

# **TECHNICAL SPECIFICATION FOR MODULAR OPERATION THEATRE**

**SCOPE OF WORK :** Complete design, supply construction, and commissioning of Modular Operating Theatre in accordance with the specifications, bill of quantities including necessary Turnkey work and providing of free spare parts and service during One (1) year Defect Liability Period. The design and construction of theatre shall be made using a pre-engineered solution with objectives of Infection control, Promoting high standard of asepsis, Facilitating coordinated services, Ensuring maximum standard of safety, Optimizing utilization of OT with flexibility and staff time, Optimizing working condition, Ensuring functional separation of spaces, Patient and staff comfort in terms of thermal, acoustic and lighting requirements, minimizing maintenance and regulating flow of traffic.

**Size of Operation Theatre - CTVS -( 5900 x 7640 ) & (5900 x 6340) -2 Nos**

**Neurology-(5900 x 7640) -1 No**

**Oncology -(6270 x 5600) -1 No**

**Height - 4 mtrs.**

## **1 WALLS & CEILING CONSTRUCTION:**

The prefabricated modular construction for 50 mm thick Double skin totally flushed False Ceiling panels should be constructed with 0.8 mm thick AISI-304 Stainless steel on both side with  $36 \pm 2$  kg/m<sup>3</sup> density PUF as infill or 1.60 mm thick AISI-304 Stainless Steel backed by 12mm thick Gypsum board to provide seamless operating room or High-tech materials like Solid Mineral Composite Sheet(SMCS) and supporting hardware to provide seamless operating Room.

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

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 65-70 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. Coving should be wall to wall, Ceiling to wall and floor to wall using Aluminum profile. The wall panel and Ceiling 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. All panels should include a fifteen (15) year delaminating warranty. Wall paneling should be of DIN 410272 fire protection or Reaction to fire class-1 norm. Room lighting, air supply inlet, Ceiling Service units, return air outlets etc should be integrated with SS metal/SMCS ceiling system. The individual panels except those at the edges should be removable individually. The Walls and suspended Ceiling should be hermetically sealed. All the four corners should have return air duct outlets and grill for the same made of steel duly powder coated 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. The individual metallic wall panels shall use the tongue and groove technology for joining two panels, **no welding should be allowed**. All joints and cavities should be filled with Metallic Epoxy sealer and sanded flush to provide seamless finish/ Silicon gasket joints. The internal surface of the wall panel should be either solid Mineral Composite Sheet or SS-304 grade material.

#### **In the case of SS-304 panel:-**

The internal surfaces of the walls and ceiling 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. The anti bacterial paint coating should overlap the floor coving, ceiling system 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. Imported Anti bacterial paint applied should not leach out in order to maintain anti- microbial system throughout the life of the product. The coating should have biocide action and prevention property against growth of mould, bacteria and yeasts for at least 10 years.

#### **In the case of SMCS :-**

The surface facing the interior of OT should be bacteriostatic, dense and non-porous. The panels should be made of durable and uniform material that should be easy to clean and extremely hygienic. The total thickness of the panel should be not less than 18 mm. Panel should be

resistant to water & detergents normally used in hospitals. The Panel should adhere to fire class-I Norms (Fire resistant norms). To create smooth uninterrupted surface between adjacent panels for presently risked accumulation of dust and bacteria in gaps, the panel should be produced in a single full height floor to ceiling piece.

Vertical and horizontal gaskets in non-toxic silicone rubber around all the contact perimeters between the various materials, and the hermetically sealed gaps between modules, should ensure optimum space segregation and ensure that sterile air pressure values are maintained in the protected environment, this being a fundamental prerequisite for guaranteed sterility. 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 and ceiling panel shall be as suggested by the Institute.

## **2 CEILING FILTRATION SYSTEM / LAMINAR AIR FLOW SYSTEM (AIR MANAGEMENT SYSTEM) -IMPORTED**

The Ceiling Filtration System should be designed to ensure homogenous low turbulence unidirectional laminar flow of sterile air with differential velocities decreasing from centre to perimeter of the theatre as Ultra Clean Ventilation System. 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.

Protective grids : White epoxy painted micro drawn grid

Separators : Continuous thermo plastic chord

Sealant : Polyurethane

Gasket : One piece polyurethane

EN 1822 class : H14

MPPS average efficiency: > 99.995%

3 Micron DOP efficiency > 99.999%

Pressure drop : 600 pa(max)

Maximum Operating Temp : 60 degree Celsius

Maximum RH : 90 %.

Efficiency test : Filters individually tested and certified (*Submission of test certificate for the filters from original manufacturer is must along with its supply*).

