# MINISTRY OF HEALTH & FAMILY WELFARE
# (GOVT. OF INDIA)

## ALL INDIA INSTITUTE OF AYURVEDA (AIIA), NEW DELHI

**Tender**

**for**

**Supply, Installation, Testing & Commissioning of Modular Operation Theatres at All India Institute of Ayurveda (AIIA), Sarita Vihar, New Delhi**

**VOLUME – III**

**TECHNICAL SPECIFICATION**

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# TECHNICAL SPECIFICATION FOR MODULAR OPERATION THEATRE

**SCOPE OF WORK : Complete design, supply construction, and commissioning of Modular Operating Theatre using a pre-engineered solution on Wall & Ceiling construction, Integrated Air & Light theatre ceiling, Antistatic OT flooring, Anti bacterial Painting etc. 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. Providing of two year defect liability with labour and spare parts free of charge.**

**Size of the Operation theatre room- - 6660 x 6630 x 4200H mm- 3 Nos.**

## 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 ± 2 kg/m³ 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 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 or powder coated 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 45-55 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 room should be rounded /coved to avoid bacterial contamination. 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. 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 individual wall panels shall use the tongue and groove technology for joining two panels, **no welding should be allowed**. All joints should be filled with metallic filler for plastic finish / sealing gaskets.Wall panel Joints should be invisible after the final wall coating is applied for SS-304/Silicon gasket joints for SMCS.

All joints and cavities should be filled with Metallic Epoxy sealer and sanded flush to provide seamless finish/sealing Gaskets both vertical and horizontal. The internal surface of the wall panel should be either solid Mineral Composite Sheet or SS-304 grade material. GI/EGP material will not be acceptable.

**In the case of SS-304:-**
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 covering, 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 be 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.

## 2. CEILING FILTRATION SYSTEM / LAMINAR AIR FLOW SYSTEM (AIR MANAGEMENT SYSTEM)

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 > 99.997%
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

## 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 screed should be provided flat to within a tolerance of ±3mm 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 equipotential 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. The sheets should be highly durable with resistance to shock and indentation. 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 2.5x10 to $2.5x10^6$ 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 requirement s 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. Corner should be uniformly curved

4. **DOORS AND FRAMES (HERMETICALLY SEALED DOORS)**
   **SIZE- 2100 X 1500**

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 ºC to +55º 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. 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 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.

## 6. EXHAUST AIR CABINETS

The openable and cleanable return-air exhaust cabinets should be provided in the operation theater. Designed flow rate should not be less than 1000 m3/hr. Distribution of exhaust air volume between fluff strainers top should be 400 m3/hr and bottom 600 m3/hr. Fixed type exhaust air cabinet (non-openable) type should not be supplied. The air cabinets should have suction from top as well as from bottom. The supplier of wall and ceiling system should manufacture and supply the exhaust air cabinet. Specification of materials and aesthetic should match perfectly with the ceiling system.

## 7. VIEW WINDOW WITH MOTORIZED BLINDS

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 by a cordless Remote controller.

## 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 form 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
- HEPA Filter Status module
- 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. ADJUSTABLE MOVABLE BOOM ARM SYSTEMS -Imported

The Ceiling boom arm systems designed to provide convenient positioning of medical equipment, medical gas terminal units, electrical and speciality services. The Ceiling Pendants should comply with international standard. 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. Should be CE marked.

### a. Equipment Boom System with boom suspension for Progressive Scan Flat Panel

**Description :** The Equipment Boom should be custom designed to meet all of the specific needs of the operating room such as concealed cables and tubes, unlimited equipment combinations. The arms should be easy to move, and each should come with pneumatic brakes as a standard option to support a locked position.

The Equipment Pendant with a service head column adjustable height and should be with Double-arm with Horizontal Motion & Vertical Height Articulating motion. There should not be any sharp edges. Should have a motorized articulating vertical drop. Vertical articulation should be through a Heavy-Duty Electric motor.
Should have atleast 3 shelves of minimum 750mm size for various medical devices having a load bearing capacity (Articulating) of minimum 200 Kg.

Top-arm Rotation &Lower-arm Rotation should be at least $330^{o}$& Service-head rotation should be at least $330^{o}$

Should have a provision of mounting a spring-arm monitor in tandem with the equipment boom arm.

**Service Points/Outlets *:***

b. Should have provision of minimum standard Medical Gas Service outlets(Oxygen-2, Vacuum-2, Nitrous-1, Medical Air-1, AGSS-1 Surgical Air-1 & atleast 10 no. of standard duplex conditioned Electrical Service outlets (same as in Anesthesia Boom System).

