HSCC (INDIA) LIMITED

(A Subsidiary of NBCC (India) Limited)
(A GOVERNMENT OF INDIA ENTERPRISE)
E-6A, Sector-01, Noida-201301

Date: 14.05.2021

AMENDMENT NO. II

Project Name: **Tender for "Construction of Tertiary Cancer Care Centre (TCCC) at Goa Medical College, Bambolim- GOA and their maintenance during defect liability period".**

Tender No. : HSCC/TCCC/GOA/2021dated: 03.05.2021

This has reference to subject work, the following Amendment may be noted, which shall be treated as a part of the contract to be uploaded along with tender/ bid:

(1.) The Last date of submission & opening of bids has been extended as follows:

Last date to fill/upload the tender through e-Tendering	:	upto **15:00 hrs.** on **25.05.2021**
Date of Opening of bids	:	on 25.05.2021 at 15:30 hrs.

(2.) Technical Specification of CSSD, MGPS, Minor OT, Normal OT can be found at ANNEXURE-I

(3.) Make List provided in Vol-IV of Tender Documents for Civil, PHE, Fire, Electrical & HVAC is "Nullified" & the new Make list for the respective works can be found at ANNEXURE-II .

(4.) Reply to Pre Bid Queries raised by bidders during pre -bid meeting held on 10.05.2021 through video conferencing

This has reference to subject work, the following Amendment may be noted, which shall be treated as a part of the contract to be uploaded along with tender/ bid:

Sr. No	Spec. Ref. Cl. No. Page No.	Specification / Requirements	Bidder's Queries	HSCC Reply
1		In Tender Volume I, page no 11, Clause 1.4.1 for Eligibility Criteria, Experience of having successfully completed works during the last 7 years ending previous day of last date of submission of tenders. In (b) (ii) One work (either part of (i) above or a separate one) costing not less than 40% of estimated cost out to tender of Project Comprising " Execution of any building work including finishing works, internal water supply, sanitary installation and internal electrical installations, fire-fighting and Centralized HVAC works all executed under one composite agreement.	We request you to kindly allow experience of any three item of MEP form same project and balance item from any other project. Experience of project which is completed more than 90 % shall be considered as similar project, if value of completed work is more than required criteria. Kindly amend accordingly.	No change in tender terms and conditions. Tender terms and conditions shall prevail
2		MGPS & OT work	Kindly provide detailed specification, list of approved makes & drawings related to MGPS & OT work	Technical specifications enclosed at Annexure-I. Tender terms and conditions shall prevail
3		Approved make for cement – OPC 43 – ACC/ Ultratech /Jaypee/ Century / JK	Kindly allow OPC 53 grade & PPC cement of any of major cement plant	No change in tender terms and conditions. Tender terms and conditions shall prevail
4		Approved make for reinforcement TMT – SAIL / RINL /TISCO	Kindly allow other manufacturer with IS specifications. Contractor shall be required to test in approved lab	No change in tender terms and conditions. Tender terms and conditions shall prevail

5		BOQ item no 1.01 & 1.02 - including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m.	BOQ item for disposal of excavated earth beyond 50m is needed. Practically disposal within 50m won't be possible.	`No change in tender conditions
6		BOQ item no 1.01 & 1.02 - Filling available excavated earth ….. lead up to 50 m and lift upto 1.5 m	BOQ item for lead beyond 50m is needed. Practically lead within 50m won't be possible.	`No change in tender conditions
7		BOQ Item 4.01 & 4.02 - (The payment of RCC band and reinforcement shall be made for seperately).	Kindly clarify that the payment for shuttering of RCC bend shall also be made separately)	Payment shall be made as per relevant BOQ items
8		BOQ item no 4.03	Kindly clarify that the payment for 2 no 6mm dia MS bar shall be considered in reinforcement item. Kindly clarify unit of measurement as Sqm or Cum?	BOQ item 4.03 is self explanatory and its rate includes cost of P/F MS bars as per BOQ item and relevant CPWD Specifications
9		Drawings	In all drawings, distance between grid G & G' is not mentioned. Kindly provide.	Distance between grid G & G' is 645mm
10		BOQ in Excel copy	Kindly provide BOQ in excel format.	Already available on Portal
11		Last date to fill / upload the tender through e-Tendering and submit the Bid Security, and Cost of Bid Document is 18.05.2021 upto 15:00 hrs	Sir as per current situation due to COVID-19 & lockdown in various states, We request you to kindly extend the date of bid submission for 1 month period i.e. 18-06-2021	Check Point-1 of this amendment

12		Requirement of MV/LV panel in Tender document: Clause of tender " Note- Approved HT panel Main LT Panel, Main HVAC Panel, APFC Panel, Active Harmonic Filter Panel will be fabricated in the workshop of OEM only."3. Main LT Panel/Main HVAC Panel Siemens/L&T/ABB/ /APFC Panels / Active Harmonic SchneiderLegrand/ Fliter (AHF) ADDLAC	From clause, we understand that here the requirement for MV & LV panels is directly from the OEMs factory. Please clarify the same. Further, we wish to inform that for MV, the panels can be supplied directly from the factory of OEMs. While for LV panel, we wish to inform that now-a-days, authorized system integrators are manufacturing the LV panels by having design verified from the OEMs. Also the major vital components including the mechanical ones are being supplied by OEMs. We request you to kindly accept the LV panels from the authorized system integrators/channel partner.	The work to be executed as per Technical specifications and BOQ item. No change in tender terms and conditions. Tender terms and conditions shall prevail
13		RCCB/ MCB 26. RCCB/ MCB L&T/Legrand-DX3/Seimens /Schenider-cti9/GE/Hager/Philips	We request you to kindly add ABB name in RCCB/MCB.	The work to be executed as per Technical specifications and BOQ item. No change in tender terms and conditions. Tender terms and conditions shall prevail

14		Modular Switch & Sockets 41. Modular Switch & Sockets Outlets — Legrand-Myrius or Anti Bacterial/L&T Oris/ Schneider- Livia/Philips-sleek	We wish to inform that ABB also manufactures the modular switches and are supplying in various projects including hospitals across India and abroad. Some of reference are as below Medanta Gurgaon. RML, Lucknow. Noida Metro. CBI Housing Delhi Technical University. In view of above, request to kindly add ABB name for Modular Switch & Sockets	The work to be executed as per Technical specifications and BOQ item. No change in tender terms and conditions. Tender terms and conditions shall prevail
15		UPS 44. UPS System — Schneider-MG/3EM/Eaton Power Ware/ Emerson	We request you to kindly add ABB name in UPS. Product catalog enclosed for your ready reference.	The work to be executed as per Technical specifications and BOQ item. No change in tender terms and conditions. Tender terms and conditions shall prevail
16		MCB Distribution Board 25.MCB Distribution Board — L&T/Hager/Legrand/ Siemens/Schneider/GE /Philips	We request you to kindly add ABB name in MCB Distribution Board also.	The work to be executed as per Technical specifications and BOQ item. No change in tender terms and conditions. Tender terms and conditions shall prevail
17	Clause 10 B(II)	Mobilization Advance	Kindly provide Mobilization Advance equivalent to 10% of the tendered value.	No change in tender terms and conditions. Tender terms and conditions shall prevail
18	As per SCC page 15	Approvals Required: Permission for tree cutting from Forest department	Since, Tree cutting is pre construction scope of work. we request to include the scope of taking approvals for the same by the client itself.	No change in tender terms and conditions. Tender terms and conditions shall prevail
19	As per SCC page 15	Environment clearance (EIA)	Kindly share Environment Clearance NOC.	No change in tender terms and conditions. Tender terms and conditions shall prevail
20	As per SCC page 88	The building is proposed to be registered for obtaining GRIHA Rating from GRIHA Secretariat under MNRE scheme.	Kindly clarify whether the cost for obtaining GRIHA rating will be borne by contractor or, client.	As per Tender terms & Conditions