Filter should be according to ULPACAT test as per EN 10204. Filter frames and top plenum should be made of AISI-304 Stainless steel. The filtration should have flow equalizer for uniform & constant air distribution over the whole surface. The high quality Diffuser should secure the unidirectional airflow according to EN ISO 14644. It should have low noise recirculation systems in compliance with noise levels of 45 to 48 db. The diffuser should have adequate perforations to ensure even diffusion of air into the OT. The Laminar flow system should have anodized aluminum perforated diffuser grill. Frame should be rigid frame system and made out of AISI-304 Stainless steel which enables the perfect integration of the OT ceiling with surrounding installations. The OT lighting should be integrated into a frame system which ensures its air sealed integration with the OT ceiling. The frame system should allow the seamless and air-sealed coverage of all gaps among the various installations and OT ceiling. The

Ceiling system should be equipped with “H” class HEPA filters with different performances according to their position in the ceiling to achieve different flow velocities. The filtration ceiling system should have flow equalizer to achieve uniform & constant air distribution over the whole surface .it should also have connection for surgical lamp to be fitted in place of any filter. The technology must avoid turbulences which may draw germs from the non-sterile area in the operating field. The complete filtration ceiling system should be factory assembled. Perfect tightness should be guaranteed by a liquid seal between filters and holding structure enabling no bypass of Mini Pleat filters. Laminar air flow system should comply with **DIN 1946**. A written confirmation from the original product catalogue is required. Laminar air flow system and mini Pleat HEPA Filters should meet relevant European/ US standards and in order to have perfect sealing both laminar air flow and filters from one source company.

Complete air management system should be duly CE Marked and should be supplied with complete test certificates. Testing & maintenance of air quality with periodic replacements of Mini Pleat HEPA filters should be done at least once in 6 months or earlier if required. The supplier should provide test certificate for HEPA filter and laminar air flow systems from the original manufactures

The Positive pressure should be maintained inside the OT.Modular OTs should be constructed considering all stipulated requirements of Air management system etc. for CTVS, Neurology and Brachytherapy OT.

### **3 OPERATION THEATRE FLOORING (ANTISTATIC CONDUCTIVE TILES)**

The Operation theatre floor finish should be laid with 2 mm antistatic seamless conductive PVC tiles 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 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 3 meter 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 lying 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. Continuous roll should be used and all the joints should be welded by heat fusion process to get seamless floor. 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, confirming the European/US standards. The sheets should be highly durable with resistance to shock, scratch proof and indentation. Corners should be uniformly curved. 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. The floor should have electrical resistance(Point to ground) within  $2.5 \times 10^5$  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 build 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) should be used overlap to a height of approx.25mm and sealed perfectly and uniformly. Self-leveling compounds should be used for this purpose.

Radius for corner coving - 70R  
3D/2D corner coves

#### **4 DOORS AND FRAMES (AUTOMATIC HERMETICALLY SEALED SLIDING DOORS) (Size 2200mm x 1500mm)**

To maintain sterility and correct air pressure in the theatre, the door should be sliding and hermetically sealed type. The door should meet following specifications confirming to relevant European/ US standards:

- Meets international quality and safety requirements.
- Controller should be Microprocessor based controller (CE marked) and should have digital display
- Regulated electro-mechanical sliding door drive.
- Motor should be 24V 70W brushless DC Motor.
- Noise level of movement should not be more than 60 decibel.
- Power efficiency should be 0.95 (in AC 100 V full load).
- The track should be made up of single piece extruded aluminum
- Environment temperature should be -20 °C to +55° C.
- Electrical safety codes for High & Low voltage system design should meet HTM 2020 /2021 standards.
- The door and control should comply current IEE regulations and BS 7971 standard.

Hermetically sealed Sliding Automatic Door shall be with Vision Panels 300 mm x 300 mm with double glazed panels and hermetically sealed should be equipped for OT.

##### **In the case of SS-304**

The door panel should be hygienic compact HP laminated board that can withstand high abrasion. The thickness of the door core should be 48mm. The top layer on both sides is high Pressure laminate of size 6mm. The overall thickness of the door shutter is 60 mm. The inner part of the door should be filled with CFC free polyurethane foam (PUF).

##### **In the case of SMCS**

The door material should be of the same material as wall panel i.e SMCS and should be able to withstand high abrasion.

Sealed airtight system should be provided to prevent further ingress of any microbial organism. The door should be fixed to SS frame(Same as Wall Panel in case of SS). Colour should match the interior case. Reinforcement of Extruded Anodized Aluminium material for HP Laminated Board Panel/SMCS should be with door frames. Nylon runner guides should be fixed to the door in such a way that there shall be no obstruction to the Trolley movement. The door leaf should have high quality synthetic rubber gasket with long life to ensure hermetic sealing to maintain pressure differential. Air tightness 99.99% at a pressure 100KPa (Test certificate for hermetic sealing with door frame should be provided with pre-despatch documents. The finished door on either side of the door should be perfectly level (maximum permissible difference +1mm). The

door should provide X-Ray protection as per AERB regulation (Lead equivalent at 100 KV is 0.27mm). The track of the door should be made up of single piece Stainless steel/extruded Aluminum and the running surface for the top rollers shall be suitably angled to reduce resistance to movement. The door leaf should be hung by means of hard plastic rollers of high quality with double bearing at the top. Roller should be provided under the stainless steel/extruded aluminum track to enable smooth the noiseless movement. The doorframe, track and the wheel should be designed in such a way that during last 50 mm at travel on the closing cycle the door should make a tight sealing with the frame. The door should be provided with high quality cylindrical lock. The lock should be activated or switched off by means of the key switch. The door should be governed by two sensors for half and full closure. The door controller should sense overload condition and in overload case the door shall be automatically stopped and reversed the direction of travel. The controller should be capable of either operated by elbow switch; foot switch & radar switch (Touch fewer sensors). The door should be operated easily manually in the event of failure of the power supply or the automatic mechanism. Door opening handle should be strong and sturdy and the handle material should be AISI-304 Stainless steel and glossy finish. High and Low voltage system of the door should meet electrical safety code.. The starting time after receiving signal should be adjustable between 0.5 secs. to 25 secs. Speed of closing movement-20-120 mm/sec. Slow speed -20-220mm/sec, Opening speed –equal to 600 mm/sec approx., Closing speed – equal to 500 mm/sec approx.