The Column should have at least 8 no. of Data (Audio/Video/Control) Ports for connections to various other medical devices desired to be integrated in future.

**Boom Suspension for 26" HD Progressive Scan Flat Panel Monitor**

**Description :** Should be 26" High Definition Progressive Scan Flat-panel Monitors with ceiling mounted spring arm suspension in tandem-mount 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 26" Flat-panel High Definition Progressive Scan Monitor with spring-arm suspension should meet all criteria mentioned above.

c. **Anesthesia Boom System**

**The boom system should be available as follows**:

- 1000 mm moveable arms each with 330 deg. Horizontal movement.
- Arm should have anaesthesia machine lifting arrangement. The head of the pendant should move the machine up & down.
- The weight carrying capacity of the arm should not be less than 150-200 KG.
- Each arm should be capable of 330 degrees of rotation, which can be easily adjusted to suit the desired mode of operation.
- Pendant should be CE/US FDA marked.
- The arms may be fitted with pneumatic brakes to prevent inadvertent movement.
- The Pendant Service Head should be supplied with provision for medical gas terminal units and 5/15 Amps. Sockets. Each pendant should have:

Provision for Oxygen Outlets– 2
Provision for Nitrous Oxide Outlet - 1
Provision for Medical Air (4 bar) Outlets–1
Provision for Surgical Air(7 bar) Outlets-1
Provision for Vacuum Outlets– 2
Provision for AGSS Outlets-1
Provision for Miscellaneous Outlet– 1
Electrical Sockets –10 nos.
Shelf with two rails one on each side – 2 no.

Monitor input & Output – 1no.
Infusion pump pole – 1
IV management - 1
The equipment pendant shall be ready with cables for accessibility of PACS and telemedicine from the sterile field.

Anaesthetic and Surgeon Pendant should be CE with four digits CE number

## 11. 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.

## 12. 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.

## 13. WRITING BOARD (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.

## 14. DIGITAL DISPLAY PANEL (WORK STATION)

The alphanumeric electronic Touch Screen should be a 29 inch wide screen monitor of latest generation model suitable to Indian condition should have Metal panel-LCD TFT, High resolution, maximum Optical clarity, USP Ports and compatibility to other hardware system. The touch screen should be for messages and data through displaying operating list and particular details etc., message storage and scroll display. Operating with Stylus. It should have a protective glass overcoat which protects the sensor by resisting scratches and increase durability. It should be mounted flush into the theatre wall with a sterile jointing system. NEMA sealable. The monitor should be completely water resistant with polyethylene gasket. Liquid on screen should not impede touch screen performance.

## 15. 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 1800mm x width 900mm 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. SCRUB STATION

Compact Surgical Scrub sink -3 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 molded mineral composite 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. The station should also have inbuilt soap dispensers.

## 18. OT SIGNAGE

It should be installed at outside the Operation theatre. It shall indicate status of operation theatres along with activation button and indicator at the Surgeon Control Panel. Complete in all respects including hardware and wiring with low leakage FRLS wire.

## 19. MEDICAL GAS LINE INSTALLATION

Oxygen, Air, Vacuum and Nitrous Oxide supply to Operation Theatres from the existing manifold should be provided. Installation and commissioning of Area Zone Service Unit, Warning and Alarm Unit and Terminal Unit etc shall be at suitable location. The line valve should be brass 25 mm ball valve with PTPE seats operated by a quarter turn handle with a pin to prevent over travel in both directions. The ball valve shall be connected by stub pipes to the distribution system by either top, bottom, side or rear entry pipes. The assembly should be housed in a valve box which shall be capable of both surface or concealed mounting incorporate a hinged lid which opens through 180 degree, to provide maximum access. The hinged door shall be fitted with a glass panel to enable a visual check on the line valve selected position and for access in an Emergency. The hinged door should normally be locked closed and area zone valves installed adjacent to each other shall be operated by different key lock combinations.

Terminal units should be gas specific and only accept the correct Medical gas probe. Gas specific components shall be pin indexed to ensure that a correct gas specific assembly is accepted. Terminal units should be designed to allow easy, accurate and low cost installation, providing a variable angle for pipeline inlet and to accommodate variable plaster depth up to maximum of 16 mm. Terminal units should incorporate a replaceable capsule assembly, enabling all working parts subject to wear through usage to be replaced as a factory assembled unit thereby reducing maintenance time. Each terminal unit should be identified by the appropriate recognized name or symbol, colour, coding and shape as detailed below as in HTM 2022 & C11/NFPA. These markings shall be permanent and be an integral part of the terminal unit.