21	Soil Report	Soil Report	Kindly provide us the soil report and contour Map of the plot as it will be helpful to understand the ground conditions and strata on which construction has to be done.	Refer NIB (Volume-I) Clause No 1.17 Bidders are advised to inspect and examine the site and its surroundings and satisfy themselves before submitting their tenders as to the nature of the ground and sub-soil
22	BOQ of Civil works	Item no. 6.05	Considering the hot and humid temperature and wind pressure of Goa, it would be better to consider other roofing instead of UV stabilized fiberglass reinforced plastic sheet roofing.	No change in tender conditions
23	BOQ of Civil works	Item no. 10.10	Kindly confirm whether integral crystalline waterproofing membrane will be sufficient for basement waterproofing.	No change in tender conditions
24	BOQ of Plumbing works	Model no. of sanitary fixtures and fittings	Kindly provide the model no. of sanitary fixtures and fittings as required in the subsequent items in BOQ of Plumbing works	The work to be executed as per CPWD specifications and BOQ item.
25	BOQ of Civil works	PT Slab	Kindly confirm whether we can opt for PT Slab. This is to ensure early progress of the work,	No change in tender terms and conditions. Tender terms and conditions shall prevail
26	BOQ	MGPS BOQ item No 1.2	Automatic Oxygen Control Panel, please clarify Capacity in LPM.	Shall be as per technical Specifications enclosed at Annexure-I
27	BOQ	MGPS BOQ item No 1.3	In Emergency system for Oxygen manifold, Regulator item shall be consider or not.	Regulator item shall be considered
28	BOQ	MGPS BOQ item No 2.2	Automatic Nitrous Oxide Control Panel, please clarify Capacity in LPM.	Shall be as per technical Specifications enclosed at Annexure-I
29	BOQ	MGPS BOQ item No 2.3	In Emergency system for Nitrous Oxide manifold, Regulator item shall be considered or not.	Shall be as per technical Specifications enclosed at Annexure-I
30	BOQ	MGPS BOQ item No 3.1,5.3, 5.4	Pressure Reducing Spool System not given in BOQ, please clarify.	Shall be as per technical Specifications enclosed at Annexure-I
31	BOQ	MGPS BOQ item No 11	Please Confirm the Capacity of AGSS Unit.	600 LPM
32	BOQ	MGPSBOQ item No 13	Please Confirm Sizes of Horizontal BHP & we required Outlet matrix of Internal Outlet & Switches.	Shall be as per technical Specifications enclosed at Annexure-I
33	BOQ	MGPS BOQ item No 15	Please Confirm that Electrical Distribution Panel is Centralized or Individual Vaccum and Air Plant.	Shall be as per technical Specifications enclosed at Annexure-I
34	BOQ	MGPS BOQ item No 16	Kindly Confirm O2 Cylinderes Sizes & Capacity.	Shall be as per technical Specifications enclosed at Annexure-I

35	BOQ	MGPS BOQ item No 17	Kindly Confirm N2O Cylinderes Sizes & Capacity.	Shall be as per technical Specifications enclosed at Annexure-I
36	BOQ	MGPS BOQ item No 18	Turnkey works complete as required with accessories as per specification- Please explain the lot Scope of Work for proper costing.	Shall be as per technical Specifications enclosed at Annexure-I
37	BOQ	MGPS All items	Request you to provide Make List of All Healthcare Equipment's. (Equipment's are imported or Indigenous.)	Shall be as per technical Specifications enclosed at Annexure-I
38	BOQ	MGPS All items	Technical Specification of All Healthcare Equipment's are missing in Tender, Request you to provide the same. In BOQ major items details are mentioned as per Technical Specification.	Shall be as per technical Specifications enclosed at Annexure-I
39	BOQ	MGPS General	As per Tender Documentation, LMO Tank, PRS and Vapourisation units and related Work is missing, Shall We consider those major items. Please confirm.	Shall be as per technical Specifications enclosed at Annexure-I
40	BOQ	Minor OT BOQ item No 1	Please Confirm the Ceiling Type either Panel Ceiling or PUF Ceiling or Normal Ceiling.	Shall be as per technical Specifications enclosed at Annexure-I
41	BOQ	Minor OT BOQ item No 5	DOUBLE LEAF DOOR- Please Confirm that it's a Automatic Sensor Type or Manual Opening Type, Sliding Type, swing type.	Shall be as per technical Specifications enclosed at Annexure-I
42	BOQ	Minor OT BOQ item No 7	Please Confirm the lights in OT are Single Dome or Double Dome Type.	Shall be as per technical Specifications enclosed at Annexure-I
43	BOQ	Minor OT BOQ item No 8	Kindly Confirm the Distribution Board Sizes.	Shall be as per technical Specifications enclosed at Annexure-I
44	BOQ	Minor OT BOQ item No10	Please Confirm the Internal Ducting Work with GI or Aluminium Sheet and also confirm that its included with Damper or not.	Shall be as per technical Specifications enclosed at Annexure-I
45	BOQ	Minor OT BOQ item No11	MEDICAL GAS LINE INSTALLATION - Please Confirm Isolation Valve, Zone Valves are Considering into this part or not. If not then where should we Consider.	Shall be as per technical Specifications enclosed at Annexure-I
46	BOQ	Minor OT BOQ item No 12	SCRUB STATION - Please Confirm the type i.e. 2 bay or 3 bay type.	Shall be as per technical Specifications enclosed at Annexure-I
47	BOQ	Minor OT BOQ item No 15	Turnkey works complete as required with accessories as per specification- Please explain the lot Scope of Work for proper costing.	Shall be as per technical Specifications enclosed at Annexure-I