#### **5. DOORS AND FRAMES (AUTOMATIC HERMETICALLY SEALED SLIDING DOORS) (Size- 2200mm x 1000 mm)**

**Technical specification same as Sl. No.4.**

#### **6 PRESSURE RELIEF DAMPERS**

The Pressure Relief Dampers are to be equipped with the theatre to prevent contamination of air from clean and dirty areas. The Dampers of suitable size should have AISI-304 Stainless Steel blades of thickness 1 mm each. The body should be epoxy powder coated as per standard BS colours. The statically and dynamically balanced Pressure Relief Damper should be properly placed. The Dampers enable to maintain differential room pressure to close tolerance inside the Operation theatre. Counter-weight balancing system should be provided in the Pressure Relief Damper to maintain positive pressure inside the operation room. The PRD should remain closed at pressure below the set pressure and should open fully at a pressure only fractionally above the threshold pressure.

#### **7 INTERNAL DUCTING**

The internal ducting **till the existing AHU system** of the Operating theatre should be done as per ISI-655 duly fabricated out of 22 swg Aluminum sheet complete with flanges and accessories such as GI suspenders and GI supports completely sealed with Silicon sealant duly insulated with Aluminum foil Nitrile rubber self adhesive type insulation.

## 8 PERIPHERAL LIGHT CUM CLEAN ROOM LUMINARIES

It should be fitted outside the air ceiling system area and flush with the ceiling in the operation theatre suitable to required illumination (750 Lux) of OT. Peripheral lights and clean room luminaries fitted in the frame should be 8-12 in numbers for each OT. The fluorescent lamps 36 W 16mm Ø- 2 nos / Non-hygroscopic high glow low power LED based peripheral lights (1'x2') having high quality low wattage LED lighting system with highly spectacular anodized Aluminum reflectors and optical antiglare system for adjustable light distribution. Luminaire cover made of highly resistant, disinfectant proof laminated safety glass with fine grained surface, glass pane with white powder coated steel frame. Luminaire 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 **IP65 protocol**. Light should not interfere when green mode of Endoscopy is performed.

## 9 OPERATION THEATRE CONTROL PANEL –(Imported)

The OT Control Panel should be designed to cope with changing technology and equipment in operating environments. Control panel should be user friendly and ease of operating and maintaining purpose.

The **touch screen** typed Control Panel should be 19" medical grade color TFT/LED panel with 1280 x1024 (SXGA) resolution stationed in the sterile field. The Control Panel should be configured to incorporate all the services required by the staff in the Operation theatre. It should be mounted flush in the theatre wall.

The Control Panel should comprise of following services in addition to Instruction board, Communication interfaces- both audio and video etc.:

- Day Time Clock
- Time Elapse Day Clock
- General Lighting System
- Hands free telephone set with memory card
- Temperature and Humidity Indicator with Controller
- Medical Gas status/alarm
- Digital Room Pressure indicator
- Music control

Day Time clock/Time Elapsed day Clock should be digital type and bright and the height not less than 30mm

Temperature and Humidity Indicator should indicate temperature and humidity of the theatre and the display shall be digital and bright and the height not less than 30mm. The temperature and Humidity controller should be connected to the Air Conditioning system.

General Lighting System should incorporate all the necessary controls of all the lighting system including Dimmer for peripheral/plan air lights. Medical Gas Alarm should indicate high, normal and low of gas pressure for each gas service provided in the Operation room. Alarm should be equipped with audible Buzzer. The pressure sensor of the Alarm should be connected to MGPS for monitoring the pressures.

The control panel should be user friendly and ease of operation and maintenance. All internal wires should be marked with plastic ferrule type cable markers, for ease of identification. The control panel should be able to be integrated with the commonly used OT software in future.

The control panel should meet Electrical Safety Code for High and Low voltage system, wired to the current IEE regulations

## **10 PENDANT FOR ANESTHESIA**

Should be double Arm Pendant with horizontal movement

One swivel arm of 800 mm and another of 600 mm.

Both arms should have electromagnetic/pneumatic brake.

Swiveling angle should be 330°.

The swivel arms move only horizontally and the length in fully stretched position is  $(800+600) = 1400\text{mm}$

Anesthesia pendant should have provision of medical outlets like Oxygen outlets X 2, Air(4 bar) X 1, Nitrous oxide X 1 and Vacuum outlet X 2, AGSS outlet X 1

Pendant should have eight 5A/15A combined electrical socket. Electrical socket should be of reputed make. One electrical socket should be connected with central UPS and should of different colors for easy identification.

Pendant should have two open shelves to keep Monitors/ESUs etc

Should have provision RJ 45 /cat 5 for telephone communication.

Should have provision RJ 45 /cat 6 for data communication.

## **11. PENDANT FOR SURGEON**

Should be double Arm Pendant with horizontal movement



One swivel arm of 800 mm and another of 600 mm.

Both arms should have electromagnetic/pneumatic brake.

Swiveling angle should be 330°.

The swivel arms move only horizontally and the length in fully stretched position is  $(800+600) = 1400\text{mm}$

Surgeon's pendant should have provision of 7 bar Air outlet for pneumatic drills.