The medical gas alarm system shall be an advanced/ multiplexing data transmission system which fully satisfies the principles of HTM 2022/NFPA and conforms in all respects to the National Health Service Model Engineering Specification C11.

Pipe work materials shall be manufactured by a licensee of the BS 5750 quality assurance certification scheme and all pipes and fittings are marked with the BSI. Pipes should be phosphorous de-oxidised non-arsenical copper to BS 6017 grade. C106. Pipe sizes and manufacture should be according half hard to BS 2671 part 1 Table x In addition to the marking requirements of BS 2871 pipes should be marked DEG to represent compliance with Medical degreasing specification. Fittings should be phosphorous de-oxidised non-arsenical copper to BS

6017 grade C 106, of sizes and manufacture to BS 864 part 2 or equivalent 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.

## 20. 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.

## 21. 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 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 : Number of LEDs should be adequate enough to provide minimum Illumination level 160000 Lux each.
- 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
- Lighthead 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 HD 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 remote control 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

**22. IN ADDITION TO THE ABOVE, FOLLOWING <u>TURNKEY WORKS</u> FOR INSTALLATION AND COMMISSIONING OF MODULAR OT AT ALL INDIA INSTITUTE OF AYURVEDA, SARITA VIHAR, DELHI ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR :**

- **Electric distribution panel (EDP)** for the above MODULAR OT equipment complete with all switchgears, wiring and controls etc complete as per specifications and drawings. (Switch gears of L&T/ Siemens/ ABB/GE or Schneider make)

- **Electrical cabling** of IS: 1554 standard and wiring as per IS : 732 standard and of adequate capacity to bear total electrical load required for MODULAR OT works from **nearby MDB/Substation in the hospital** to the Electric Distributional Panel(EDP) of MODULAR OT room and from the EDP to the corresponding load points.

- Providing fixing of **Electrical Gadgets** like ELCB, MCB, Light Points, Power points, Fans, Cool air Fans, Exhaust fan etc in the MODULAR OT room. Number of fans, power point, bulbs/tube light. Apart from these supplies to the individual equipments with ELCB & MCB in the MODULAR OT room. Installation of MCB, ACB, ELCB & OCB of Havell/Siemens/L&T/Schneider etc for Control Panel for MODULAR OT.

- Laying of **GI water pipe line** with necessary taps, joints, elbows, Unions and valves of GI made and IS-1239 standard (Latest version) and of adequate sizes to feed total water requirement of the MODULAR OT from the available source point in the hospital to the overhead tank and from the overhead tank to the installed machines'/users' ends at MODULAR OT Room.

- Construction/laying of **Draining system** from all the equipments/Sinks to the main drain line with proper trap and flow system and tapping.
- Arrangement for requisite **Fire Fighting** for the entire effective zones in the MODULAR OT Room
- Additional work pertaining to Civil, Electrical, Furniture, Plumbing, Overhead Water Tank, Sanitary, Servo stabilizers/U.P.S etc. and any other protections relevant as per State/Central Govt. regulation/local authority/NDMC, required for successful installation testing and commissioning of the system and the offered price should include all such costs, each Schedule is to be considered a package in itself and contractor to execute the order in package on a “turnkey basis”.

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

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 contractor should prepare and submit layout plan for Modular OTs, Laminar flow System, Electrical Wiring, EDP to HSCC for approval before beginning of supply and installation.

**APPROVED MAKES**

| | | |
|---|---|---|
| 1. | HEPA Filter | SAGICO FIM/THERMODYNE/ADVANCE/PENTAGON |
| 2. | Cable | SKYTONE/KEI/UNIVERSAL/NATIONAL/RR CABLE |
| 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**

**Responsibility of the Contractor**

- **The contractor shall be responsible for the complete works including submission of working drawing and walk through view.**
- **The Contractor should provide list of commonly used spares, Operation 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 to the staff & engineers of AIIA & by the Manufacturer**
- **The engineer of the contractor should reach at AIIA within 24 hrs of service call.**
- **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 should prepare and submit layout plan for Modular OTs, Laminar flow System including ducting, Electrical Wiring, EDP to HSCC for approval before beginning of supply and installation.**
- **The contractor shall be responsible for the complete works including submission of working drawing and walk through view.**
- **The contractor should provide complete parts manual/Service manuals for all systems and subsystems.**
- **The contractor should prepare and submit layout plan for Modular OTs, Laminar flow System including ducting, Electrical Wiring, EDP to HSCC for approval before beginning of supply and installation.**