48	BOQ	Normal OT BOQ item No 6	INTERNAL HVAC DUCTING AND EXHAUSTION SYSTEM- Should we Design a Positive Pressure System or not needed.	Shall be as per technical Specifications enclosed at Annexure-I
49	BOQ	Normal OT BOQ item No 11	HERMETICALLY SEALED DOOR- Please Confirm that it's a Automatic Sensor Type or Manual Opening Type, Sliding Type, swing type.	Shall be as per technical Specifications enclosed at Annexure-I
50	BOQ	Normal OT BOQ item No 15	Electrical Distribution Panel , Please Confirm that its Centralized Electrical Panel or Individual Panel or Vacuum Panel.	Shall be as per technical Specifications enclosed at Annexure-I
51	BOQ	Normal OT BOQ item No 17	Matrix of Outlet needed, Please Share.	Shall be as per technical Specifications enclosed at Annexure-I
52	BOQ	Normal OT BOQ item No17	DOUBLE ARM MOVEABLE PENDANT FOR ANESHTHETIST- Please Confirm Pendant are considering with outlet or not.	Shall be as per technical Specifications enclosed at Annexure-I
53	BOQ	CSSD BOQ item No6	Kindly confirm the Compressor Capacity.	3 hp
54	BOQ	CSSD BOQ item No15	CONTROL & PACKING TABLE WITH TWO SHELVES FOR CLEAN AREA- Size need to be clarify.	Shall be as per technical Specifications enclosed at Annexure-I
55	BOQ	CSSD BOQ item No 17	Pass Box Size and type i.e. Automatic or Manual type opening, please clarify.	Shall be as per technical Specifications enclosed at Annexure-I
56	BOQ	CSSD BOQ item No24	TURNKEY WORKS-1 lot, Please explain the lot Scope of Work for proper costing .	Shall be as per technical Specifications enclosed at Annexure-I
57	BOQ	CSSD General	Compressor System is n missing in BOQ for piping, outlet & valves quantity .	Shall be as per technical Specifications enclosed at Annexure-I
58	BOQ	CSSD General	Electrical Panelling, Cabling, earthing , Wiring, Industrial Sockets, Plumbing, HVAC and UPS System are needed, Please Share the details Scope of work.	Shall be as per technical Specifications enclosed at Annexure-I
59	BOQ	Electrical DG Set BOQ item No 3.01	Exhaust Piping work and Support Structure is mentioned in BOQ along with DG set. We require quantities for the MS Piping in Rmt and Support Structure of Steel in Kg.	DG exhaust as per CPCB Norms & tender conditions
60	BOQ	Electrical DG Set BOQ item No 3.02	Vol 5, BOQ, Subhead 3, DG Set, Page No.143 of 232, mentioned Synchronising Cum AMF Panel for 2 Nos. DG Set, but in BOQ, given 1 Set of DG. Hence, clarify the DG Set quantity.	One no. DG set as per BOQ

61	BOQ	Lift BOQ item No 14.01	Vol 5, BOQ, Subhead 14, Is it ok if consider elevator with Machine Room Less as given in BOQ with MR.	No change, As per tender condition.
62	BOQ	Lift BOQ item No 14.01	Vol 5, BOQ, Subhead 14, Shaft Size with Section and floor Plan is required.	As per tender drawings
63	BOQ	Lift BOQ item No 14.01	Vol 5, BOQ, Subhead 14, Cabin and Door size with height are required.	As per CPWD specification/ NBC-2016 amended upto date
64	BOQ	UPS BOQ item No 6.01	Vol 5, BOQ, Subhead 6, UPS System, the 2x40 kva UPS is given in Parallel but in MV Panels, 4.10, UPS Input Panel for OT 80 kva is given. Hence, please clarify the UPS are connected individually or in parallel.	2X40KVA UPS for ICU in parallel redundant load sharing mode.
65	BOQ	HVAC BOQ item No 1.1	WATER CHILLING UNITS- Chiller Plant Manager Unit are required or no need please clarify.	Shall be as per Tender Conditions.
66	BOQ	HVAC BOQ item No 7.1	MONSOON REHEAT ARRANGEMENT FOR OTs AND ICUs are considered - for Summer time need to be considered Humidification Package for Relative Humidity Control also, please clarify	Shall be as per Tender Conditions.
67		Form A-Form of Bid and Appendix-Vol-I Page No.39 Sl.No.16 16. We enclose; a. All documents as per the checklist b. Bank guarantee for Rs _____ (Rupees _____ only) issued by _____ (name of the bank) valid until _____ towards EMD.ishu	what should be written in place of Bank guarantee for Rs _____ (Rupees _____ only) issued by _____ (name of the bank) valid until _____ towards EMD. please clarify,	Original declaration in lieu of EMD/ Bid Security as per the proforma (Annexure-II) of Vol.-I

68	2.3.6, (A) Sr. ii on page 20	Signed & stamped Declaration in lieu of EMD/ Bid Security as per the proforma (Annexure-II) of Vol.-I of tender.	As per tender clause no. 2.3.6, (A) page 37, Annexure-II on page 37. CI. 1.9 Of page 12. CI. 2.3.15, Sr iv page on page no. 15, the bidder shall submit declaration in lieu of EMD/ Bid Security as per the proforma (Annexure-II) and therefore bidder need not required to submit! upload the bank guarantee towards EMD with technical bid Kindly confirm	Original declaration in lieu of EMD/ Bid Security as per the proforma (Annexure-II) of Vol.-I in lieu of EMD as per tender terms & conditions
69	Annexure-I on page 37	Original declaration in lieu of EMD as per the proforma (Annexure-II) of Vol.-1.		
70	Annexure-II on page 37	Proforma for Declaration towards Earnest Money Deposit		
71	CI. 1.9 Of page 12	The Bid shall be accompanied with declaration along with tender in lieu of EMD/ Bid Security as per the proforma (Annexure-II) of Vol.-1		
72	2.3.15, Sr iv on page 15	On opening of the Bid, it will be checked if they contain Technical & Financial Bids and EMD/ Bid Security as detailed above.		
73	Sr.5 on page no 5	But the bid can only be submitted after uploading the mandatory scanned documents such as Demand Draft or Pay order or Banker's Cheque towards cost of bid document and bank guarantee of any Scheduled Bank towards EMD in favour "HSCC (India) Limited', payable at Delhi/Noida as per details given in the Bid Document and Processing Fee via online mode only and other documents as specified.		Demand Draft or Pay order or Banker's Cheque towards cost of bid document & Original declaration in lieu of EMD/ Bid Security as per the proforma (Annexure-II) of Vol.-I in lieu of EMD as per tender terms & conditions
74	1.10 on page 13	The tender comprising the Instructions to bidders, Technical Package Part-I, Technical Package Part-II and Financial Package as detailed in clause 2.3.6 and 2.3.7 of ITB shall be submltted online, each marked as per clause 2.3.12 of ITB. upto 15:00 hrs on 18.05.2021 and will be opened at HSCC, Head office, Noida on the same day at 15:30 hrs i.e. on 18.05.2021. Technical Package Part-II" of only those tenderer, whose earnest money, placed in the other envelope, is found to be in order, shall be opened.		As per tender terms & Conditions

