should be filled with CFC free polyurethane foam thickness of 48mm or nearby. (Sealed airtight to prevent further ingress of any microbial organism).
- l) The door and controls should comply with BIS/IEE regulation/EU Directives. All motors used should be DC brushless/PMDC motors with essential isolation from mains.
- m) Door should be with vision window 300 mm x 300 mm with double glazed panels and hermetically sealed.
- n) Door movement should have minimum noise.
- o) The starting time after receiving the signal should be adjustable between 0.5 to 20 seconds.
- p) The door controller should be BIS/CE marked.
- q) Test certificate for hermetically sealed door frame (factory test certificate) should be enclosed with the pre dispatch documents.

#### 12A. **HERMETICALLY SEALED DOORS** (Size-2.1 X 1.0)

Same as Sl.No.-11

#### 13. **VIEW WINDOW (WITH MOTORIZED BLINDS)**

(1.5m x 1m /2m x 1.5m/1.2mx1m)

- a) View window with motorized horizontal Venetian blinds sandwiched in two parallel tempered glasses of thickness 5/6 mm should be complete with FHP Motor Control for 90° rotation.
- b) The Window frame should be powder coated Aluminum of approved shape flush mounted to wall panelling material with proper sealing.
- c) The entire assembly should be completely sealed and fitted with proper Aluminum/SMS profile.
- d) The assembled thickness of the Window should be minimum 33-40 mm. The window blinds should be operated with Remote Control/manually.

#### 14. OPERATING LIST BOARD

- a) One operating list board should be provided in each operating theatre.
- b) It should be made of ceramic having magnetic properties and should be flushed to the wall of the operating room.

#### 15. SCRUB STATION (1500mm minimum)

- a) Compact surgical scrub sink should be designed for use in OT complex providing for pre procedural scrub up.( Double sink combination as suitable)
- b) Each fixture should be fabricated from heavy gauge type 304 stainless steel (minimum thickness 1.5mm) and should be seamless welded construction, polished to a satin finish.
- c) The scrub sink should be provided with a front access panel which should be easily removed for access to the water controlled valve, waste connections, stoppers and strainers.
- d) Hands free operation should include infra-red sensors with programmable adjustment.
- e) Thermostatic mixing, valve control should be located behind the access panel and maintain constant water temperature.
- f) Timing should be adjustable to meet individual application requirements.
- g) Provided with infrared sensors, thermostatic control taps with fail safe temperature controls.
- h) All units should have reduced anti- splash fronts.
- i) Should have dispenser for soap/disinfection scrub solutions.
- j) Knee/foot operated switch should be provided additionally.

#### 16. ELECTRICAL INSTALLATIONS

- a) Power distribution within the OT should be "provided' from distribution boards located local to each theatre. Sub mains power to these panels should be by the general electrical contractor. From these panels all distribution services within the departments should be run. Isolated power supply, insulation measuring and protection as per IEC standards should be provided. The unit should be EN/CE/UL/FDA/IEC certified
- b) Institute/HSCC will provide one point supply at MOT.

- c) Light fittings within the clinical areas should be recessed LED type with control gear
- d) Earthed equipment bonding of all exposed metalwork should be provided.
- e) Power sockets within the Operating Theatres ancillary areas should be matched to the rest of the hospital.
- f) Fittings should be sealed In accordance with the standard IP54.
- g) All equipment should be fully and permanently labelled to identify and describe the function, operation and voltage of the apparatus concerned. Throughout and upon completion of the electrical installation, tests in accordance with relevant sections of the local wiring regulations should be carried out and the results recorded.
- h) Each wall of MOT should have minimum 02 Nos 6/16A hybrid Antibacterial switch socket & 32A industrial socket at any two walls as per IEC standard

#### **17. DISTRIBUTION BOARD**

- a) Distribution box, isolation transformer, leakage relays, cable tray, etc for OT should be under the scope of MOT contractor.
- b) All high voltage equipment should be installed in a separate enclosure. Bidder should provide two DB for each MOT should be installed with suitable wiring (One DB dedicated for UPS power supplies and Other for Raw power supplies to MOT equipment).
- c) The remote cabinet should house the operating lamp transformers, mains failure relays, UPS, electrical distribution equipment & circuit protection equipment for all circuits within the operating theatre.
- d) All internal wiring should terminate in connectors with screw & clamp spring.
- e) Connections of the clip- on type mounted, on a CE approved rail & labeled with indelible proprietary labels.
- f) Individual fuses or miniature circuit breakers should protect all internal circuits.
- g) Complete schematic drawing with description should be enclosed with the equipment.
- h) DB should have minimum two 32A/16A (As per requirement) extra circuits with MCCB/MCB for future

## 18. SURGICAL OT LIGHT WITH HD CAMERA

### A. OT Light – Dual dome LED

Operating Room Surgical Lighting System should provide an ideal combination of brightness, manoeuvrability, and shadow resolution without sacrificing color accuracy through a consistent LED technology.

Such Lighting System should have the following technical specifications:

- a) Number of Light heads : Two per suspension
- b) Colour Temperature range: 3800 k -5000 ( $\pm 10$  %) - Variable colour temperature. c) Field Size Diameter: 15 to 28cm (+/- 10%)
- c) Depth of Field : 750 to 1100mm (+/- 10%)
- d) Illumination Level : 160000Lux at both domes
- e) Controls : Control Panel (wall and on dome)
- f) Rotation : 360 -330degrees
- g) Sterilizable Handle: 02 Nos
- h) Mounting Type : Ceiling
- i) Supply Voltage : 230 VAC 50 Hz
- k) Bulb Type : LED
- l) Dimming Range : 50% - 100% or 30% - 80%
- m) Operating/Storage Humidity: 10-95%
- n) Life of Light Source : >40,000 Hrs
- o) Should have provision to mount the Camera in one dome
- p) Surgical Light System Should be compliant with relevant European CE with 4 digit /UL Listed/ETL/US FDA standards.

### **HD Camera System – 1080 p/i**

Integrated In-Light Camera System should be integrated at the centre of one of the domes of this lighting system/ third arm in order to capture images & video sequences of the open cases.

Such an autofocus – Locable camera should have the following specifications:

- a) Signal to Noise Ratio (S/N Ratio) : >50 dB
- b) CCD/CMOS : 1/3”or 1/2.8”
- c) Optical Zoom : 10X
- d) Digital Zoom : 12-15X
- e) Video Output : HD, DVI, S-Video & Composite Video
- f) White Balance & Gain : Automatic/Manual
- h) Light and Integrated Camera should have a control through Touch Panel of the control equipment placed inside the operating room (This feature is applicable only for integrated MOT only not applicable for non-integrated MOT.)
- i) It should be USFDA/European certified.

#### **HD LED FLAT PANEL MEDICAL GRADE MONITOR**

- a) Should be 30”-32” High Definition Progressive Scan Flat-panel Medical Grade Monitors with ceiling mounted spring arm suspension to support high definition/HDTV progressive Scan images and should be able to support and display DVI/HDTV, RGBHV, S-Video, Composite video signals. Aspect ratio 16:9/16:10. Resolution – 1920X1080 or better.
- b) The flat Panel suspension should be ready with the cables for integration of High Definition Digital(DVI/HDTV), RGBHV (High Resolution), SVHS (S-Video), Composite video signals to travel from the various sources of video like endoscopic camera, room camera, in light camera, high definition flat panel monitors, while assuring native resolution / signal.
- c) Monitor should capable of displaying from other sources like endoscope, microscope etc. necessary provision should be provided as standard.
- d) -HD Flat Panel Monitor should be done according to IP 54 regulations.

-ESG Safety Glass Cover is must to protect the Monitor Screen from breakage and for additional Safety of Patient.

-For optimizing the quality of Pictures, it should have Dicom Preset, BT 709, BT 1886 features.

-Video Connectors on the back side of Monitor is to be hide by Cover of Aluminum from the Back side of Monitor.

-Monitor should be integrated by Command Bar shown in the front side of Monitor.

-It should be BIS/USFDA/ETL/UL/European CE Declaration of Conformity.

