

**MINISTRY OF EXTERNAL AFFAIRS
(GOVT. OF INDIA)**

**NEPAL BHARAT MAITRI EMERGENCY AND TRAUMA CENTRE (NBMETC),
KATHMANDU
NEPAL**

Tender

for

**Construction of Additional works for making Operation Theaters (OTs)
functional at 200 Bedded Nepal Bharat Maitri Emergency and Trauma Centre
(NBMETC), Kathmandu, Nepal**

VOLUME – IV

TECHNICAL SPECIFICATION

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TECHNICAL SPECIFICATION OF ADDITIONAL WORK FOR CONSTRUCTION OF OPERATION THEATRE

SCOPE OF WORK -

Supply construction of Operating Theatre on turnkey basis in accordance with the specifications, bill of quantities and providing of free spare parts and service during 1 year Defect Liability Period.

Size in mm of

Operation Theatre (1)	6548 x 5990 x 4000
Operation Theatre (2)	8450 x 5250 x 4000
Operation Theatre (3)	7230 x 5250 x 4000
Operation Theatre (4)	8685 x 5250 x 4000
Operation Theatre (5)	7035 x 6145 x 4000

1. CEILING SYSTEM

50 mm thick Double skin totally flush false ceiling prefabricated panels shall be made with 0.8 mm thick Stainless Steel (SS-304) sheet on both side with 36 ± 2 kg/m³ density PUF as infill, with suitable Ceiling grid and supporting hardware. Joints shall be sealed with clean room compatible silicon sealant. Panel shall be class "0", fire rated. Factory made cutout in the ceiling panel for light fixture.

All joints and cavities should be filled with Metallic Epoxy sealer and sanded flush to provide **seamless finish**. The internal surfaces of the 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.

The laminar flow system should comprise of aluminum alloy frame complete with Heat insulation and sound insulation properties. The complete unit should have factory prepared fine sealing system. The Plenum should be made of extruded aluminum sections which should support the fire retardant housings in such a manner that the air is passed through the HEPA filters only. The Laminar flow system should have specially

designed anodized aluminum perforated diffuser grill in which each diffuser should have minimum perforation of 80% of the total individual area. The Laminar flow system should have all metal structure and the perforated diffuser grills structure should be minimum 50 mm in depth so that it guides the laminar air flow pattern out. The perforated grills should also provide the Multi velocity air flow, The perforated grills should also provide the Multi velocity air flow, i.e. The velocity in the centre diffusers should be maximum and the diffusers at the periphery should be Minimum. Duct connection of Tent should be provided with the incoming ducts from AHU. Perfect Tightness should be by a special sealing between filters and holding structure enabling no bypass of HEPA Filters. The HEPA Filters should be supplied at site duly sealed in factory made packing. The filters installed in the plenum should be suitable for applications for Laminar flow.

1	Protective grids	White epoxy painted micro drawn grid
2	Separators	Continuous thermo plastic chord/metallic cords
3	Sealant	Polyurethane
4	Gasket	One piece polyurethane
5	EN 1822 class	H14

6 MPPS average efficiency >- 99.995%

7	MPPS average efficiency	>- 99.975%
8	3 micron DOP efficiency	>- 99.997%
9	Final pressure drop	600 Pa (maximum)
10	Maximum operating Temperature	60° centigrade
11	Maximum RH	90 percent
12	Efficiency Tests	Filters individually tested and certified

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 PAINTING

Anti-bacterial/Antifungal paint should be quoted smoothly and uniformly on wall (Colour should be as per the choice of client). The wall should be smooth and free from any roughness.

3. CORNER COVING

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 coves. Covering and coving of Return air ducting lines inside OT. Material to be used for covering ducting lines should be Powder coated galvanized sheet/Powder coated Aluminium/SS-304.

4. 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 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 laying of the floor finish. 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 ± 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 equipotential grid. A self-leveling compound should be laid prior to laying of the floor finish. One earthing lead should be brought out of from every 150 Sq.ft. area and attaching it to main earthing strip/ground. 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. 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 2.5×10^5 to 2.5×10^6 Ohms 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 and sealed perfectly and uniformly. Self-leveling compounds should be used for this purpose.

5. 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 - 12 in numbers for each OT. The fluorescent lamps 36 W 16mm Ø- 3 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 **IP54 protocol**. Light should not interfere when green mode of Endoscopy is performed.