75	Sr. 16 of FORM OF BID on page 39	16. We enclose; a. All documents as per the checklist b. Bank guarantee for Rs (Rupees only) issued by (name of the bank) valid until towards EMD	We presume that the bank guarantee details towards EMD shall not applicable as the bidder shall allow submitting declaration in lieu of EMD/ Bid Security. Kindly confirm	Original declaration in lieu of EMD/ Bid Security as per the proforma (Annexure-II) of Vol.-I in lieu of EMD as per tender terms & conditions
76	1.9.1 on page 13	The bid submitted shall become invalid if: (ii) The bidder does not upload all the documents (including service tax registrationl VAT registrationl Sales Tax registration) as stipulated in the bid document.	This is to inform you that the service tax registration/ VAT registration/ Sales Tax registration is replaced with GST. Kindly confirm	Bidder should upload GST registration. In case bidder does not have GST registration, undertaking to be submitted that bidder shall get GST registration done upon award of work.
77	1.27 on page 15	Registration/ Licence: The firm should have his firm registered for GST, PF, ESIC, Building Cess Registration etc. with the appropriate Authorities. In case the firm is not registered at the time of submission of bid, they will submit an undertaking that they will get themselves registered with the concerned authorities in case they are awarded the work.	Generally the Building Cess is deducted from contractor's bill/ payment and paid to government by respective client.Therefore firm need not required to register with the concerned authorities in case the work is awarded.	No change in tender terms and conditions. Tender terms and conditions shall prevail
78	Sr. VX on page 7	Complete Bid documents, as listed in Notice Inviting Bids i.e. Vol- I, II, III, IV & VI excluding the Bill of Quantities (Volume - V} but including· amendment(s)/addendum(s)/ Corrigendum(s) /Clarification(s) issued, if any	Kindly confirm whether bidder shall require to upload the all Bid documents with amendment(s)/ addendum(s)/ Corrigendum(s)/Clarification(s) issued by you or only the amendment(s)/ addendum(s)/ Corrigendum(s) /Clarification(s).	Shall be as per Tender Terms & Conditions
79	2.3.6, (B) b) Sr, 12 on page 21	All Amendment(s)/ addendum(s)/ Corrigendum(s) / Clarification(s) issued, if any.		Shall be as per Tender Terms & Conditions
80	CI. No 10 of FORM - 'T - 2' on page 55	Remarks indicating the type of structure (RCC Framed or load bearing) and Nos. of storeyes alongwith basement constructed & also indicate all component of works as per requirement of similar nature of work executed or not.	As per definition of similar work, the requirement of Nos. of storeyes alongwith basement constructed is not mandatory to fulfill the condition. Kindly confirm,	Shall be as per Tender terms & conditions. No change in tender terms and conditions.

81	Sr/10 of FORM - 'T -4' on page 57	Details of arbitration 1 court cases if any including amount of claim amount of award and present position	As per standardl general practice using by various government dept., the detail of arbitration 1 court cases dose not certified at the time of issue of such completion certificate. Therefore we request to bidder will allow to submit these details by self-certified. Kindly confirm.	No change in tender terms and conditions. Tender terms and conditions shall prevail
82			Request you to kindly furnish AutoCAD Drawings & Total Built-up-area statement of the Project.	• **PDF Drawings already uploaded on the Portal** • Built Up area of the project as as below: Basement - 3753 Sqm Lower Ground Floor - 3745 Sqm Ground Floor - 4016 Sqm First Floor - 3348 Sqm Second Floor - 2888 Sqm Third Floor - 2551 Sqm Total Area - 20301 Sqm **However above area may varies at any extent during construction stage.**
83			As per the Schedule 'F' and GCC, 10CA is applicable, therefore you are requested to furnish cement & steel rate under 10CA.	*Cement- OPC Rs. 4,219/- per MT *Reinforcement Steel- Primary Manufacturer Rs.49,000/- per MT
84			As per the tender stipulation all the statutory approvals except Municipal and other local bodies are in the scope of contractor specially EC clearance, Aviation Clearance etc. which will take substantial time and therefore we request you to consider the commencement date after receipt of all such clearances.	No change in tender terms and conditions. Tender terms and conditions shall prevail

85			As bidders are not able to visit the site presently, we request you to furnish contour layout. We also presume that the site is clear from all the encumbrances and no need to take any approval! clearance from Forest Dept.	No change in tender terms and conditions. Tender terms and conditions shall prevail
86			Please inform us the availability of water & electricity nearby the site, as the bidders cannot visit the site due to pandemic situation.	Refer NIB (Volume-I) Clause No 1.17 Bidders are advised to inspect and examine the site and its surroundings and satisfy themselves before submitting their tenders
87			Mobilization advance - We request you to pay 10% mobilization advance alongwith the work order against the submission of bank guarantee.	No change in tender terms and conditions. Tender terms and conditions shall prevail
88			We presume that the land for temporary structures such as labour camp, office, batching plant etc. is available within the site and will be given to contractor free of cost.	No space for labour camp will be provided. Spaces for batching plant, steel/shuttering yard etc. may be provided depending upon availability. The bidder shall not have any claim whatsoever reason in case the space is not provided. Bidder should visit and examine the site before submitting the bid.
89		Specially designed shuttering for wall, beam and slab of Linac and breachy therapy: BOQ-Item No.1.00:Sr.No.3.04	Kindly furnish the design of special shuttering as these special shuttering costs will be much more than the general shuttering work.	As per tender terms & conditions.
90		Catalogue: BOQ-Plumbing works:Sr.No.1.01 to 1.28, 3.10, 3.11, 3.12,3.16,3.17,3.18	Kindly specify the suitable catalogue of approved make for all the plumbing 1 sanitary fixtures. As prices are varies depending on various make, and their catalogues models.	The work to be executed as per CPWD specifications and BOQ item.
91	Volume-5, BOQ-Electrical works, SUBHEAD 3: 3.01 & 3.02, DG SET & Accessories	DG Set of 750 KVA qty is mentioned with 1 No SYNCHRONISING-CUM-AMF Panel (for 2 nos. DG Sets Mentioned above)	In clause no 3.01, it is mentioned with qty of 1No and in clause 3.02, Synchronizing panel is mentioned with 2Nos of DG sets. We Request you to please confirm the no of DG sets	One no. DG set as per BOQ