## **19. PENDANTS FOR ANESTHETIST AND SURGEON**

### **19A DOUBLE ARM MOVEABLE PENDANT FOR ANESTHETIST**

- a) The Pendants should comply with NFPA 99C/HTM 02-01/ISO 7396-1/DIN. The support arms should be extremely robust and revolve on high quality bearings, so that the pendant head glides smoothly and quickly to any desired position
- b) Double moveable arms (any combination) with total coverage of min 1800mm and 330 deg. Horizontal movements for each arm. Vertical movement should be motorized and the arm height should remain to a height greater than 6.5 feet above floor level
- c) Weight carrying capacity of the arm should not be less than 150-180 Kgs. should have electromagnetic/pneumatic brakes
- d) Each arm should be capable of 300-340 degrees of rotation, which can be easily adjusted to suit the desired mode of operation.
- f) The Pendant Service Heads should be modular with 600-800mm head or more and pendants must accommodate all the fittings, all gases outlets, electrical switch & sockets and shelves. The heads should be capable of accepting a range of shelves, and infusion poles, electrical switches & sockets, gas outlets other accessories. The Pendant Heads should support the range of Physiological Monitor Mounting Solutions.
- g) The Pendant Service Heads should be supplied with medical gas terminal units and 5/15 or 6/16 Amps antibacterial hybrid sockets with switches.
- h) Double arm pendant anaesthesiologist : Each pendant should be supplied with outlets and probes as mentioned below :  
Oxygen Outlets – 2 nos., Vacuum Outlets – 2 nos., Nitrous oxide – 1 nos., Air(4 bar) Outlets - 2 nos., AGSS outlet - 1 no  
Electrical switch & sockets (Antibacterial) -10 nos.  
Shelf with two rails one on each side – 2 nos. or more IV Fluid Pole with 4 hooks – 1No. Data socket RJ-45 -2 nos.
- i) The pendants should be BIS/European CE certified with 4 digit notified body number/ USFDA/UL/ETL approved.
- j) Pendant supplier should provide cut outs for Patch Panels in Integrated OTs. (only for integrated OT)

- k) For Safety reasons, Pendant should have NIST Connection for Individual Gases, Manometer for each gas.
- l) Pendant should be supplied with Ceiling Flange Tube, Ceiling Plate from OEM along with shipment. It should not be fabricated in India.
- m) Pendant should have IV Pole with IV Hooks on both side required for operation.
- n) Shelf of Pendant should be made of High quality Bio- Clean Material.
- n) Pendant should have Anti-microbial Coating/Powder coating.
- o) For Safety reasons, all the Electrical Sockets should have Earthing Points

**19B DOUBLE ARM MOVEABLE PENDANT FOR SURGEON**

- a) The Pendants should comply with NFPA 99C/HTM 02-01/ISO7396-1/DIN. The support arms should be extremely robust and revolve on high quality bearings, so that the pendant head glides smoothly and quickly to any desired position
- b) Double moveable arms (any combination) with total coverage of min 1800mm and 330 deg. Horizontal movements for each arm. Vertical movement should be motorized and the arm height should remain to a height greater than 6.5 feet above floor level
- c) Weight carrying capacity of the arm should not be less than 150-180 Kgs. Should have electromagnetic/pneumatic brakes
- d) Each arm should be capable of 300 - 340 degrees of rotation, which can be easily adjusted to suit the desired mode of operation.
- e) The Pendant Service Heads should be modular with 600-800mm head or more and pendants must accommodate all the fittings, all gases outlets, electrical switch & sockets and shelves.
- f) The heads should be capable of accepting a range of shelves, and infusion poles or other accessories. The Pendant Heads should support the range of Physiological Monitor Mounting Solutions.
- g) The Pendant Service Heads should be supplied with medical gas terminal units and 5/15 or 6/16 Amps antibacterial hybrid Sockets with switches. Each pendant should be supplied with outlets and probes as mentioned below :



Oxygen Outlets-2 nos Vacuum Outlets – 2nos, Nitrous Oxide – 1 No., Air (7bar) Outlet- 01nos, CO2 Outlet - 01 nos.,  
Electrical switch & sockets (Antibacterial)- 10 Nos.  
Expandable shelf (minimum width: 70cm & Depth min. 45cm) – 3 Nos or more with two rails one on each side for hanging arrangement.  
Data socket RJ-45 -2 no.  
IV Fluid Pole with 2 hooks – 1No. (Pole should be capable of stacking 4 nos of syringe pumps)

- h) The pendants should be BIS/European CE certified with 4 digit notified body number/ USFDA/UL/ETL approved.
- i) Pendant supplier should provide cut outs for Patch Panels in Integrated OTs. (only for integrated OT)
- j) For Safety reasons, Pendant should have NIST Connection for Individual Gases, Manometer for each gas.
- k) Pendant should be supplied with Ceiling Flange Tube, Ceiling Plate from OEM along with shipment. It should not be fabricated in India.
- l) Pendant should have IV Pole with IV Hooks on both side required for operation.
- m) Shelf of Pendant should be made of High quality Bio- Clean Material.
- n) Pendant should have Anti-microbial Coating/Powder coating.
- o) For Safety reasons, all the Electrical Sockets should have Earthing Points

## **20. Medical Gas Pipe Line**

- a) The bidder should ensure that all works carried out as per HTM 02-01 /NFPA 99C / DIN/ISO 7396-1standard
- b) Bidder should provide Oxygen, Air4, Air7, Co2, Vacuum, AGSS, and Nitrous Oxide, etc. supply to Operation Theatres from the existing lines terminated outside the MOT.
- c) Bidder shall be responsible for supply, installation, testing and commissioning of complete MGPS system inside the operation theatre including Distribution piping, connection to Pendants, outlets and other essential accessories.
- d) Copper pipes should be of solid drawn, seamless, deoxidized, non-arsenical, half hard, tempered and degreased copper pipe. All copper

pipes should be degreased & delivered capped at both ends. The pipes should be accompanied with manufacturers test certificate for the physical properties & chemical composition. The copper pipe should comply with BS EN 13348:2008

- e) Copper pipe must have reputed third party inspection certificate (Eg. Lloyd's, TUV, SGS).
- f) Fittings should be made of copper and suitable for a working Pressure of up to 17 bar and especially made for brazed socket type connections.
- g) The copper fitting should comply with EN 1254-1
- h) The Brazing filler material should comply with EN 1044

## 21. RECORDING SYSTEM

- a) Recording system to be offered separately (Only for non-integrated OTs).
- b) Recording system should be full HD medical grade monitor LCD 19" touch screen or more and having the one TB storage space and 1 SSD in addition for operating system.
- c) Data cable for communication from both pendants and monitors should be laid down upto outside of OT in a patch port for future expansion for all OTs where there is no integration
- d) Patch panel for power & signal to be laid down for 31"-32" LCD Monitor at wall of MOT
- e) Recorder should be capable of recording video from other sources like-microscopes, endoscopes etc. suitable provision should be provided as standard.
- f) Should be flushed mounted on the OT wall with suitable frame
- g) Recording system should be integrated streaming with streaming.
- h) ESG Safety Glass Cover is must to protect the Monitor Screen from breakage and for Additional Safety of Patient.
- i) Recording system should be done according to IP 54 regulations. j) Recording System should have P-CAP Multi-Touch Display
- k) It should be BIS/USFDA/ETL/UL/European CE Declaration of Conformity.

## 22. MONITOR –DIGITAL DISPLAY

- a) Medical grade monitor size should be minimum 32 inch.
- b) Should be integrated with hospital PACS. Vendor has to do the necessary coordination with PACS/HMIS contractor or hospital authorities for connecting the monitor to hospital PACS/HMIS.

- c) If PACS/HMIS is not available in the hospital, vendor should terminate all monitors connection to switch (should be located at MOT corridor) from where hospital will connect further.
- d) Monitor should be flush mounted with suitable frame in MOT wall. Frame should be openable/serviceable for service.
- e) HD Flat Panel Monitor should be done according to IP 54 regulations.
- f) ESG Safety Glass Cover shall be used to protect the Monitor Screen from breakage and for additional Safety of Patient.
- g) For Optimizing the quality of Pictures, kindly add it should have Dicom Preset, BT 709, BT 1886 features.
- h) Accessories like keyboard and Mouse is to be provided along with PACS Monitor.
- i) Video Connectors on the back side of Monitor is to be hide by Cover of Aluminum from the Back side.
- j) Monitor should be integrated by Command Bar shown in the front side of Monitor.
- k) It should be BIS/USFDA/ETL/UL/European CE Declaration of Conformity.

### **23. Online Central UPS**

The room for the central UPS will be provided by the respective institute/hospital preferably at same OT floor and one point electric supply will be provided to the UPS Room by the respective institute/hospital.

Bidder should provide required electrical wiring from UPS to all modular MOT as per IEC/International standard.

Electrical control panel complete with MCCB, Switchgears etc should be provided **for distribution of power.**

Per MOT UPS load should be provided minimum **20 KVA with one 20 KVA** backup for all OTs and redundancy (n+1) should switch automatically. The battery bank may be common for UPS.

For eg. If there are 10 MOT, the USP should be 20KVAx10 and one 20KVA as standby, total 200KVA+20KVA and battery bank may be common, also if MOTS are in 2 places like, 6 MOT at 4th floor and 4 MOT at 3rd floor, in this case bidder has to provide 6x20KVA +20KVA and 4x20KVA+20KVA or bidder may offer 20KVAx10 +20KVA but wiring from UPS room to all floor should be done by bidder only.

UPS make – APC / TATA Liebert / Delta / Hitachi/ Consul Neowatt/3EM/Uniline

### **24. Turn Key Job to be provided by the Bidder**

1. Commissioning and installation of wall & ceiling panelling, Frame Structures & substructure, PVC flooring, Lighting, Touch Screen Control Panel, laminar flow, pendants, OT Light, Painting (if any), electrical work, ups, windows (if any) and Doors, etc. as per technical specification.