Surgeon's pendant should have carbon dioxide outlet in laparoscopy and endoscopy theatres.

Pendant should have eight 5A/15A combined electrical socket. Electrical socket should be of reputed make. One electrical socket should be connected with central UPS and should of different colors for easy identification.

Surgeons pendant should have infusion management system.

Pendant should have two open shelves to keep Monitors/ESUs etc

Should have provision RJ 45 /cat 5 for telephone communication.

Should have provision RJ 45 /cat 6 for data communication.

## **12 X-RAY FILM VIEWER**

The two (2)-plate viewing LED type/4 pieces of 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 holes of 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.

## **13 HATCH/PASS BOX**

It should be of 610mmx610mm size for disposal of dirty linen/waste to non-sterile store with Door open/close indication. Each Hatch should be equipped with two doors and the door should be operated electronically. The Hatch should be designed in such a way that only one door will be opened at one time. The Hatch Box should be constructed of Stainless Steel AISI-304 Door and completed with interlocked UV light and electro-magnetic mechanism complete with indicators and hours meter. This UV light should be automatically turned off in case of opening

of either of the doors. Indicators should be provided on both sides of the OT so that door open / close status can be monitored from both sides.

#### **14 WRITING BOARD (OPERATING LIST BOARD)**

Writing Board as operating list Board of size-1000x700x60deep should be made of ceramic having magnetic properties and should be flushed to the wall of the operating Room.

#### **15 BUILT-IN STORAGE UNIT**

Storage Unit should be made out of 1.60 mm thick AISI-304 Stainless steel. The storage unit should be divided 2 or more parts and each part should have individual glass doors with high quality locking system. These doors should be installed on the storage units with the help of imported fittings allowing an opening allowance of 160degree. Each part should be provided with steel racks which should be completely detachable type. The storage unit should be fitted with 5mm thick vacuum insulated glass door and mounted flush with the theatre wall. The storage unit should be continuously ventilated by positive air in the OT through ventilation holes provided at the bottom and top of opposite sides. The dimensions of each storage unit should not be less than height 2100mm x width 1200mm x depth 350mm.

The storage units should be designed in a way that they are flush with the OT wall panels and the units should be air tight, not allowing any leakage between units and the wall panels.

#### **16 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. Electric Distribution Panel, UPS, Transformers, 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 DIN/CE approved 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. Wiring for 250 volts single phase and neutral 6/16 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.

## 17 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 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 LLOYDS.

Medical graded Copper Piping should be laid down from Pendant of OT to the nearby Valve Box outside the Operation Theatre via Surgeon Control Panel.

## 18 VIEW WINDOW WITH MOTORIZED BLINDS (Size- 1500 x 1200)

View window with motorized horizontal Venetian blinds sandwiched in two parallel toughened glasses of thickness 5 mm should be complete with FHP Motor Control for 90° rotation. The Window frame should be powder coated Aluminum of approved shape flush mounted with wall paneling. The entire assembly should be completely sealed and fitted with proper Aluminum profile. The assembled thickness of the Window should be 33 mm. The window blinds should be operated with Remote Control and manually.

## 19 OT LIGHT WITH CAMERA AND MONITOR- (Imported)

**Description:** Dual Dome LED Surgical Lighting System with one dedicated Spring-Arm Suspension for Progressive Scan HD Flat Panel with an Integrated In-Light Camera 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 adequate enough for following minimum illumination level
- Color Temperature : 4000 - 5000 K
- Field Size Diameter Depth : 6 inch – 12 inch
- Depth of Field : 30 – 35 inch
- Illumination Level : minimum 160,000 Lux each
- Controls : Wall Control Touch Panel
- Rotation : 360 degrees
- Vertical Adjustment Range : + 20 inch – 25 inch
- Sterilizable Handle : Yes
- Lighthouse Diameter : 20 – 30 inch
- Mounting Type : Ceiling
- Supply Voltage : 230 VAC 50 Hz
- Bulb Type : LED
- Dimming Range : 30% - 100%
- Operating/Storage Humidity : 10 – 95%
- Life of Light Source : > 30,000 Hrs.

### **Camera System**

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

Such a camera should have the following specifications:

- Signal to Noise Ratio (S/N Ratio) : <50 dB.
- Minimum Illumination : <3 lx
- Optical Zoom : 25 – 30x.
- Digital Zoom : 12-15X
- Power Supply : Through Light / max. 12W.
- Relative Humidity : <90%.
- Video Output : S-Video & Composite Video
- White Balance & Gain : Automatic/Manual

Such Surgical Light System Should be compliant with relevant European (CE) /US FDA standards

Such Light and Integrated Camera should have a control through Touch Panel of the control equipment placed inside the operating room at documentation station / nurse works station.

### **C. Flat Panel Monitor**

Should be 23” High Definition Progressive Scan Flat-panel 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.

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.