92	Volume-5, BOQ- Electrical Works, SUBHEAD 5: MCB DISTRIBUTION BOARDS	Supplying & fixing following way, three pole and neutral sheet steel, MCB Distribution board, 415 volts, on recess/surface complete with loose wire box, Terminal Blocks, tinned copper bsbar, neutral link, earth bar, din bar, detachable gland plate, interconnections, hospitalized and powder coated including earthing connection bolt etc. as per technical specifications and as required. (but without MCB & RCCB).	We request you to please clarify whether phase segregated DBs are to be considered and also we presume IP43 protection shall be considered	Item to be executed as per BOQ and Technical specifications
93	Volume-5, BOQ- Electrical Works, SUB HEAD 7: WIRING	Wiring for light point/fanpoint/ exhaust fan point/call bell point with 1.5 sq.mm. PVC insulated, fire retardant low smoke (FRLS) copper conductor cable, single core/ Multi strand, in steel conduit (including supplying & **recess laying of MS Conduit** and accessories) including the following and complete as required.	we presume that MS conduit will be laid on surface of slab inside the flase ceiling areas and will be laid concealed in walls. Please confirm.	Item to be executed as per BOQ and Technical specifications
94	Volume-5, BOQ- HVAC Works 1.0 WATER CHILLING UNITS	Supply, Installation, Testing and Commissioning of water cooled screw type Water chiller Machines (ARI Certified) each having a capacity of 250 TR (actual) at Chilled water inlet/outlet temperature of 12.22° C/6.6°C with chilled water circulation rate of 600 USGPM (nominal) and condenser water inlet/outlet temperature of 32.2°C/37.8°C with circulation rate of 750 USGPM (nominal), suitable for operation on refrigerant R134a each comprising of the following complete as per specification and as required. Complete water chilling machine as above.(2W+1S) 2Nos.	Water chilling machine mentioned with qty- 2nos and also it is mentioned as 2W+1S. We request you to please clarify the no of chillers whether 2 Nos or 3Nos to be Considered.	Quantity shall be as per Quantity Column, i.e, 2 Nos.
95	Volume-6, Architectural Drawings	26Passenger Lift Shaft size is mentioned with 2400x3000mm (WXD)	Width of Lift Shaft metioned in drawing is 2400mm and it requires minimum 2500mm as per OEM manufacturers standard	As per CPWD specification/ NBC-2016 amended upto date

All other terms & Conditions of the Tender shall remain unchanged.

Prospective bidders are advised to regularly scan through HSCC e-tender portal http://www.tenderwizard.com/HSCC & HSCC website http://www.hsccltd.co.in as corrigendum/amendments etc., if any, will be notified on this portal only and separate advertisement will not be made for this.

(-sd-)
GM (Projects)
HSCC (India) Ltd.

ANNEXURE-I

TECHNICAL SPECIFICATION OF CSSD EQUIPMENTS

Scope of Work: Supply, Installation, Testing and Commissioning of CSSD equipment on Turnkey basis and handover to the client in satisfactory condition and providing of free spares and service during defect liability period.

HORIZONTAL DOUBLE DOOR AUTOCLAVE 550-600 Litres (8 STU) WITH ACCESSORIES

Fully automatic PLC controlled Horizontal Autoclave (Steam Sterilizer), with pre and post-vacuum treatment and with loading equipment. (a) Door: The sterilizer door should be pneumatically (Compressed Air)/Electrically operated double door with fully automatic vertical sliding movement along with door safety features. Door Safety Systems: 1. Pressure sensor system should be available in the chamber to monitor the chamber pressure. Chamber should be completely depressurized before the door seal is retracted by vacuum. 2. Door chamber should not be opened when chamber is pressurized. 3. A mechanical safety edge should stop the door if it is obstructed while closing, thus protecting operator & loading equipment. 4. A Cycle should not start if the door is open or not properly locked. 5. The door seal should be silicon gasket & on commencement of the process the door gasket should be pressed against the rear face of the door by steam to ensure the door remains closed during the process. 6. A Pressure Switch should be there to monitor the door gasket pressure whether it pressed against the door with right pressure during the entire process. 7. Double door safety should be implemented through interlocks which shall prevent both doors from being opened simultaneously. 8. Door Gasket should be resistant to sterilization temperature and sterilization pressure. It should be sealed through a inflation of the door gasket against the door and should not require any lubrication or maintenance. (b) Construction: 1. Chamber & Doors : The chamber and doors should be made of solid, high quality AISI 316L Stainless Steel. The chamber should be resistant to corrosion. The operating thermo mechanical stress should be welded with a robotic system. The chamber should be constructed with a rectangular/quadrangular section made of stainless steel with minimum 6 mm thickness. It should be able to withstand the relative pressure (-1 to 3.5 bar) and operating temperature upto 180 deg C. The chamber should be jacketed to ensure the temperature uniformity in chamber. The chamber floor should be slightly sloped towards an internal drain to facilitate drainage. A stainless steel mesh strainer should be provided to protect the drain port from blockage by debris. The chamber should be mounted on a stainless steel bearing structure at least 2mm thick tubular stainless steel so that to allow load to be distributed in four corners with height adjustable feet. 2. Surface Treatment: The internal surface should be electro-chemically/mechanically treated for high quality smooth finish to facilitate cleaning. The resultant surface should be polished to less than 0.2-0.8 µm fineness to protect against corrosion (certificate from OEM should be provided along with the bid). The internal corners should be rounded off to facilitate efficient cleaning. 3. Insulation: The chamber should be covered with extra thick insulating material that limits heat dissipation. The insulation should ensure the surface temperature of the sterilizer to be less than 45 Deg C. The insulation should be minimum 50 mm thick . It should have low thermal conductivity and should not release any particles. 4. Jacket: The jacket should be made of quality stainless steel with pressure gauge and it should be minimum 5 mm thickness. 5. Steam Generator: The sterilizer should have inbuilt steam generator of adequate capacity. In built steam generator should be made of quality stainless steel. The steam generator should have insulation. Steam generator should be fitted with all safety & control

devices as Certified Safety valve for: 1) Excess pressure, 2) Resettable Safety Thermostat for over heat protection, 3) Pressure switch to control & regulate the steam pressure in the steam generator, 4) Automatic electronic water level regulator, 5) Automatic Water feed system, 6) Low level and high level water cut off, 7) Automatic periodical self-drain for the steam generator, 8) water level glass gauge inspection device visible on screen inspection device visible from service area, 9) The heating element should be made of Inconel /incolloy /international standard material and should be of sufficient capacity to make the sterilization process faster and it also should be differential protected, 10) It should also have the automatic blow down valve and degassing system for feeding water to steam generator.
(c) Pipes, Valves and Components: 1. All the process valves should be stainless steel & should be pneumatically operated piston valves. All the non-standard components should be non-proprietary & should be easily sourced. All the hot pipes should be properly insulated. The safety valves should be made of SS 316/ Chrome plated Red Brass/Gun metal quality quality. 2. Primary piping & fittings should be stainless steel threaded or stainless steel/ Chrome plated Brass /copper/ Gun metal tri clamp fittings. 3. Primary components: SS 316/ Chrome plated Brass/copper/ Gun metal quality tri clamps or threaded fitting components like – Manual valve, non-return valve, pressure, regulator, pneumatic/Electro-pneumatic valves, and steam trap, etc. 4. Electrical Components: the terminals & contacts should be housed in a watertight cabinet. There should be no external Electrical cabinet for control and should be housed only inside the Sterilizer. (d) Air Filter: A disposable air filter should be provided by filtering the atmospheric air before entering inside the chamber. The filter separation efficiency should be higher than 99.998% for particle size less than 0.3µm. (e) Control System: 1. The control system should be dual PLC/microprocessor-based system specially designed for sterilization application (one to control the main parameters (PLC) and the other to verify the functionality). Control system should have touch sensitive, minimum 7”-10” colour display interface at operator loading side. Apart from main PLC based control system the sterilizer should also have additional independent monitoring & documentation system which constantly cross checks the safety systems & time. 2. Multiple password access levels should be provided to control access/operation of the machine preventing unauthorized access. These access levels should be user selectable. The control system should have CPU processor with battery back-up & non-volatile memories. Digital input/output controls, analog measuring inputs & COM ports for printer & PC connectivity. (f)Temperature and Pressure Sensors: 1. The sterilizer should have at least 2 temperature sensors for chamber drain & one for Jacket. It should also have two pressure sensors in chamber and one pressure sensors for Jacket as per EN 285 standards. 2. The sensors should be PT100 sensors to confirm Class A of the IEC 571 standards, with accuracy of + 0.1°C While the pressure sensor should have the accuracy 1% over the range of 0-5 bar. 3. Each sensor circuit should be calibrated with individual constants to correct the deviation in manufacturing and aging. (g) Alarms: Automatic process checking & failure correction should be possible by the control system. The system should perform a self-diagnosis and check the autoclave for the following alarms, and it should be audio/visual:

1. minimum/maximum sterilization temperature alarm,
2. no supply voltage/Power failure alarm,
3. no generator water alarm,
4. overload relay alarm,
5. no mains water alarm,
6. maximum generator water load time alarm,
7. temperature probe & Pressure Transducer fault alarm,
8. minimum/maximum chamber pressure alarm,
9. door opening residual chamber pressure alarm,
10. chamber vacuum tightness alarm,
11. maximum phase time alarm,
12. air in chamber alarm (calculated),
13. Maximum time steaming,

14. Maximum time vacuum,
15. Maximum time for heating,
16. maximum drying phase alarm.
17. Doors not properly closed alarm,
18. Door open during cycle alarm,

(h) Loading/Unloading system: Sterilizer should have the Internal trolley and External trolley for easy loading of the materials.

(i) Cycle Documentation – Printer: The autoclave should be equipped with built in Ink type Printer/ non-fading Thermal Printer and also with a provision for alpha-numeric Laser printer which prints each cycle parameter performed by the sterilizer. The measured valves of temperature and pressure should be printed at 30 sec time intervals and also for various phases of the sterilization process. (j) Vacuum Pump: It should have a High vacuum system consisting of a multi-stage vacuum pump with a liquid ring that ensures removal of the air during the pre-vacuum stage with atleast 15 kPa vacuum level and excellent drying during the post-vacuum stage. It should also have low water level alarm to protect it from dry run and should be equipped with overload protection relay. (l) Available Cycles: The sterilizer should be designed to operate various programs. Apart from standard cycles, special cycle should be programmed by an authorised supervisor code only. Programs include:

1. Wrapped Instruments, Porous load 134°C.
2. Heat Sensitive material, rubber, plastic, porous load 121°C
3. Liquid Cycle-for sterilization of Liquids
4. Heavy load cycle
5. Bowie & Dick test (7 kg), PCD test.
6. Leak test

(n) Directives & Standards: It should meet BIS/EN ISO / IEC directives and product should be BIS/European CE/ US FDA Standards. Copy of certificate is to be attached. (o) Should pass a hollow load (A) test (Batch monitoring system).

p) Steam Sterilizer should have provision for connecting a ¾" line terminating in the shut off valve, non-return value, pressure relief valve steam riser, condensate drain and other essential accessories.

q) should have at least 5 sterilizers working in India for the last three years. r) Water coming out should not be reused. s) It should have integrated degassing system. t) It should have an integrated discharge cooling device which would not discharge water of more than 70-degree C. The system should ensure that no liquid discharge should be of more than 70 deg C.

2. RAPID STERILIZER (FLASH AUTOCLAVE)TABLE TOP STERILIZER WITH ACCESSORIES FOR TSSU

1	Sterilizer Type: Table Top Sterilizer
2	Capacity: minimum 20 L
3	Chamber Size: The sterilizer should have Circular or Rectangular chamber.
4	Quality System Compliance: Sterilizer should comply the quality systems as per ISO 9001:2000/ EN ISO 13485:2003/ ISO 14001:2004/BIS.
5	Quality Standards: Sterilizer should be BIS/US FDA/European CE certified with four digit notified body number
6	Types of Cycles Process: Table Top Sterilizers should be equipped with B-process, N process as per latest BIS/EN 13060 . Proof of declaration of conformity.
7	Chamber: Should be made of S.S.316 & should comply the Pressure Equipment Directive (PED) &EN 13445/BIS norms. Chamber should have working pressure 2.2 bar & design pressure upto 3.8 bar. Chamber should be equipped with electrically heated jacket for preheating on standby mode.

8 Door Design: Should have radially opening door with at least one or two locking bolts for enhanced door safety. The doors should come with silicon elastomeric rubber gasket to withstand temperature upto 140°C & 20-30 psi.

9 Air Filter: Air filter should be provided for filtering the atmospheric air before entering inside the chamber. The filter separation efficiency should be higher than 99.998% for particle size less than 0.3µm. Air filter should be covered warranty & CMC period

10 Cycle programs:
- 134°C Wrapped.
- 121°C Wrapped.
- 134°C Flash/Rapid open instrument cycle.
- 134°C Textile.
- Test programs : Bowie & Dick, Leak Test.

11 Water Storage Tank: Sterilizer should have inbuilt water reservoir with storage capacity up to 5 L. The water reservoirs should have easy access for cleaning & to avoid bio film.

12 Steam Generator: Sterilizer should have inbuilt steam generator .The steam generator design should be with integrated energy storing system for building up power for sterilization loads in short time.

13 Control Panel: The control system should be microprocessor based PLC system specially designed for sterilization applications. The control system should have CPU processor with battery back-up, Digital input/output controls, analogue measuring inputs & COM ports for printer & PC connectivity.

14 Alarms: Automatic process checking & failure correction should be possible by the control system. The range of alarm should include Temperature & pressure sensor failure, phase timeout, doors not properly closed, power failure (less than 10 sec should be ignored), continuous self-checking of all the safety devices, low water level etc. All the alarms should be audiovisual.

15 Accessories: The sterilizer unit should include rack with 3 or more levels & suitable size instrument trays should be the part of the supply for every sterilizer. The Sterilizer should have water circulation system so that no drain point & fixed water inlets required

16 Electrical Requirement: 230V & 50 Hz electric supply. .

3. ETHYLENE OXIDE STERILIZER (ETO)

I. The ETO gas sterilizer should be fully automatic type for sterilization of heat sensitive goods such as anesthetic tubing and other plastic disposable materials etc.