2. All cable MS conduit, trenches and railings wherever required.
3. All electrical accessories like cable wire, electrical outlets, switches, Control panels, etc should be fireproof, of reputed make, certified for electrical safety.
4. Bidder has to provide and install hatch box, storage shelves, scrub basins and other service areas as mentioned in the tender.
5. Testing, Installation and commissioning of all equipment/services.
6. Any other necessary work required for satisfactory working/performance of the modular OT and not mentioned/specified.

**5. Site Modification Work:** Site Modification Work is indicated in the technical specification of the respective items, wherever required. The Tenderer shall examine the existing site where the equipment is to be installed, in consultation with HOD of Hospital concerned. Site Modification Work details of each Hospital are given at the end of Technical Specification. The Tenderer to quote prices indicating break-up of prices of the Machine and Site Modification Work of each Hospital. The Site Modification Work costs to be quoted in Indian Rupee will be added for Ranking Purpose.

The taxes to be paid extra, to be specifically stated. In the absence of any such stipulation the price will be taken inclusive of such duties and taxes and no claim for the same will be entertained later. The Site Modification Work should completely comply with AERB requirement, if any.

**Note 1: General:** Bidders are requested to make sure that they should attach the list of equipment for carrying out routine and preventive maintenance wherever asked for and should make sure that Electrical Safety Analyzer / Tester for Medical equipment to periodically check the electrical safety aspects as per BIS Safety Standards IS-13540 which is also equivalent to IEC electrical safety standard IEC-60601 is a part of the equipment s. If the Electrical Safety Analyzer/Tester is not available they should provide a commitment to get the equipment checked for electrical safety compliance with Electronic Regional Test Labs / Electronics Test and Development Centres across the country on every preventive maintenance call.

**Note 2:** Adequate training of personnel and non-locked open software and standard interface interoperability conditions for networked equipment in hospital management information system (HMIS)

The successful tenderer will be required to undertake to provide at his cost technical training for personnel involved in the use and handling of the equipment on site at the institute immediately after its installation. The company shall be required to train the institute personnel onsite for a minimum period of 1 month

All software updates should be provided free of cost during warranty period and CMC Period.

### **Note 3: DISMANTLING AND DEMOLISHING**

Providing all tools, tackles, manpower for demolishing /dismantling, alteration/addition for lime concrete, cement concrete, R.C.C, R.B work, precast concrete or stone slabs in walls, partition walls , stone rubble masonry, dressed stone work, ashlar face stone work, marble work or precast concrete work, dismantling doors, windows and clerestory window (steel or wood) shutter including chowkhats, architrave, holdfasts etc. CI or asbestos rain water pipes of any diameter with fittings and clamps, dismantling G.I. pipes (external work) including excavation and refilling trenches after taking out the pipes, taking out doors, windows and clerestory window shutters (steel or wood), wood work in frames, trusses, purlins and rafters, dismantling steel work in single sections including dismembering and stacking, dismantling steel work in built up sections in angles, tees, flats and channels including all gusset plates, bolts, nuts, cutting rivets, welding etc., old plaster or skirting raking out joints and cleaning the surface for plaster, dismantling of R.C.C. spun vent shaft including excavating the cement concrete pit completely, taking out the shaft, refiling the excavated gap, stacking the useful materials near the site extra for cutting reinforcement bars, Dismantling aluminium/ Gypsum partitions doors, windows, fixed glazing and false ceiling including disposal of unserviceable surplus material and stacking of serviceable material within 1000 meters lead and any other work as directed by engineer-in-charge. Disposal of building rubbish/ malba/ similar unserviceable, dismantled or waste materials by mechanical means, including loading, transporting, unloading to approved municipal dumping ground or as approved by Engineer-in-charge.

### **RESPONSIBILITY OF BIDDER**

1. Bidder shall be responsible for complete design, construction, testing and commissioning of modular operation theatres.
2. Bidder shall execute all required civil, electrical and peripheral lighting, plumbing, air-conditioning system(Ducting inside the OT), demolition and other works as may be required for complete installation and trouble-free functioning of the operation theatres as a part of the “turnkey work”. Necessary coordination with fire-safety vendor for the installation of fire safety sensor/instrument inside the MOT and also other necessary coordination with civil contractor to be done by the MOT bidder.
3. The bidder shall be responsible for the complete works including the submission of Working Drawings, and walk through view.

4. Bidder shall be responsible for installation and commissioning of medical equipment for MOT in coordination with respective institute/hospital authorities.
5. Deleted
6. Bidder shall be responsible for free maintenance with spares of modular operation theatres during warranty period.
7. Bidder shall be responsible for commissioning of Medical Gas pipe lines, Pendants, LED OT Light and Gas outlets for the OTs and other associated works to make MOT fully functional. MOT Bidder should coordinate with MGPS, Integration and other vendors for the successful completion of MOTs.
8. Bidder shall be responsible for maintaining suitable air conditioning inside the operation theatre (Ducting inside the OT). Setting and monitoring of temperature and RH should be in the scope of the MOT.(Necessary coordination with HVAC vendor to be done by the MOT bidder)
9. Bidder should provide factory test certificates for the material used for the construction of modular theatres.
10. Bidder should supply complete set of Operation manuals, service manuals and As-Built drawing for all the systems and subsystems supplied.
11. Training should be provided for a week by the vendor.
12. Final electrical safety test, system test, and calibration should be done by authorized persons using calibrated test equipment.
13. OEM or his authorized agent should post a trained engineer who should be available at site or should reach the site within 24 hrs of raising a service call.
14. Regarding Outlets of the Anesthesia & surgeon Pendants, bidders have to supply same type of outlets as installed in the same building/block. Before shipment of the Pendants, bidders should take necessary action for selecting the same outlets.
15. Deleted.
16. Third party quality certification of the equipment from SGS/TUV/Lloyds/Bureau Veritas should be submitted by the contractor as “Certifies that the Modular OT items meet the technical specification and BOQ of the tender document vide contract No (Mention Contract No.)”
17. Third party test certificate and manufacturer test report for the items/equipment should be provided at the time of pre-despatch inspection.

18. Deleted

## **TECHNICAL SPECIFICATION FOR PNEUMATIC TUBE TRANSPORT SYSTEM (PTTS)**

### **Scope of Work:**

**Execution including Supply, Installation, Testing and Commissioning (SITC) of Pneumatic Tube Transport System on Turnkey basis and handover to the client in satisfactory condition and providing of free spares and labour for maintenance during 1 years defect liability period.**

**Bidder shall quote all items of the BOQ. At the time of Notification of Award (NOA) bidder may be entrusted to execute SITC of PTTS by supplying all items as per BOQ OR NOA may be issued after dropping some of the items like Pneumatic tubes 160mm dia. with Bents, Cables and other miscellaneous accessories, Diverters and Linear Coupler/Line Transfer zone etc from BOQ.**

**PTTS contractor should be solely responsible for completion of PTTS project as per approved SLD/Drawing and smooth functionality of PTTS at Neuroscience PGI Chandigarh after installation.**

### **System Requirements:**

1. The facility of PTTS must have the provision of self-sorting and be able to transport multi types of sample like Vacutainers/Urine container/Biopsy sample/ Blood clot sample etc.
2. Supply of Pneumatic Tube Transport System (PTTS) of 160mm pipe (outer diameter) Network, with transfer speed ranging from a minimum transfer rate of 3 m/s to maximum rate of 4 m/s; as per specifications.
3. The Primary function of the PTTS is to transport bio-samples, medicines & Blood bags etc to and from various locations/departments within the Institute.
4. The Carrier or Container should be able to carry loads weighing 3-4 kg.
5. **The Pneumatic Tube Transport System (PTTS) shall cover the entire hospital building.**

### **1. MAIN CONTROL SYSTEM:**

- a) The entire Pneumatic Tube Transport System (PTTS) has to be electronically controlled by Dedicated Computer / microprocessors / digitally with software unit and the main control unit, which controls the sending and receiving process and the compressor unit and supervises all system components.
- b) The Main Control System of the PTTS must remain fully operational at all times without any restrictions in the event of errors detected in the system.
- c) The sending process has to be indicated on the display of the Main Control System. The Main Control System has to provide information to find the cause of a system malfunction. Customer-specific data such as the system's layout, Target / Station numbers, target names, arrival signals, and priority and special functions must be



selectable onsite without change or external reprogramming of memory devices of the Main Control System.

- d) The Main Control System should have ability to store all data regarding carrier destination, so that, the PTTS when restarted after mains power failure, should automatically start functioning normally and the system status is restored to what it was while power failure. Carriers must be delivered to their assigned target/station address automatically after power restoration without any manual intervention.
- e) All components of the PTTS should be constantly monitored; the operating software has to be based on action-reaction control for any carrier. The status of each carrier should be checked by the master control unit/system.
- f) A test program must be included in the Main Control System, so as to automatically check, move and supervise all of the system's carrier, or specific selected carrier from the master control unit.
- g) During both normal operation and testing, all devices (namely Carriers and Stations) should be able to communicate to the Main Control System that the selected functional position has been reached. The PTTS should be designed in such a way that it has facility for error detection of stations.
- h) Main Control System should also allow the transfer to continue functioning with a robust fault-clearance program that automatically recognizes operating errors, power failures, time-out errors and other system errors.
- i) It should be possible to designate a particular station as Recovery Station wherein carriers which have been lost in transit can be returned / recovered.
- j) Control unit : The system is fully automatic computer control and supervising centre that controls and monitors all transmissions within the whole system on a continuous basis. The Control unit should be connected to HMIS/BMS to report system failures. The control unit is provided with licensed software that a) enables configuration of the whole system (b) Controls and monitors the operation of the whole system (c) Enables fully analyses based on self-creating log files. (d) Graphical display is provided to display the system schematic together with the operating status of all components. (e) The control unit has a simulation mode for training and testing. (f) the control unit log all the transactions in the system to the hard disk.