Such Monitor should at least meet the following technical criteria:

- Resolution : 1600 dots x 1200 dots, Progressive Scan
- Display Colors : 16 Million Colors
- Inputs : DVI, RGBHV, S-Video, Composite Video
- Synchronization : 2.5 – 5.0 Vpp separated sync
- Response time : <25ms
- Travel : 330° - 340°
- Forward Tilt : 30° - 40°
- Backward Tilt : 45° - 50°
- Cable Kit for Integration : DVI, Fiber Optic, RGBHV, S-Video, Composite

## 20. ANESTHESIA WORK STATION (Imported)

**The Anaesthesia work station system duly CE marked, should be Integrated with ventilator, vaporizer and Monitor.**

### **Anaesthesia machine with vaporizers:**

- a. Rigid construction and design with standard frame.
- b. Integrated suction (venture operated), auxiliary Oxygen flowmeter for mask O2 delivery without going through the main rotameter, integrated active AGS system and integrated LED light should be supplied.
- c. Gas specific (pin indexed) Yokes-Two for oxygen, and one for nitrous oxide to accommodate 5-liter water capacity cylinders.
- d. Provision to connect oxygen, air & nitrous oxide directly to system with pipeline supply for each gas.
- e. Gas mixer/ Flow meter assembly with 5 tube, with possibility of enabling or disability air or N2O and activating as per requirement.
- f. Automatic Cutoff of Nitrous by Oxygen Pressure failure along with hypoxic guard for linear regulation of minimum O2 concentration at 25% volume and a base flow of 200ml.
- g. Oxygen flush, which is able to deliver at least 30-70 liters per minute of oxygen.
- h. Single canister integrated circle absorber with unidirectional and airway pressure relief valves, integrated sensing mechanism. It should have facility for changing the soda-lime intra-operatively with soda-lime capacity of about 900 gms.
- i. Fully integrated Circle absorber system for adult as well as pediatric patient category. It should have an autoclavable block.
- j. It should have a spirometry sensor position able at Y or at the distal end, for measurement of I/E Tidal vol, min volume, loops and scalars etc..
- k. Integrated LED light.
- l. It should have an integrated colour TFT screen of at least 8"size for display of ventilation parameters etc.

- m. **Vaporizer:-**provision to connect two vaporizers at a time with interlocking facility. One Isoflurane, Halothane, Sevoflurane each vaporizers should be supplied with the machine. Vaporizers flow should be temperature, and pressure compensated and maintenance free for 07 years.
- n. Active Scavenging System: Should have integrated active scavenging system.

**Integrated anaesthesia ventilator:-**

- i Microprocessor based, Electronically controlled and electrically/ pneumatically driven should not require change of bellows for adult and infants.
- ii. It should have following features.
  - a) Modes-VCV, PCV, PSV, Manual, Spontaneous modes so that reversal complications can be handled in the OR itself.
  - b) Tidal volume range 20 ml to 1500 ml.
  - c) Facility for Sigh
  - d) Integrated PEEP variable electronically up to a minimum of 20 mbar.
  - e) Adjustable breath rate 5-80 bpm.
  - f) Inspiratory pause
  - g) Should automatically display and compensate for compliance of breathing circuit.
- iii. Alarms should have audiovisual display of alarm messages for:- Airway pressure, minute volume, inspiratory O<sub>2</sub> concentration, audio power supply fail alarm, fails to cycle warming, airway pressure alarms for high and low pressures.
- iv. In built battery backup facility for up to a min. of one hour.
- v. Self-diagnostic facility to check the overall system including ventilator for leakage.

**Integrated Monitor:-**

- i) Should have the facility of monitoring ECG, RR, SpO<sub>2</sub>, NIBP, Temp, Dual IBP and Microstream Capnography for Adult, Paediatric & Neonatal applications.
- ii) Should have integrated colour TFT display of at least 12" or more.
- iii) Should have facility of viewing at least 8 waveforms simultaneously.
- iv) Should have detection facility for advanced arrhythmias and ST segment analysis.
- v) Must use Nellcor/ Masimo branded pulse oximetry module with facility for display of Plethysmograph, Pulse strength & SpO<sub>2</sub> values.
- vi) Should have IBP waveform overlapping facility.
- vii) Should have Graphical & Tabular trend facility for at least 72 hrs.
- viii) Should have facility of downloading data on a USB port and SD card.
- ix) Should have alarm limits with alarm levels and alarm indication (visual as well as audio)
- x) Simultaneous 3 lead ECG measurement and simultaneous monitoring of temperature.
- xi) Should have built in Capnography facility to measure End tidal and Fractional Inspired values of CO<sub>2</sub> along with calculation of respiration rate.

**Unit should be supplied with following accessories:**

- i) 5 lead ECG cable
- ii) 3 lead ECG cables X2
- iii) NIBP CUFF- Adult X2
- iv) Temp probe Rectal & Skin
- v) SpO2 PROBE- Two no. for adult use and one Paediatric
- vi) Accessory kit for Capnography

Monitor should have built in Electro Surgical Unit & Defibrillator protection.

Monitor should have facility for Anaesthesia Gas Monitoring (AGM) with auto gas identification along with display of MAC value, Dual IBP

Relevant evidence of compliance to IEC 60601 series Safety standards and US FDA approval should be submitted.