6. OT CONTROL PANEL

The room Surgeon's control panel should be designed to cope with changing technology & equipment in operating environments.

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.

Control Panel will be user friendly & ease of operating & maintaining purpose. 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, 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.

7. 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.

8. WRITING BOARD

Writing Board as operating list Board of size-1000x700x60 deep should be made of ceramic having magnetic properties and should be flushed to the wall of the operating Room.

9. BUILT-IN STORAGE UNIT

Storage Unit should be made out of 1.50 mm thick SS-304 sheet. 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 flushed with the OT wall.

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

All high voltage equipment should be installed in a separate enclosure. Electric Distribution Panel, UPS, Transformers, Mains, Relays, Circuit protective equipment etc. for all circuits of Operation theatre shall be installed in the remote cabinet. All electrical wiring should be terminated to the connectors mounted on rail and labeled with indelible labels. Individual fuse and miniature circuit breakers should protect all internal circuits. Complete schematic diagram drawing description should be enclosed with the equipment.

Laying of PVC conduits, Modular Switch Boxes, Modular Switches-sockets, Power and Light wiring including Earthing wire for all the lighting controls, Pendant and other equipment fixtures and fittings inside the theatre Wiring with low leakage current wires of FRLS wires should be as per requirements. 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.

TECHNICAL SPECIFICATION FOR CONSTRUCTION FOR ADDITIONAL WORK OF MINOR OT

SCOPE OF WORK -

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

Size of Minor OT (mm) 6140 x 5070

1. CEILING SYSTEM

50 mm thick Double skin totally flush ceiling prefabricated panels made with 0.8 mm thick Stainless Steel(SS-304) sheet on both side with 36 ± 2 kg/m³ 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 fixtures and diffusers. Aluminium Ducting inside the OT with Diffusers and ducting connection with the incoming duct at the OT from AHU.

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 PAINTING

Anti fungal paints should be quoted smoothly and uniformly on wall (Colour should be as per the choice of client)

3. CORNER COVING

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 coves. Covering and coving of Return air ducting lines inside OT. Material to be used for covering ducting line should be Powder coated galvanized sheet/Powder coated Aluminium/SS-304.

4. 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 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 IP 54 protocol. Light should not interfere when green mode of Endoscopy is performed.

5. DISTRIBUTION BOARD, ELECTRICAL WIRING, CONDUITING WITH FIXTURES INSIDE THE OPERATION THEATRE

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

Laying of PVC conduits, Modular Switch Boxes, Modular Switches-sockets, Power and Light wiring including Earthing wire for all the lighting controls, Pendant and other equipment fixtures and fittings inside the theatre Wiring with low leakage current wires of FRLS wires should be as per requirements. 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.

6. OPERATION THEATRE FLOORING (ANTISTATIC EPOXY)

Providing and laying of approved make Epoxy ceramic aggregate mixed abrasion resistance flooring over IPS flooring. Antistatic Epoxy flooring to be laid over Epoxy Primer coating applied on levelled IPS floor. Supply & laying of 2mm thick self leveling screed and Antistatic Epoxy Flooring. 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. Supply and laying of 150 mm wide Epoxy coving for wall to flooring.

IN ADDITION TO THE ABOVE, FOLLOWING TURNKEY WORKS FOR CONSTRUCTION OF 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 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 Modular OT room. • Number of fans, power point, bulbs/tube light. Apart from these supplies to the individual equipments with ELCB & MCB for OT • Installation of MCB, ACB, ELCB & OCB of Havell/Siemens/L&T/Schneider etc for Control Panel for OT.

In addition to the above mentioned equipment/appliances, if the contractor thinks it necessary to include any other equipment/appliances, accessories etc. for the OT then that may be provided 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 SKYTONE/KEI/UNIVERSAL/NATIONAL/RR CABLE

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
9.	HEPA Filter	SAGICO FIM/THERMODYNE/ADVANCE/PENTAGON

Note:

- **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 OT**
- **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.**
- **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 client by the Manufacturer**
- **The contractor should prepare and submit layout plan to HSCC for approval before beginning of supply and installation.**
- **The contractor should prepare and submit layout plan for OTs including Electrical Wiring to HSCC for approval before beginning of supply and installation and As-built drawing after construction.**