## **2. LINE TRANSFER ZONE/LINEAR COUPLER:**

The PTTS should be provided with a “Line Transfer Zone Mechanism” which allows the interface between all the transport lines of the PTTS, so as to allow smooth transfer of carriers between the transfer lines, providing smooth and uninterrupted operation of the PTTS.

The Line Transfer Zone Mechanism should have the following features:

- a. Contactless positioning, two direction operation.
- b. Carrier designated as “Emergency-Carrier” should be able to physically overtake the normal carriers in the PTTS within the Line Transfer Zone Mechanism using line prioritisation.
- c. Should be equipped for transporting of emergency carrier on priority.
- d. Should be able to accommodate multiple carriers within the Line Transfer Zone Mechanism, so as to prevent stacking of carriers within the incoming lines.
- e. The Line Transfer Zone Mechanism shall operate without any manual intervention.

Integrates all priority and slow speed transactions. Adequate capacity to cater Neurosciences Block work load. Smart multi storage system. Silent and shockproof transport, suitable for

blood transport and other bio hazard materials. Designed for intensive use. Long lifespan. Easy installation. Service and maintenance friendly, requires a minimum of service. Low energy consumption. Meets the BIS/CE guideline 2006/42/EC for mechanical engineering and the EMC standard 2004/108/EG

### **3. SIDE CHANNEL BLOWER WITH SPEED CONTROL (VFD)**

- a) Independent Blowers of maximum power consumption of 5.5/6 KW, 3-phase 400v/50Hz each, low noise, unidirectional rotation with electronic air switch to switch between compressed air and vacuum. Each blower should be provided with a system to Control frequency of the blower which will further control the speed of the carrier for transferring sensitive laboratory samples at lower transfer speed of 3-4 m/s.
- b) To be provided with all accessories and mounted on vibration proof arrangement.
- c) Solid particles or contaminants must be withheld using the filters before entering the side channel blower.
- d) The open intake and discharge ports should be protected by wire guards

### **4. TOP LOAD STATION 160mm:**

NW 160 mm Stainless steel station, pass through type having LCD display, backlit, soft membrane touch buttons, full multiline 3 line/5 line display with 16 characters per line or more including RFID reader circuit board and optical sensors built-in pneumatic pressure trough passage for sample safety.

The Pneumatic Station should be designed as a fully automatic dispatch and receiving unit and used as pass- through station.

The Pneumatic Station should be able to send and receive containers.

The conveying direction of the containers should be both sided (single tube reversing principle).

Inserting a container into the Pneumatic Station and selecting a target number should be possible independent from system status.

The container should be loaded on the top side of the Pneumatic Station.

The Pneumatic Station should be Steel made, maintenance free mechanism, with self-adjusting optical switches, with self-adjusting maintenance free gaskets for noise less operations, contact less censoring of the unit positions. There should not be any air exiting at the pneumatic station. Front load stations should be equipped with RFID Readers for container ID and inventory, which should ensure automatic container redistribution to its home address & also non-acceptance of any items than authorized container.

The Pneumatic Station should have Air cushioned soft landing facility for arriving container to protect samples. Provided with container rack and receiving basket with cushion.

Design – All Stations must have a modern front loading/Top loading design with a safety door and must be manufactured of moulded hygienic closed cell materials.

The station should be capable of detecting strange object this ensures stuff cannot send anything other than Pneumatic capsules. Return to sender – The stations must have the capability of automatically returning the carrier to the sender once the receiving party removes the items, he/she receives and places the carrier back in the station. Top loading station with safety door and must be manufactured of moulded hygienic closed cell materials.

## **5. Multi Receive Station**

The Pneumatic Station should be able to send and receive containers from the same unit.

Inserting a container into the pneumatic station and selecting a target number should be possible independent from system status.

It should control the condition of the receiving station when sending to the selected receiving station is possible.

It should be Microprocessor-controlled.

The main Lab should be provided with Multi Receive to handle bulk loads.

It should be designed as a fully automatic dispatch and receiving unit and can only be used as end station.

The Pneumatic Station should be Steel made, maintenance free gear mechanism, with self-adjusting optical switches, with self-adjusting maintenance free gaskets for noise less operations, contact less sensing of the unit positions.

With RFID readers for container ID and inventory, which should ensure automatic container redistribution to its home address & also non-acceptance of any items than authorized container.

It should be built in a way that in case of power failure carriers in the transit will be stopped in the tubes. During power failure, Online UPS with PTTTS will keep its Computer system and its program alive and the carriers will move as per its predesignated destinations as soon as the power will be restored in the Blowers and Pneumatic tube system.

It should have Air cushioned soft landing facility for arriving containers to protect samples.

It should be provided with container rack & PVC Slide bend/Stainless steel receiving Platform/Bend, sliced from the top for soft landing of the samples.

## **6. Compact End Station**

The Pneumatic Station should be designed as a fully automatic dispatch and receiving unit and used as end station.

The Pneumatic Station should be able to send and receive containers.

Inserting a container into the Pneumatic Station and selecting a target number should be possible independent from system status.

The Pneumatic Station should be controlled by the use of the integrated Touch Panel Display for the following features:

1. 7'' to 9'' touch screen display with multifunctional operation screens
2. Touch panel operation via finger, safety gloves or styluses
3. Individual programmable user profiles and customized hotkeys
4. Individual authorization levels for personalized users profiles
5. Touch screen surface protection for easy cleaning addressees are individually programmable; Search button and addressee index simplify the usage.
6. Bar Code Reader for Pharmacy Stations and Blood Bank Stations

The Pneumatic Station should be Steel made, maintenance free gear mechanism, with self-adjusting optical switches, with self-adjusting maintenance free gaskets for noise less operations, contact less sensoring of the unit positions.

There should not be any air exiting at the pneumatic station.

With RFID readers for carrier ID and inventory, which should ensure automatic carrier redistribution to its home address & also non-acceptance of any items than authorized carrier.

It should have Air cushioned soft landing facility for arriving carrier to protect samples. Provided with carrier rack and receiving basket with cushion.  
Dimensions: (60 x 50 x 50 cm) Approx. to occupy least possible space.

In the case, the PTS End stations are placed in the areas with increased air exchange, areas to be protected from contamination; areas causing potential contamination should use of filters at the end of the tube is must for sensitive clinical areas in which a pneumatic dispatch end – Air filter for inlet air transport Class H 14. Return to sender – The stations must have the capability of automatically returning the carrier to the sender once the receiving party removes the items, he/she receives and places the carrier back in the station.

Compact End station must be manufactured of moulded hygienic closed cell materials.

## **7. CARRIERS WITH RFID:**

- a. Carriers for hospital use should be with easy to operate with swivel top mechanism, sealed load chamber to prevent contamination of tubing in the unlikely event of spill

of transported goods.

- b. The carrier lid shall be closed in a “LOCKED” position. The lid should be kept locked by a spring force and has to be equipped with seals to prevent accidental opening of the carrier in transit. Furthermore, the design of the carrier shall ensure that an open carrier can't be sent.
- c. Every carrier has to be equipped with two free programmable data transponders. transponders are used to electronically identify any carrier by a unique address and to offer the user automatic redistribution to home Station and optionally a second address for dedicated locations or special carrier use.
- d. The carriers must be provided with an easily visible wear and tear resistant colour coding system, with caps/bands/stickers.
- e. Standard 160mm Carrier loading dimension may be read as Standard 160mm Carrier Loading Dimensions are 330 x 160mm / 330 X 120mm.
- f. To be provided with suitable holders of vacutainers and a pair shuttle bung for each carrier.

## **8. RADIO FREQUENCY ID (RFID)**

The system should be provided with an integrated Radio frequency ID (RFID) solution within the Stations, Carriers as standard supply, so that proper management of carriers can be achieved; especially the return of empty carriers. The RFID system has to be built-in to all stations and carriers. No separate module of RFID system shall be used in any station for carrier / station authentication. The RFID system shall be programmed so that it shall not allow anything other than legitimate carriers to go in the PTT system.

## **9. DIVERTERS (THREE-WAY)**

The routing device shall consist of One incoming and Three outgoing delivery tubes. It should Air Tight with Steel Housing and provided with Optical Sensors. The Routing device must provide smooth connection between incoming and outgoing tube, to prevent impact on transported items. The Routing device must consist of a maintenance-free rotary oscillating pipe in a pneumatically sealed device housing to prevent air loss with self-adjusting Teflon gaskets/gear driven S-tube technology providing airtight operation in negative as well as positive pressure operation.