**21. Operation Table (Electro – hydraulic)- (Imported)**

**(Conforming to the requirement for CTVS OT, Neuro OT & Brachy therapy OT)**

- i** Electro Hydraulic operating Tables are tables for performing surgical procedures and it works with electrical power.
- ii** OT Table is required for general surgery and should have X-Ray translucent tops.
- iii** The operation table should have the following features:-
  - a. Four / Five section table top with divided foot section.
  - b. Table top should permit x-ray penetration and fluoroscopy with full length X-ray cassette tunnel accessible from either end.
  - c. Should have a handset for various functions.
  - d. Four / Five section table top with divided foot section.
  - e. Table top should permit x-ray penetration and fluoroscopy with full length X-ray cassette tunnel accessible from either end.
  - f. Should have a handset for various functions.
  - g. There should be inbuilt standby control enabling full use of table in case of handset failure.
  - h. All table positioning, i.e., height, back section, lateral tilt, trendelenburg, and anti-trendelenburg, should be operated electro-hydraulically through handset and standby control.
  - i. The table top can be moved cranially and caudally on its base.

- j. The casings on the frame and centre supporting column should be made of hygienic stainless steel.
- k. Mattress should be radiolucent and suitable for fluoroscopy.
- l. Table should have mobile base with lockable castors.
- m. Should have built in kidney bridge.

iv. **Measurements (Approx):**

- a. Height: 650-1100mm
- b. Side tilt: +/-20degrees
- c. Back section adjustment: - 40 degrees to 80 degrees
- d. Foot section adjustment: - 90 to 0 degree, detachable
- e. Trendelenburg: 30 degree
- f. Anti trendelenburg: 30 degree
- g. Head section adjustment: +/- 45 degree, detachable
- h. Width: 550 mm or better
- i. Length: 2000 mm or better
- j. Cranial and caudal traversing 200 – 300 mm
- k. Maximum patient weight – 250 to 300 Kg

v. **Complete set of standard Accessories required for CTVS.Neuro surgery and Brachytherapy including the following:-**

All accessories as following should be included.:

- a. Padded arm rest with straps - pair with dampers
- b. Anesthesia screen with clamps
- c. Side supports: pair with clamps
- d. Shoulder supports: pair with clamps
- e. Knee crutches: pair with dampers
- f. X-ray cassette tray with pushing rod
- g. Accessories for operating in prone position
- h. Optional accessories for endourology work



## vi Power Supply

- a. Power input :220-240V/ 50 Hz AC Single phase fitted with appropriate Indian plugs and sockets.
- b. Electronic Voltage corrector/stabilizer of appropriate ratings meeting BIS Standards/Specifications.( Input 160-260 V and output 220-240 V and 50 Hz)

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

**The contractor should construct the Modular OTs considering all stipulated requirements of Air management system etc. for CTVS, Neurology and Brachytherapy OT.**

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

## 22. IN ADDITION TO THE ABOVE, FOLLOWING TURNKEY WORKS FOR INSTALLATION AND COMMISSIONING OF MODULAR 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 Distribution Panel and to the corresponding load points
- Providing fixing of **Electrical Gadgets** like ELCB, MCB, Light Points, Power points, in the Modular OT room. • Number of fans, power point, bulbs/tube light. Apart from these supplies to the individual equipments with ELCB & MCB for Modular OT • Installation of MCB, ACB, ELCB & OCB of Havell/Siemens/L&T/Schneider etc for Control Panel for Modular 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 Modular OT then that may be provided and any other necessary work required for satisfactory working of the Modular OT and not mentioned

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

#### **APPROVED MAKES**

1.	HEPA Filter	SAGICO FIM/THERMODYNE/ADVANCE/PENTAGON
2.	Cable	GLOSTER/UNIVERSAL/NATIONAL/ KALINGA
3.	Control Panel	L & T/ SIEMENS/ SCHNEIDER
4.	PVC Pipe Class III with Fitting	FINOLEX/ SUPREME/ PRINCE/ ORI-PLAST
5.	G.I. / M.S. Pipe Heavy Class	TATA/ JINDAL(HISSAR)/SAIL /SURYA PRAKASH
6.	MCCB/Contactor/Relay	L&T/ABB/SIEMENS/SCHNEIDER
7.	Pressure Gauges	H.GURU /FIEBIG
8.	Stainless Steel	TATA/SALEM/JINDAL/MUKUND/BHAYANDER/AMBICA
9.	Copper Pipe	MAXFLOW/PRECISION/RAJCO

#### **Note:**

- **The bidder should attach Technical Compliance item wise with respect to the above technical specifications and turnkey work along with Printed catalogues**
- **Manufacturer's authorization as per the format of the tender document should be provided by the bidder along with the bid when the bidder is not a manufacturer.**
- **All electrical accessories like cable wire, electrical outlets, switches etc, 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 Modular OT**
- **The contractor shall be responsible for the complete works including submission of working drawing and submit layout plan for Modular OTs, Laminar flow System including ducting, Electrical Wiring, to HSCC before beginning of supply for approval and As-built drawing after installation.**
- **Bidder should provide complete Operation manual/parts manual/Service manuals for all systems and subsystems.**
- **Final electrical safety test, system test and calibration should be done by authorized person with test instruments.**
- **Training for seven working days should be provided**
- **Bidder should quote for Post-DLP 5 years CMC which will be considered for**

**ranking purpose in tender evaluation. Separate agreement will be made for post DLP CMC between the hospital authority and the contractor. The tender shall be rejected if CMC cost is not quoted by the bidder.**

## TECHNICAL SPECIFICATION OF OPERATION THEATRE (NORMAL)

### SCOPE OF WORK -

**Supply construction, and commissioning of Normal Operating Theatre in accordance with the specifications, bill of quantities and providing of free spare parts and service during One (1) year Defect Liability Period.**

<b>Size of OT</b>	-	<b>5900 x 4645- 1 No.</b>
		<b>6370 X 6455 -2 Nos</b>
<b>Height</b>	-	<b>4 mtrs.</b>

### 1. CEILING SYSTEM

50 mm thick Double skin totally flushed False Ceiling panels made with 0.8 mm thick Epoxy powder coated Galvanized sheet on both side with  $36 \pm 2$  kg/m<sup>3</sup> density PUF as infill, with suitable Ceiling grid and supporting hardware. Joints shall be sealed with clean room compatible silicon sealant. Panel will be class "0", fire rated. Factory made cutout in the ceiling panel for light fixture and Diffusers etc..