II. The sterilization chamber should be double walled, corrosion and gas resistant of suitable alloy.

III. The inner surface should be smoothly finished to minimize gas deposits.

IV. The chamber shall be insulated against heat emission and jacket shall be connected to warm water circulation arrangement.

V. The sterilizer door shall have a quick release locking arrangement, with door opening to the sides.

VI. Suitable safety interlocking arrangement shall be provided for the door so that the sterilization process does not start unless the door is properly locked in position and during the programme run it should not open.

VII. The sterilizer shall be provided with suitable vacuum pump and gas trap to separate and evacuate the gas.

VIII. The ETO sterilizer should be able to operate for the minimum essential following cycles programmes :

a) Sterilization cycle for heat sensitive objects that ensure temperature from 33-55degreeC with subsequent aeration for protection of the operating personnel.

b) Aeration cycle/programme to extract residual gas out of the sterilized objects after each sterilization cycle.

c) Automatic chamber evacuation cycle with subsequent venting before releasing the door lock for opening, thereby prohibiting exposure of the operating personnel by gas dissolving from the chamber walls during shutdown period.

d) Gas disposal arrangement/catalytic converter.

IX) Capacity: Should have capacity of **250 L**

X) The ETO sterilizer shall be equipped with the following accessories:

a) Sterilization basket of suitable size : 1 No.

b) EO gas cartridges: 25 No.

c) Packaging material with chemical indicator of all sizes, 1 roll each. (minimum 3 rolls)

XI) Gas cartridges should be puncturing system

XII). Technical Data

a) Sterilization Gas : Ethylene Oxide

b) Sterilization method : Cold sterilization of heat sensitive material

c) Operating temp. Range : 33 to 55 C

d) No. of doors : One Should be provided with Compressor if required.

4. DOUBLE DOOR WASHER DISINFECTOR 300-350 Litre (10/15 DIN Trays) WITH ACCESSORIES

1. The washer disinfector shall be suitable for cleaning and disinfection of surgical instruments/goods. The process shall include pre wash, detergent wash and hot water disinfection, rinse and drying cycles.
2. The unit shall be suitable for electrical operation and would be complete with two water circulation pump of minimum 800-1200 litre/minute capacity, two dryer blower pump, necessary valves & fittings.
3. Washer Disinfector Management System: The Management of Washer Disinfector for cycle process and various other menus and functions should be done through at least a 5" to 8" inch monochrome/multi coloured touch screen display with the password protection ensures control of the operator and the Programmable Logic Controller (Omron PLC). The system should consists of double PLC devices, one to control the main parameters (PLC) and the other to verify the functionality and safety. The programmable electronic controller should be of a well-known company, highly reliable and fitted with a number of safety systems to ensure the Washer/Disinfector works properly. 4. Chamber Capacity: Volume should be 300 L. Should supply 15 Nos of standard DIN trays. The chamber should be made of S.S. AISI 304L/316L quality with electro polished washed surfaces. The chamber edges should not have the pockets & folds so as to avoid bacterial growth. The wash chamber should also be fitted with illuminated light for visibility of the washing process. 5. Washer should have following features: a) Should

have built-In Boiler for pre-heating the water thus reducing the cycle time by 45%. It should also have the provision to work with Hospital central Steam Network and option of combining both b) It should use Pneumatic valves since they are durable with long life. c) Cleansable spray arms should be located at the top and bottom of the chamber. d) Wash carts should be equipped with cleansable spray arms between each shelf so as to facilitate water to reach all the surfaces which needs to be cleaned. e) Injection wash carts should be automatically connected to water and drying air in order to clean and dry the inside of the tubular instrument. f) Working Temp should be 60°C-93° C. Should have Pre Programmed cycles for instruments, micro-instruments, anaesthesia instruments, containers etc., & variable cycle of parameters for the different utilities in Washing & Disinfection. At least 20 cycles and can be programmed with the assistance of touch screen display. g) The total thermal dissipation should not be more than 1300 watt. h) It should have two temperature probes for both water & air temperatures. i) It should have built-in water recovery device. j) It should have built-in drain cooling device. k) It should have access for maintenance from front only. l) The washer should be equipped with independent temperature monitoring and validation test port. m) It should have provision for barcode tracking/RFID system, remote maintenance system, networking management system, remote connection via RS232 serial plug and data interface RS232 should be available. n) The noise level should be < 65dB. o) Washer should have a built in Fine filter/self-cleaning debris filter. p) Washer should be equipped with audible alarm that alerts if error code occurs. q) Double doors should be made of special tempered & Heat resistant glass contained in a frame of AISI 304L/316L stainless steel. Closure of the doors should be carried out automatically either by Pneumatically driven, Vertical sliding movement with interlocked doors to avoid simultaneous operation. l) The washer should have 3/4 dosing pump (Detergent, Neutralizer, Disinfectant, and/or Lubrication) for process chemicals, instrument lubricants/ enzymatic cleaners ,It should be able to measure & display the dosing volume of each chemical in ml and there should be a dedicated compartment with door to keep the chemical canisters (at least 4 nos). 6. The washer should perform: a) Pre-rinses with cold water. b) Main washes with hot water (60C) and detergent. c) Final rinse with water (55C) d) Disinfection with hot water (93 C) e) Should have Thermal & Chemo-Thermal Washing. Should have validity of the cycle through A0 calculation. 7. The unit should also have an inbuilt-Ink type Printer/non fadeable Ink type Thermal Printer with provision of interface with External printer.
8. The washer disinfector shall be supplied with universal rack, 5 level racks for instrument tray, rack for anaesthesia instruments, full size instrument tray as well as stop valves, anti-suction device and plastic water trap manufactured by the manufacturer of the equipment only or unrestricted air gaps as per BIS/EN1717category 5 type AA standards. 9. Should ensure essential washing accessories. 10. Standards & Norms: 11.The device should be a medical device according to Directive 93/42 EEC concerning medical devices. Should be BIS/US FDA/European CE certified. Manufacturer should be ISO 13485:2003, ANSI/AAMIST-15883-2 for thermal infection ISO 15883-2 and ISO9001. Bidder/Manufacturer should also be ISO9001 and ISO13485 certified. 12. Safety Features: The washer disinfector should be provided with the following safety devices: a) device to block the door from opening during the execution of the cycle b) device to block the door from opening when there electric resistors are operating c) device for detecting overheating while running during the washing and disinfecting phase d) device for detecting temperature abnormalities during the washing and disinfecting phase e) device to block the emission of water in the chamber if the door is open or not perfectly closed f) device that inhibits simultaneous opening of the doors g) breakers for the protection of the motors h) fuse and electrical protection on the auxiliary electrical system i) emergency stop button of all of the machine functions (reset in stand-by with rotation and start-up of the cycle functioning with new start command) j) sensor system for the anti-flood level k) differential protection for the electrical system for hot water production (resistance) l) safety thermostat for the resistance of the wash chamber m) safety thermostat for the resistance of the air heating system n) safety thermostat for the pre-heater resistors o) safety thermostat for the washer chamber resistors p) safety thermostat for the air heating system resistors q) device for detecting the internal rack and

choosing the relative cycle r) All Electrical components & Panels should be IP55 protected and control panel should be IP22 protected. 13. Should have digital display of temperature, time, pressure, cycle time & elapsed time for ease of operation of the cycle and display calculation of A0 values. 14. ALARMS: It should be with audio-visual alarms in case of Error(s). All Alarms should be with full explanatory text messages on the Display and the system should perform a self-diagnosis and check the autoclave for all the alarms and these alarms are displayed & printed. 15. It also should perform a self-diagnosis and check for the following alarms: a) No supply voltage alarm b) minimum/maximum washing temperature alarm c) No water supply(hot, cold & treated water) alarm d) Overload relay alarm for motors/pumps e) temperature probe fault alarm f) maximum phase time alarm (for all the phases) g) tank temperature probes differences of readings alarm.