## **10. FORWARDING TUBE (Grey & Transparent):**

Every Station and Routing device must be provided transparent tube. The forwarding tube should be made of medium density PVC of 160 mm Outer Diameter and 153-154 mm (approx.) Inner Diameter ie. with thickness of approx. 3.2 mm with properties such as good Physical tensile strength, absorption of water, self-extinguishing.

## **11. BENTS (Grey & Transparent):**

It should be of 90 deg. with radius not more than 800 mm (centre) with length approx 1.5 metre, for optimal space utilization.

12.

**MISCELLANEOUS: -**

160mm Pipe clamp, Screw bolts, Cable Tie, Clips, 90 Deg Bends for Air Tube, Dowel, PVC Conduit for Cable, Baskets, Cushion, insert for carrier PU Foam including other misc. items Complete with all accessories as per detail technical specification

**COMPOSITE SYSTEM CABLE:**

Forwarding tube should be supplied with the necessary cable and other tube mounting accessories for networking between Pneumatic Stations. It should not be localized and it should be supplied from the principal equipment manufacturer with company brand name marked.

**INSERTS:**

Cushion Bag or Foam Pad for holding vacutainers.

**13. ONLINE UPS:**

Uninterruptable Power Supply shall be provided for Main Controller. It should be of reputed make of capacity 3KVA, Back-up of minimum 30 minutes power backup for Main Control System & peripherals excluding Blowers.

**14. QUALITY CONTROL**

The Contractor must ensure that the works conform to the quality standards and to the satisfaction of the Institute. The contractor shall submit his quality plan in accordance with the above. The works and materials shall be subject to tests from time to time as per best practices in the industry. Wherever mentioned in the Contract, the tests must be carried out at the Contractor's expense. The materials shall be procured from reputed vendors approved by the Institute's Engineer. The Contractor must also supply samples to the Institute's Engineer for his approval and also carry out the tests as and when required by the Engineer.

**15. TESTS AFTER COMPLETION**

After completion of the project, the Institute may carry out the tests after completion, which shall be carried out under normal operating conditions to assure that the system performs well under normal operating conditions. These tests will include but not limited to:

- i) Running of equipment and system as a whole to a minimum of 7 days.
- ii) System specific tests and equipment specific test
- iii) Any other test which Institute intends to carry out to check the stability and reliability of the system.
- iv) Any defects if pointed out in the tests after completion shall be ratified at Contractor's expense and within time as deemed reasonable by the Institute.

## **16. MAINTENANCE AND TRAINING REQUIREMENTS FOR SYSTEMS, MACHINES AND EQUIPMENT**

- i) The Contractor shall maintain the system during the defects liability period. The Contractor shall submit Operation manuals, Maintenance manuals and As-Built drawing.
- ii) The Contractor shall train the staff of the Institute for proper operation and essential trouble shooting of the system. The Contractor shall make arrangements for demonstration & trial run before commissioning of the system.
- iii) PTT system may be expanded to other blocks/new buildings coming in the campus. Unit rates coated shall apply for such cost

## **17. TURNKEY WORKS**

- a. Bidders are strongly advised to visit the site and carry out the assessment of works before bidding.
- b. Area dedicated for plant room is available at site.
- c. Plant room should aesthetically look good and all the tubes, cables, diverters etc. should be properly routed.
- d. All electrical work required for commissioning and installation of equipment like cable wire, electrical outlets, switches, cable trenches, railings, etc. should be fire proof, of reputed make, certified for electrical safety as per international standard. All work has to be done by the bidder including Electrical Isolators, MCBs, Electrical boards, Switches, Sockets and any other thing which are required for smooth running of Equipment.
- e. Institute will provide one point electrical supply and further distribution within the plant room will be responsibility of bidder as per approved layout.
- f. Carry out the complete partitioning/separation of the work site with controlled access.
- g. Bidder has to provide sound proof (noise level below 65 dB) enclosure/ room for the operator in the plant room.
- h. Provide all necessary safety equipment to site as per international guide line.
- i. Ensure that signage are posted all around (Work permit, hot work permit, Site inspection check list, etc).
- j. Carry out the Civil work including core cut, wall breaking and complete flooring inclusive of all materials.
- k. Carry out any other finishes required in the area of work such as wall protectors, corner guards, etc.
- l. Air conditioner and electrical wiring/data cable wiring for PTTS to be provided by the vendor as works on turnkey basis. Electrical supply at single point to be provided by HSCC/PGI. Power may be available at site but payment to be made by the vendor for consumption of electricity. In case power supply is not available at site, vendor has to arrange of its own.
- m. Supply, install, testing & commission the Electrical Control Panels, distribution box, circuit breaker, fire sensors & extinguishers and cabling from the nearest mains power supply. Re- routing all electrical, fire safety, telephone, security & network cables as per planning and design.
- n. To be Carried out all plant area renovation, maintenance and preparation, including, doors, furniture, windows, tiles, ceilings, lights, painting etc.

**Note 1:** General: Bidders are requested to make sure that they should attach the list of equipment for carrying out routine and preventive maintenance wherever asked for and should make sure that Electrical Safety Analyzer / Tester for Medical equipment to periodically check the electrical safety aspects as per BIS Safety Standards IS-13540 which is also equivalent to IEC electrical safety standard IEC-60601 is a part of the equipment. If the Electrical Safety Analyzer/Tester is not available they should provide a commitment to get the equipment checked for electrical safety compliance with Electronic Regional Test Labs /Electronics Test and Development Centres across the country on every preventive maintenance call.

**Note 2:** Adequate training of personnel and non-locked open software and standard interface interoperability conditions for networked equipment in hospital management information system (HMIS)The successful tenderer will be required to undertake to provide at his cost technical training for personnel involved in the use and handling of the equipment on site at the institute immediately after its installation. The company shall be required to train the institute personnel onsite for a minimum period of 1 month All software updates should be provided free of cost during warranty period and CMC period

**Note:**

1. **Deleted**

2. **After Sales Service:**

After sales service centre should be available at the city of Hospital/Institution/Medical College on 24 (hrs) X 7 (days) X 365 (days) basis. Complaints should be attended properly, maximum within 8 hrs. The service should be provided directly by Tenderer/Indian Agent. **Undertaking by the Principals that the spares for the equipment will be available for at least 10 years from the date of supply.**

3. **Training:**

On Site training to Doctors/ Technicians/ staff shall be provided by Principal/ Indian Agents (if they have the requisite know-how) for operation and maintenance of the equipment to the satisfaction of the consignee.

4. Deleted

**Responsibility of bidder**

Bidders are strongly advised to visit the site for assessment before the submission of tender offer

1. Bidder shall be responsible for complete design, supply, installation, testing and commissioning including turnkey works, demolition and construction as applicable. The bidders are required to survey the site before furnishing the quotations.



2. Bidder shall execute all required civil, electrical, plumbing, lighting, fire safety, exhaust systems and other works as maybe required for complete installation and trouble-free functioning as a part of the 'turnkey work'.
3. Hospital will provide one point electrical supply with isolator in the plant. The wiring, peripheral lighting, fans, exhaust etc have to be done by the bidder.
4. The bidder shall be responsible for the complete works including the submission of working drawings, and isometric views, detailed work schedule and materials. Bidder shall be responsible for design, supply, installation, testing and commissioning of medical gas supply system in coordination with respective institute authorities & HSCC.
5. Bidder shall be responsible for free maintenance of all component of PTT system during warranty period including all filters & consumables.
6. Bidder should provide factory test certificates for the materials used. Bidder should supply complete set of manuals, **Operation and Service manuals and As-built drawing** for all the equipment, systems and subsystems supplied. Final electrical safety test, system test, leakage and calibration should be done by authorized persons using calibrated test equipment as per standards.
7. **Third party quality certification of the PTTS equipment** from SGS/Lloyds/Bureau Veritas should be submitted as "Certifies that the PTTS equipment meets the technical specification and BOQ of the tender document".
8. Based on the building drawings to be provided, **Bidder has to submit drawing and data sheet within 15 days after Letter of commencement.**
9. Bidder should be responsible for suitable arrangement of Ventilation/ Air-condition as per offered PTTS plant requirement/recommendation from the Manufacturer and as per local site condition for 24 x 7 as per requirement.
10. Bidder should be responsible for dedicated earthling (Chemical type) for PTTS Plant room (If required)
11. Bidder has to design the PTTS as per the approved SLD and technical specification mentioned in the tender, any clarification/suggestions regarding design of PTTS should be submitted at Pre-bid meeting.
12. Bidder has to clarify their doubts or prerequisites during pre-bid meeting. Bidder has to submit the list of prerequisites along with bid. No further pre-requisite/requirement after placement of NOA will be addressed.
13. Zoning of PTTS should be done to meet the peak flow requirement with suitable back up arrangements for all services, if required.
14. The bidder must ensure that they have Authorization from Manufacturer for all the major equipment.
15. The contractor (after award of work) will coordinate with other contractors for the related works/services like Civil, Electrical, MOT, MGMS, IT etc. for proper integration of all the services and timely completion of the works.
16. **It should have import/manufacturing license from Central licensing Authority or**