Laminar Flow Tent should be made of 0.8mm thk Epoxy powder coated Galvanized sheet and provision for flanges for Duct connections and 6mm perforated grill Size 8ft x 8ft x 700mm ht. Duct connection with the incoming Duct line from AHU and Diffusers/Dampers, filters if any required in the OT room shall also be made. Tent shall be made so as Laminar Flow System shall prevail in OT. Tent shall be made so as Laminar Flow System to integrate with OT equipments

The ceiling suspension should be as:

Suspension elements : Suspension bracket with tension spring

Suspension Height: Adjustable from 250 to 1100 mm

Stability: Permanent and non-stop after adjustment.

Material High quality galvanized steel

### 2. WALL WITH CORNER COVING

Antifungal painting (Colour shall be suggested by the client). Extruded Aluminium powder coated/Anodized clip on type covings for the entire wall to wall, and wall to ceiling. R-70, 3D internal/ external corner coving.

### 3. OPERATION THEATRE FLOORING (ANTISTATIC CONDUCTIVE TILES)

A floor should be provided, flat to within a tolerance of +/- 3mm over any 3-metre area. Onto this sub floor, a self-leveling compound should be laid prior to lying of the floor finish.

Copper grounding strips (not less than 0.05mm thick, 50mm width) should be laid flat on the floor in the conductive adhesive and connect to copper wire of grounding. The floor finish in the

operating room should be 2mm Conductive PVC tiles, laid on a semi conductive adhesive base. The floor finish should terminate at the room perimeter passing over a concealed cove former and continuing up the wall for 100mm. All joints should be welded with electrodes of the same compatible material to provide a continuous sealed surface.

#### **4. SWING DOOR**

**(Size- 2200mm x 1500mm- Double Leaf)**

50 mm thick doors made with Poly Urethane painted 0.8mm thick Epoxy powder coated GI sheets on both sides with PUF as infill, 1.2 mm thick Epoxy powder coated GI door frames totally flush with the wall panels, hardware like push plates, handles, **Door Closure**, double glazed view glass of std size, Stainless Steel Ball Bearing butt hinges and provision for concealed automatic door bottom Drop seal etc. Supply & Installation of double glazed **View Panels** (300mm x 300 mm) with flush design, with 6mm thick float glass fixed in double panel with necessary arrangements.

#### **5. SWING DOOR**

**(Size- 2200mm x 1000mm – Single Leaf)**

**Same as technical specification of sl. No.-4**

#### **6. 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 in numbers for each OT. The fluorescent lamps 36 W 16mm Ø- 3 nos 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 IP54 protocol. Light should not interfere when green mode of Endoscopy is performed.

## **7. OT CONTROL PANEL**

The room Surgeon's control panel should be designed to cope with changing technology & equipment in operating environments. Control Panel will be user friendly & ease of operating & maintaining purpose. The panel should be "Membrane" type; configured to incorporate all the services that operation room staff required. Operation Theatre Surgeon Control Panel consisting of display like Real time, Count down time, lighting control through dimmer, Telephone, Gas pressure set point, Alarm, Room Temperature and Relative Humidity mounted flush in the theatre wall with Distribution Board complete with all accessories etc. Lighting Control along with Day time clock –Digital and Elapsed Time Clock –Digital.

The control panel should be user friendly and ease of operation and maintenance. All internal wires should be marked with plastic ferrule type cable markers, for ease of identification. The control panel should be able to be integrated with the commonly used OT software in future.

The control panel should meet Electrical Safety Code for High and Low voltage system, wired to the current IEE regulations.

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

The two (2)-plate viewing 3 pieces of 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 upto 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 holes of 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.

## **9. BUILT-IN STORAGE UNIT**

Storage Unit should be made out of 1.50 mm thick AISI-304 Stainless steel. The storage unit should be divided 2 or more parts and each part should have individual glass doors with high quality locking system. These doors should be installed on the storage units with the help of imported fittings allowing an opening allowance of 160degree. Each part should be provided with steel racks which should be completely detachable type. The storage unit should be fitted with 5mm thick vacuum insulated glass door and mounted flush with the theatre wall. The

storage unit should be continuously ventilated by positive air in the OT through ventilation holes provided at the bottom and top of opposite sides. The dimensions of each storage unit should not be less than height 2100mm x width 1200mm x depth 350mm. The storage units should be designed in a way that they are flush with the OT wall panels and the units should be air tight, not allowing any leakage between units and the wall panels.

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

Electrical Distribution Board along with UPS, Transformers, 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 DIN/CE approved 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. Wiring for 250 volts single phase and neutral 6/16 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.