**State licensing authority of CDSCO for the product and copy of valid license should be submitted, if applicable.**

**BOQ- CSSD****Package - Supply, Installation, Testing and Commissioning of CSSD Equipments with one (1) year of Defect Liability Period****Rate shall be inclusive of all charges, freight, insurance, GST@18% etc.**

<b>Item No.</b>	<b>Description</b>	<b>Unit</b>	<b>Qty</b>	<b>Unit Rate in Rs.</b>	<b>Amount in Rs.</b>
	<b>PART-I</b>				
1.0	<b>HORIZONTAL DOUBLE DOOR AUTOCLAVE 500-600 Litres (8 STU or More) WITH ACCESSORIES Complete with all accessories as per detail technical specification.</b>	Nos	2		-
					-
2.0	<b>HORIZONTAL DOUBLE DOOR AUTOCLAVE 840-1000 Litres (12-15 STU or more) WITH ACCESSORIES Complete with all accessories as per detail technical specification.</b>	Nos	1		-
					-
3.0	<b>ETHYLENE OXIDE STERILIZER (ETO) Size- 250L Complete with all accessories as per detail technical specification.</b>	Nos	1		-
					-
4.0	<b>DOUBLE DOOR WASHER DISINFECTOR 250-300 Litre (10-12 DIN Trays) WITH ACCESSORIES Complete with all accessories as per detail technical specification.</b>	Nos	1		-

					-
5.0	<b>ULTRASONIC CLEANER (40 - 45 L) Complete with all accessories as per detail technical specification.</b>	Nos	1		-
					-
6.0	<b>COMPRESSOR 7.5 hp Complete with all accessories as per detail technical specification.</b>	Nos	1		-
					-
7.0	<b>HEAT SEALING MACHINE Complete with all accessories as per detail technical specification.</b>	Nos	2		-
					-
8.0	<b>SPRAY GUN RINSER Complete with all accessories as per detail technical specification.</b>	Nos	1		-
					-
9.0	<b>DRYING CABINET 275 L Complete with all accessories as per detail technical specification.</b>	Nos	1		-
					-
10.0	<b>GAUZE CUTTING MACHINE Blade size - 200 mm Capacity- 165 mm Complete with all accessories as per detail technical specification.</b>	Nos	2		-
					-
11.0	<b>MULTI-ROLL TAPE DISPENSER Complete with all accessories as per detail technical specification.</b>	Nos	2		-
					-
12.0	<b>DOCUMENTATION LABELLER Complete with all accessories as per detail technical specification.</b>	Nos	1		-

					-
13.0	<b>WASH STATIONS WITH 2 SINKS FOR DIRTY AREA Size Approx. (L x W x H) : 2000x750x850 mm Complete with all accessories as per detail technical specification.</b>	Nos	1		-
					-
14.0	<b>SS WORK TABLE SIZE-1200X650X900 Complete with all accessories as per detail technical specification.</b>	Nos	4		-
					-
15.0	<b>CONTROL &amp; PACKING TABLE WITH TWO SHELVES FOR CLEAN AREA Complete with all accessories as per detail technical specification.</b>	Nos	3		-
					-
16.0	<b>WIRE STORAGE SHELF MODULE FOR DIRTY/DISINFECTION AREA/CLEAN/STERILE AREA Complete with all accessories as per detail technical specification</b>	Nos	3		-
					-
17.0	<b>PASS BOX Complete with all accessories as per detail technical specification.</b>	Nos	3		-
					-
18.0	<b>CLOSED TRANSPORT TROLLEY FROM STERILE STORE TO OT Size : 1400x750x1260 mm(LxWxH) (External) approximately Complete with all accessories as per detail technical specification.</b>	Nos	4		-
					-
19.0	<b>Table Trolley with 2 shelves 530x1080x800 H Complete with all accessories as per detail technical specification</b>	Nos	3		-

					-
20.0	<b>MODULAR STERILIZING BASKETS BIG Complete with all accessories as per detail technical specification.</b>	Nos	50		-
					-
21.0	<b>MODULAR STERILIZING BASKETS MEDIUM Complete with all accessories as per detail technical specification.</b>	Nos	50		-
					-
22.0	<b>BASKET RACK suitable to accomodate Baskets Complete with all accessories as per detail technical specification.</b>	Nos	6		-
					-
23.0	<b>STORAGE RACK 5 SHELVES 1830X535X1830 Complete with all accessories as per detail technical specification.</b>	Nos	8		-
					-
24.0	<b>STAFF CHAIR Complete with all accessories as per detail technical specification.</b>	Nos	2		-
					-
25.0	<b>LAB STOOL WITHOUT BACKREST.(SS) Complete with all accessories as per detail technical specification.</b>	Nos	6		-
					-
26.0	<b>STORAGE CUPBOARD Complete with all accessories as per detail technical specification.</b>	Nos	1		-
					-
27.0	<b>WASTE BIN PEDAL OPERATED-SS Complete with all accessories as per detail technical specification.</b>	Nos	2		-

					-
28.0	<b>CHANGE LOCKER -4 COMPARTMENTS Complete with all accessories as per detail technical specification.</b>	Nos	2		-
					-
29.0	<b>VISITORS CHAIR Complete with all accessories as per detail technical specification.</b>	Nos	2		-
					-
30.0	<b>OPEN STORAGE RACK Complete with all accessories as per detail technical specification.</b>	Nos	2		-
					-
31.0	<b>OFFICE TABLE Complete with all accessories as per detail technical specification.</b>	Nos	1		-
					-
32.0	<b>SHOE RACK Complete with all accessories as per detail technical specification.</b>	Nos	1.00		-
					-
33.0	<b>PAPER DISPENSING TROLLEY Complete with all accessories as per detail technical specification.</b>	Nos	2.00		-
					-
34.0	<b>TURNKEY WORKS</b>	Lot	1.00		-
					-
	<b>Total of Part-I in Rs.</b>				-
					-

	<b>Part-II</b>				
1.0	<b>Comprehensive Maintenance Charges</b> for the complete CSSD Equipment including spares, repair or replacement of defective equipments/parts, tolls, tackles, accessories, consumables, labour charges etc. complete in all respect after completion of Defect Liability Period as per the contract.				
	2nd Year	Job	1		-
					-
	3rd Year	Job	1		-
					-
	4th Year	Job	1		-
					-
	5th Year	Job	1		-
	<b>Total of Part-II in Rs.</b>				-
	<b>SUMMARY OF RATES</b>				
1	TOTAL (PART-I)			-	-
2	TOTAL (PART-II)			-	-
	<b>Grand Total Amount (PART - I + PART - II)</b>			-	-



**BOQ -MGPS**

<b>Package - Supply, Installation, Testing and Commissioning of Medical Gas Manifold System with 1 Year of Defect Liability Period</b>					
<b>Rate shall be inclusive of all charges, freight, insurance, GST@18% etc.</b>					
<b>SL. NO.</b>	<b>ITEM DESCRIPTION</b>	<b>UNIT</b>	<b>QTY</b>	<b>Unit Rate in Rs.</b>	<b>AMOUNT (Rs.)</b>
<b>1.0</b>	<b>Oxygen System :</b>				
1.1	16 + 16 Bulk Cylinder Manifold for Oxygen complete with Middle Frame, NRV and Tail Pipes as required as per specifications	Set	1		-
1.2	Automatic Oxygen Control Panel with automatic switchover from one bank to other bank of cylinders complete as required with accessories as per specification	Nos	2		-
1.3	10 cylinder Emergency system for Oxygen complete as required with accessories as per specification	Set	1		-
					-
<b>2.0</b>	<b>Nitrous Oxide System :</b>				-
2.1	4+4 Bulk Cylinder Manifold for Nitrous Oxide complete with Middle Frame, NRV and Tail Pipes complete as required with accessories as per specification	Set	1		-
2.2	Automatic Nitrous Oxide Control Panel with automatic switchover from one bank to other bank of cylinders complete as required with accessories as per specification	Nos	1		-
2.3	2-cylinder Emergency system for Nitrous Oxide complete as required with accessories as per specification	Set	1		-
					-

SL. NO.	ITEM DESCRIPTION	UNIT	QTY	Unit Rate in Rs.	AMOUNT (Rs.)
3	<b>Carbon di Oxide System</b>				-
3.1	2+2 Bulk Cylinder Manifold for Carbon di Oxide complete with Middle Frame, NRV and Tail Pipes complete as required with accessories as per specification	Set	1		-
3.2	Automatic Carbon Oxide Control Panel with automatic switchover from one bank to other bank of cylinders complete as required with accessories as per specification	Nos	1		-
3.3	2-cylinder Emergency system for Nitrous Oxide complete as required with accessories as per specification	Set	1		-
4	<b>Compressed Air System :</b>				
	4.1 Compressed Air System of minimum capacity 4500 LPM as primary and 1500 LPM as standby) Complete as required with accessories as per specification 4.2 Auto Drain System for Air receivers complete as required with accessories as per specification-2 Nos 4.3 3-Stage Breathing Air Filter as per ISO 8573-1 complete as required with accessories as per specification -2 Nos	Set	1		-
5.0	<b>Vacuum System :</b>				
	5.1 Vacuum pumps of capacity 5000 LPM as primary and 2500 LPM as standby. Complete as required with accessories as per specification. 5.2 Bacterial Filter suitable for Vacuum Pump system complete as required with accessories as per specification	Set	1		-