## **11. MEDICAL GAS LINE INSTALLATION**

Oxygen, Air, Vacuum and Nitrous Oxide supply to Operation Theatres from the existing manifold should be provided. The medical gas alarm system shall fully satisfy 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. Each pipe shall be capped at both ends before supply.

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

Medical graded Copper Piping should be laid down from Outlets of OT to the nearby Valve Box outside the Operation Theatre via Surgeon Control Panel.

### **VIEW WINDOW WITH ROLLER BLINDS (Size- 1500 x 1200)**

View window with motorized horizontal Venetian blinds sandwiched in two parallel Vacuum insulated toughened glasses of thickness 5 mm. The Window frame should be powder coated Aluminum of approved shape flush mounted with wall paneling. The entire assembly should be completely sealed and fitted with proper Aluminum profile. The assembled thickness of the Window should be 33 mm. The window blinds should be operated with manually.

### **12. OT Light Ceiling –HALOGEN**

The unit should have reflector for optimum utilization of the dual reflector by means of targeted light direction technique with following specifications:

- Power supply : 230V, 50/60Hz
- Colour Temp. : 4200K
- Light intensity at 0.8m distance : 40000-45000lux
- Light field diameter : 180-200mm
- Colour rendering index Ra(1-8)-93
- Luminous efficacy in the light field : 290lm/w or more
- Power consumption : 12V/50W
- Working space : 27-173cm
- Lifetime of bulb : Atleast 2000hrs.
- Swivel radius : 960mm
- Vertical adjustment : 1250mm
- Weight : 20 kg.
- Should have CE certification for electricity safety

### **13. Operation Table (Hydraulic)**

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Hydraulic operating Tables are simple tables for performing surgical procedures and they work without electrical power.

OT Table is required for general surgery and should have X-Ray translucent tops.



- a. Four/five section table top with divided foot section
- b. Table top should permit x-ray penetration and fluoroscopy
- c. All table positioning, i.e., height, back section, lateral tilt, trendelenburg, and anti-trendelenburg, except foot and head section should be operated hydraulically
- d. Should have a manual position selector
- e. The casings on the frame and centre supporting column should be made of hygienic stainless steel
- f. Mattress should be radiolucent and suitable for fluoroscopy

**Measurements:(approximate)**

- a. Height: 730-1040 mm
- b. Side tilt: + 15-20 degrees
- c. Back section adjustment: - 15 degrees to 70 degrees
- d. Foot section adjustment: - 90 to 0 degree, detachable
- e. Trendelenburg: 25-30 degree
- f. Anti trendelenburg: 25-30 degree
- g. Head section adjustment: -40 to -30 degree, detachable
- h. Width: 550 mm
- i. Length: 1950 mm

**ACCESSORIES:**

All accessories as listed below should be included.

- a. Padded arm rest with straps - pair with clamps
- b. Anaesthesia screen with clamps
- c. Side supports: pair with clamps
- d. Shoulder supports: pair with clamps
- e. Knee crutches for lithotomy position: pair with clamps
- f. X-ray cassette tray
- g. Kidney bridge
- h. Patient Restraint Strap
- i. Accessories for operating in prone position
- j. Optional accessories for endurology work

**. 15. 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) to Electric Distributional Panel and to the corresponding load points
- Providing fixing of **Electrical Gadgets** like ELCB, MCB, Light Points, Power points, in the Normal OT room. • Number of fans, power point, bulbs/tube light. Apart from these supplies to the individual equipments with ELCB & MCB for Normal OT • Installation of MCB, ACB, ELCB & OCB of Havell/Siemens/L&T/Schneider etc for Control Panel for Normal 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 Normal 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.

#### **APPROVED MAKES**

1.	Cable	GLOSTER/UNIVERSAL/NATIONAL/ KALINGA
2.	Control Panel	L & T/ SIEMENS/ SCHNEIDER
3.	PVC Pipe Class III with Fitting	FINOLEX/ SUPREME/ PRINCE/ ORI-PLAST
4.	G.I. / M.S. Pipe Heavy Class	TATA/ JINDAL(HISSAR)/SAIL /SURYA PRAKASH
5.	MCCB/Contactor/Relay	L&T/ABB/SIEMENS/SCHNEIDER
6.	Pressure Gauges	H.GURU /FIEBIG
7.	Stainless Steel	TATA/SALEM/JINDAL/MUKUND/BHAYANDER/AMBICA
8.	Copper Pipe	MAXFLOW/PRECISION/RAJCO

#### **Note:**

- **The bidder should attach Technical Compliance item wise with respect to the above technical specifications and turnkey work along with Printed catalogues**
- **Manufacturer's authorization as per the format of the tender document should be provided by the bidder along with the bid when the bidder is not a manufacturer.**

- All electrical accessories like cable wire, electrical outlets, switches etc, 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 OT
- The contractor should prepare and submit layout plan before beginning of supply and installation for approval and As-built drawing after installed equipment and component, Electrical Wiring to HSCC.
- Bidder should provide complete Operation manual/parts manual/Service manuals for all systems and subsystems.
- Final electrical safety test, system test and calibration should be done by authorized person with test instruments.
- Training for seven working days should be provided
- Bidder should quote for Post-DLP 5 years CMC which shall be considered for ranking purpose in tender evaluation. Separate agreement shall be made for post DLP CMC between the hospital authority and the contractor. The tender shall be rejected if CMC cost is not quoted by the bidder.