SL. NO.	ITEM DESCRIPTION	UNIT	QTY	Unit Rate in Rs.	AMOUNT (Rs.)
<b>6.0</b>	<b>Gas Outlet complete as required with accessories as per specification</b>				-
6.1	Oxygen (OT outlets are in the OT Package)	Nos	267		-
6.2	Nitrous Oxide (OT outlets are in the OT Package)	Nos	127		-
6.3	Medical Air 4 Bar (OT outlets are in the OT Package)	Nos	127		-
6.4	Surgical Air 7 Bar (OT outlets are in the OT Package)	Nos	127		-
6.5	Vacuum (OT outlets are in the OT Package)	Nos	267		-
6.6	AGSS Outlets (OT outlets are in the OT Package)	Nos	75		-
6.7	Carbon di oxide outlet (OT outlets are in the OT Package)	Nos	127		-
<b>7</b>	<b>Distribution Copper Piping having copper pipes as per BS EN 13348:2016 standard with 3rd party inspection complete as required with accessories as per specification</b>				-
	Cu Pipe 76 mm OD x 1.5 mm thick	Mtr.	40		-
	Cu Pipe 54 mm OD x 1.2 mm thick	Mtr.	80		-
	Cu Pipe 42 mm OD x 1.2 mm thick	Mtr.	90		-
	Cu Pipe 35 mm OD x 1.2 mm thick	Mtr.	220		-
	Cu Pipe 28 mm Od x 1.0 mm thick	Mtr.	810		-
	Cu Pipe 22 mm Od x 1.0 mm thick	Mtr.	1520		-
	Cu Pipe 15 mm Od x 1.0 mm thick	Mtr.	1150		-
	Cu Pipe 12 mm Od x 1.0 mm thick	Mtr.	1210		-

SL. NO.	ITEM DESCRIPTION	UNIT	QTY	Unit Rate in Rs.	AMOUNT (Rs.)
					-
<b>8</b>	<b>Isolation Ball Valve (Factory-Degreased) with Brass Adaptor complete as required with accessories as per specification</b>				-
	76 MM.	Nos	4		-
	54 MM	Nos	10		-
	42 MM	Nos	9		-
	35 MM	Nos	5		-
	28 MM	Nos	5		-
	22 MM	Nos	42		-
	15 MM	Nos	45		-
					-
<b>9</b>	<b>Valve Box complete as required with accessories as per specification</b>				-
	2 services	Nos	4		-
	3 services	Nos	13		-
	6 services	Nos	3		-
					-
<b>10</b>	<b>Alarm complete as required with accessories as per specification</b>				-
10.1	<b>Master Alarm</b>	Nos	1		-
10.2	<b>Area Pressure Alarm ( Digital )</b>				-
	2 services	Nos	4		-
	3 services	Nos	13		-

SL. NO.	ITEM DESCRIPTION	UNIT	QTY	Unit Rate in Rs.	AMOUNT (Rs.)
	6 services	Nos	3		-
					-
11.0	<b>AGSS UNIT</b>				-
	Duplex AGSS UNIT with control panel complete as required with accessories as per specification	No.	1		-
					-
12.0	<b>Tubing:</b>				-
	LP Tubing	Mtr.	300		-
					-
13.0	<b>Horizontal Bed Head Panel-1500 mm long</b>	Nos	125		-
	High Strength Anodised Aluminium Extrusions with inbuilt single railing, etc complete as required with accessories as per specification				-
<b>14.0</b>	<b>ACCESSORIES</b>				-
14.1	<b>BPC Flowmeter with humidifier bottle &amp; adapter</b> complete as required with accessories as per specification	Nos	279		-
14.2	<b>Ward Vacuum Unit</b> with 600ml poly carbonate collection jar complete as required with accessories as per specification	Nos	267		-
14.3	<b>Theater Suction Unit</b> with regulator, trolley & 2x2000ml poly carbonate collection jars	Nos	6		-
15	<b>Electric Distributional Panel</b> complete as required with accessories as per specification	Nos	1		-

SL. NO.	ITEM DESCRIPTION	UNIT	QTY	Unit Rate in Rs.	AMOUNT (Rs.)
16	Supply of O2 cylinder complete as required with accessories as per specification	Nos	60		-
17	Supply of N2O cylinder complete as required with accessories as per specification	Nos	15		-
18	Supply of CO2 cylinder complete as required with accessories as per specification	Nos	8		-
19	Turn Key	lot	1		-
					-

**BILL OF QUANTITY (BOQ) OF MINOR OT****Part-I : Execution including Design, Supply, Installation, Testing & Commissioning of Minor Operation Theatre (Minor OT) on Turnkey Basis with 1 Year of Defect Liability Period****Rate shall be inclusive of all charges, freight, insurance, GST@18% etc.**

<b>Item No.</b>	<b>Description</b>	<b>Unit</b>	<b>Qty</b>	<b>Unit Rate in Rs.</b>	<b>Amount in Rs.</b>
1	CEILING CONSTRUCTION Complete with all accessories as per technical specification	SQM	55		0.00
2	CEILING FILTRATION SYSTEM / LAMINAR AIR FLOW SYSTEM (AIR MANAGEMENT SYSTEM) Complete with all accessories as required as per technical specification	Nos	1		0.00
3	CORNER COVING Complete with all accessories as per technical specification	Mtr	75		0.00
4	WALL PAINTING Complete with all accessories as per technical specification	SQM	95		0.00
5	HINGE DOOR (2100 X 1500) mm Complete with all accessories as per technical specification	Nos	1		0.00
6	HINGED DOOR (2100 x 1000) mm Complete with all accessories as per technical specification	Nos	1		0.00
7	PERIPHERAL LIGHT CUM CLEAN ROOM LUMINARIES -LED Complete with all accessories as per technical specification	Nos	10		0.00
8	DISTRIBUTION BOARD ELECTRICAL WIRING, CONDUITING WITH FIXTURES INSIDE THE OPERATION THEATRE Complete with all accessories as per technical specification	Lot	1		0.00
9	FLOORING (ANTISTATIC CONDUCTIVE ROLL ) WITH SELF LEVELLING COMPOUND Complete with all accessories as required as per technical specification	SQM	65		0.00
10	INTERNAL DUCTING Complete with all accessories as per technical specification	Lot	1		0.00
11	MEDICAL GAS LINE INSTALLATION Complete with all accessories as per technical specification	Lot	1		0.00
12	SCRUB STATION Complete with all accessories as required as per technical specification.	Nos	1		0.00
13	X-RAY FILM VIEWER Complete with all accessories as per technical specification	Nos	1		0.00
14	OT LIGHT DUAL DOME LED LIGHT Complete with all accessories as required as per technical specification.	Nos.	1		0.00
15	TURNKEY works	Lot	1		0.00
	<b>TOTAL Rs.</b>				<b>0.00</b>

<b>BOQ - MOT</b>					
<b>Package- Supply, Installation, Testing and commissioning of MODULAR OT on turnkey basis with 1 year of Defect liability period</b>					
<b>Rate shall be inclusive of all charges, freight, insurance, GST@18% etc.</b>					
<b>Item No.</b>	<b>Description</b>	<b>Unit</b>	<b>Qty</b>	<b>Rate in Rs.</b>	<b>Amount in Rs.</b>
1.0	<b>WALL PANEL SYSTEM</b> Complete with all accessories as per tender specification	SQM	485		-
					-
2.0	<b>CEILING PANEL SYSTEM</b> Complete with all accessories as per tender specification	SQM	125		-
					-
3.0	<b>PVC FLOORING WITH SELF LEVELLING (ANTISTATIC CONDUCTIVE ROLL)</b> Complete with all accessories as per tender specification	SQM	150		-
					-
4.0	<b>LAMINAR AIR FLOW SYSTEM,</b> Complete with all accessories as per tender specification	Nos	3		-
					-
5.0	<b>INTERNAL HVAC DUCTING</b> Complete with all accessories as per tender specification	Nos	3		-
					-
6.0	<b>PERIPHERAL LIGHTING AND CLEAN ROOM LUMINARIES</b> Complete with all accessories as per tender specification	Nos	30		-
					-
7.0	<b>TOUCH SCREEN CONTROL PANEL</b> Complete with all accessories as per tender specification	Nos	3		-
					-



Item No.	Description	Unit	Qty	Rate in Rs.	Amount in Rs.
8.0	<b>X-RAY FILM VIEWER</b> Complete with all accessories as per tender specification	Nos	3		-
					-
9.0	<b>STORAGE UNIT</b> Complete with all accessories as per tender specification	Nos	3		-
					-
10.0	<b>HATCH BOX</b> Complete with all accessories as per technical specification	Nos	3		-
					-
11.0	<b>PRESSURE RELIEF DAMPERS</b> Complete with all accessories as per technical specification	Nos	3		-
					-
11A	<b>HERMETICALLY SEALED SLIDING DOOR (2100 X 1800mm)</b> Complete with all accessories as per technical specification	Nos	3		-
					-
12.0	<b>HERMETICALLY SEALED DOOR (2100 X 1000mm)</b> Complete with all accessories as per technical specification	Nos	6		-
					-
13.0	<b>VIEW WINDOW</b> Complete with all accessories as per technical specification	Nos	3		-
					-
14.0	<b>OPERATING LIST BOARD</b> Complete with all accessories as per technical specification	Nos	3		-
					-
15.0	<b>SCRUB STATION</b> Complete with all accessories as per technical specification	Nos	3		-
					-

Item No.	Description	Unit	Qty	Rate in Rs.	Amount in Rs.
16.0	<b>ELECTRICAL INSTALLATION</b> Complete with all accessories as per technical specification	Nos	3		-
					-
17.0	<b>DISTRIBUTION BOARD</b> Complete with all accessories as per technical specification	Nos	3		-
					-
18.0	<b>SURGICAL OT LIGHT LED WITH HD CAMERA &amp; FLAT MONITOR</b> Complete with all accessories as per technical specification	Nos	3		-
					-
19.0	<b>PENDANTS FOR ANESTHETIST AND SURGEON</b>				-
19A	<b>DOUBLE ARM MOVEABLE PENDANT FOR ANESHTHETIST</b> Complete with all accessories as per technical specification	Nos	3		-
					-
19B	<b>DOUBLE ARM MOVEABLE PENDANT FOR SURGEON</b> Complete with all accessories as per technical specification	Nos	3		-
					-
20.0	<b>MEDICAL GAS PIPELINE</b> Complete with all accessories as per technical specification	Ls	3		-
					-
21.0	<b>RECORDING SYSTEM</b> Complete with all accessories as per technical specification	Nos	3		-
					-
22.0	<b>MONITOR –DIGITAL DISPLAY (PACS/HMIS)</b> Complete with all accessories as per technical specification	Nos	3		-
					-
23.0	<b>Online Central UPS</b> complete with all accessories as per technical specifications	Ls	3		-
					-
24.0	<b>TURNKEY WORKS</b>	Ls	3		-
	<b>TOTAL AMOUNT IN Rs.</b>				-
					-

<b>BOQ- Normal OT</b>					
<b>Package-Supply, Installation, Testing &amp; Commissioning of NORMAL OT with 1 year of Defect Liability Period</b>					
<b>Rate shall be inclusive of all charges, freight, insurance, GST@18% etc.</b>					
<b>Item No.</b>	<b>Description</b>	<b>Unit</b>	<b>Qty</b>	<b>Rate in Rs.</b>	<b>Amount Rs.</b>
1.0	<b>CEILING CONSTRUCTION</b> Complete with all accessories as per technical specification	SQM	53		-
					-
2.0	<b>CEILING FILTRATION SYSTEM / LAMINAR AIR FLOW SYSTEM (AIR MANAGEMENT SYSTEM)</b> Complete with all accessories as required as per technical specification	Nos	1		-
					-
3.0	<b>CORNER COVING</b> Complete with all accessories as per technical specification	Mtr	75		-
					-
4.0	<b>WALL PAINTING</b> Complete with all accessories as per technical specification	SQM	65		-
					-
5.0	<b>HERMETICALLY SEALED SLIDING DOOR (2100 X 1500mm)</b> Complete with all accessories as per technical specification	Nos	1		-
					-
6.0	<b>HINGED DOOR (2100 x 1000) mm</b> Complete with all accessories as per technical specification	Nos	2		-
					-
7.0	<b>PERIPHERAL LIGHT CUM CLEAN ROOM LUMINARIES -LED</b> Complete with all accessories as per technical specification	Nos	8		-

Item No.	Description	Unit	Qty	Rate in Rs.	Amount Rs.
					-
8.0	<b>DISTRIBUTION BOARD ELECTRICAL WIRING, CONDUITING WITH FIXTURES INSIDE THE OPERATION THEATRE</b> Complete with all accessories as per technical specification	Lot	1		-
					-
9.0	<b>FLOORING (ANTISTATIC CONDUCTIVE ROLL ) WITH SELF LEVELLING COMPOUND</b> Complete with all accessories as required as per technical specification	SQM	42		-
					-
10.0	<b>INTERNAL DUCTING</b> Complete with all accessories as per technical specification	Lot	1		-
					-
11.0	<b>MEDICAL GAS LINE INSTALLATION</b> Complete with all accessories as per technical specification	Lot	1		-
					-
12.0	<b>SCRUB STATION</b> Complete with all accessories as required as per technical specification.	Nos	1		-
					-
13.0	<b>X-RAY FILM VIEWER</b> Complete with all accessories as per technical specification	Nos	1		-
					-
14.0	<b>SURGICAL OT LIGHT DUAL DOME LED LIGHT</b> Complete with all accessories as required as per technical specification.	Nos.	1		-
					-

Item No.	Description	Unit	Qty	Rate in Rs.	Amount Rs.
15.0	<b>TOUCH SCREEN CONTROL PANEL</b> Complete with all accessories as per tender specification	Nos	1		-
					-
16.0	<b>HATCH BOX</b> Complete with all accessories as per technical specification	Nos	1		-
					-
17.0	<b>VIEW WINDOW</b> Complete with all accessories as per technical specification	Nos	1		-
					-
18.0	<b>OPERATING LIST BOARD</b> Complete with all accessories as per technical specification	Nos	1		-
					-
19.0	<b>PRESSURE RELIEF DAMPERS</b> Complete with all accessories as per technical specification	Nos	1		-
					-
20.0	<b>DOUBLE ARM MOVEABLE PENDANT FOR ANESHTHETIST</b> Complete with all accessories as per technical specification	Nos	1		-
					-
21.0	<b>TURNKEY WORKS</b>	Nos	1		-
	<b>Total Part-I in Rs.</b>				-
	<b>Rate per OT</b>				-

Normal OT

**BILL OF QUANTITY (BOQ) OF PTTS**

<b>Part-I : Execution including Design, Supply, Installation, Testing and Commissioning of Pneumatic Tube Transfer System (PTTS) on Turnkey Basis with 1 Year of Defect Liability Period</b>					
<b>Rate shall be inclusive of all charges, freight, insurance, GST@18% etc.</b>					
<b>Item No.</b>	<b>Description</b>	<b>Unit</b>	<b>Qty</b>	<b>Rate in Rs.</b>	<b>Amount in Rs.</b>
1	Main Control System: including hardware, software package with license key for programming, real time monitoring & RFID pack for all carriers , stations & transfer System Complete with all accessories as per detail technical specification	Nos	1		0.00
2	Line Transfer Zone Mechanism/Linear Coupler for 8 zones at least Complete	Nos	1		0.00
3	Side Chanel Blower 3/4 kw with speed control( VFD) Complete with all accessories as per detail technical specification	Nos	3		0.00
4	Diverter 160 mm, 3-Way, Air Tight, Steel Housing. Provided with Optical Sensors Complete with all accessories as per detail technical specification	Nos	12		0.00
5	Front/Top load station : 160 mm , with OEM carrier rack , OEM soft-landing	Nos	29		0.00
6	Multi Receive station of 160 mm	Nos	1		0.00
7	Compact end Station of 160 mm	Nos	4		0.00
8	Standard 160mm Carrier loading dimension 330 x160 mm: compatible with the 160mm transfer line system, size programmable RFID tag for easy return of empty carrier Complete with all accessories as per detail technical specification.	Nos	70		0.00
9	Miscellaneous 160mm Pipe clamp, Screw bolts, Cable Tie, Clips, 90 Deg Bends for Air Tube, Dowel, PVC Conduit for Cable, Baskets, Cushion, insert for carrier PU Foam including other misc. items Complete with all accessories as per detail technical specification	lumps um	1		0.00
10	Grey Tubing material suitable for 160 mm system including 160mm Tube, Air tube, Bends, Endpiece, Sleeve, Special Adhesive Glue, Cleaner for PVC Tube, System cable & Mounting tools etc Complete with all accessories as per detail technical specification	mtr	755		0.00
11	Transparent Tubing material suitable for 160 mm system including 160mm Tube, Air tube, Bends, Endpiece, Sleeve, Special Adhesive Glue, Cleaner for PVC Tube, System cable & Mounting tools etc Complete with all accessories as per detail technical specification	mtr	200		0.00
12	Grey Tube bents of 160mm Complete with all accessories as per detail techni	mtr	285		0.00
13	Transparent Tube bents of 160mm Complete with all accessories as per detai	mtr	100		0.00
14	ON LINE UPS Complete with all accessories as per detail technical specification	Nos	1		0.00
15	TURNKEY WORKS Complete with all accessories as per detail technical specification				
a	Air Conditioning	LS	1		0.00
b	Electrical Cabling	LS	1		0.00
c	Earthing	LS	1		0.00
d	Switch & Scoket	LS	1		0.00
e	Light & Fan	LS	1		0.00
f	Foundation of Blower	LS	1		0.00
g	Furniture for Computer, printer & operator	LS	1		0.00
	<b>Total Amount in Rs.</b>				<b>0.00</b>