5. ULTRASONIC CLEANER (40 L)

1. The units should be a compact bench top model, with a built-in tank manufactured from high-qualityAISI-304/316 stainless steel and a solid-state generator that sends ultrasonic (approx 40 KHz) impulses through wash water containing detergent and electrical heating; microprocessor controlled display with memory time and temperature functions. 2. The electrical energy should be transformed into sound waves by transducers, fixed to the bottom of the tank. 3. The tank should be made of solid stainless steel AISI 304/316. 4. The ultrasonic cleaner should have a display and control which could be easily seen and placed above any liquid for safety and reliability. 5. It should have digital read out timer and temperature setting (temperature adjustable from 30 to 90 °C) monitoring. 6. Capacity should be 40LTRS. 7. Should work on 230V, 50 Hz AC Supply. 8. Ultrasonic cleaner should be BIS/European CE /US FDA certified. 9. Ultrasonic cleaner should supplied with Wire mesh basket of suitable size & Stainless steel lid. 10. It should be according to BIS/ EN 61010 11. It should have Sweep & Degassing System.

6. AIR COMPRESSOR

Rotary/Reciprocating Air Compressor coupled with appropriate capacity.

Make-ELGI/FUJI/INGERSOLRAND/ATLAS COPCO

7. HEAT SEALING MACHINE

1. Rotary heat sealers should provide validated sealing of sterilization bags and clear-view pouches (paper/plastic laminate).
2. It should be microprocessor-controlled.
3. The rotary heat sealer should give documentation of process parameters via an integrated printer and could be integrated with documentation system.
4. The ergonomically design should be tilted forward for increased user convenience and space saving installation.
5. The sealer housing should be powder-coated and the control panel is of the flat-membrane type, for easy cleaning.
6. It should be operationally simple. When a bag is fed into one side of the machine, the machine should start automatically or by pushing a button, moving the bag through the machine, and applying pressure and heat to form a perfect seal.

7. The warm-up time should not exceed 30 seconds, and the feed speed should be approx. 10 m/min.

8. The temperature should be adjustable from 50–200°C with a tolerance of 1% of the set value.

9. It should be regulated by a heating element that is highly sensitive to temperature fluctuations, assuring even temperature and perfect seals.

10. It should offer a number of additional features, including:

a) Automatic start-up

b) Reverse feed function in case an instrument accidentally enters the sealing area

c) Energy-saving stand-by mode

d) Pre-set temperatures
e) Re-settable counter function

11. Rotary heat sealers come with a port and cable for connection of the sealer to a PC and printer, enabling monitoring and documentation of the entire process.

12. Should have a protection mechanism against overheating and start prevention at temperature deviations outside +/- 5° C tolerance.

8 SPRAY GUN RINSER

1. Spray gun rinse unit should be designed for connection to water or compressed air, to use for assisted cleaning of pipettes, catheters, cannulas, syringes etc.

2. The spray-gun should include tubing and different tips and nozzles for the various cleaning purposes, like

a) Syringes and cannulas with Record cone

b) Measuring and blood pipettes

c) Catheters and small pipes

d) Drainage tubing

e) Syringes and cannulas with Lure cone

f) Spray jet for rapid instrument cleaning

g) Bottles and Erlenmeyer flasks

h) Water jet pumps for suction cleaning

i) All appliances are stored within easy reach on a special wall-mounted rack (included).

3. A special wall-mounted rack should be a part of standard supply to store all appliances within easy reach.

4. All tips should be able to get easily locked to the spray gun by a safety cone.

5. The gun grip is heat-insulated. The water/air pressure is released, regulated and fully controlled by the spray-gun trigger (adapted to a 1/2" connection).

6. Bidder should provide complete details of sets of standard and optional adapters, nozzles and accessories

9. DRYING CABINET

1. Should be automatic in operation
2. Inner chamber should be made up of stainless steel and outer chamber should be of SS sheets
3. Should have heaters of minimum 2.0 KW
4. There should be provision for setting the drying temperature and drying time.
5. Capacity-275L

10. GAUZE CUTTING MACHINE

1. Should be useful in cutting thickest of cotton gauze material
2. Should consist of a cutting unit and a knife sharpening unit
3. Blade size should be 200 mm.
4. Cutting Capacity should be 165 mm.
5. Should work on 230V, 50 Hz power supply.

11. MULTI-ROLL TAPE DISPENSER

1. Size (LxWxH) 2600x600x1200mm
2. This dispenser for sterilizer tape should hold two reels of tape.
3. The heavy-duty bottom plate should be fitted with anti-slip rubber to prevent the dispenser from slipping when tape is torn off.
4. Should be made of high quality coated steel for long use.

12. DOCUMENTATION LABELLER

The labeller should be 3–line for printing the following information

a) Person responsible for sterilization

b) Load number

c) Packaging content

d) Sterilizer number

e) Production date
f) Expiry date

Should have 24 rolls of 750 3-line labels with double adhesives (Steam and ETO) indicator

13. WASH STATIONS WITH 2 SINKS FOR DIRTY AREA

1. Size Approx. (L x W x H) : 2000x750x850 mm
2. The worktop should be made of solid, bright-polished minimum sheet thickness of 1.5 mm stainless steel (304) to withstand heavy-duty work with wet instrument.
3. Designed with an integrated 10 mm high edge at the front and sides, and a 60 mm high edge (splash back) at the rear
4. The front and side edges are reinforced and widened to 49 mm. Edges are welded together and polished at the corners.
5. The worktop should slope to the sink, and reinforced by a full-length support frame.
6. The support frame should be a complete assembly with the front, back and ends welded together at the corners.
7. The worktop and support frame should be bonded together with double-adhesive tape of a special, age-resistant quality to give rigidity and noise abatement.
8. The floor stand should be made of polished stainless steel.
9. The table should be available with double sink units preferably at both ends of the table, all with a smooth, polished inside finish made of stainless steel (304) top
10. Corners should be curved to a 65 mm radius for easy cleaning.
11. The bottom should slope to the drain.
12. Sink units should be of sizes that allow processing of the large modular instrument trays
13. Sink units should have 650 mm wide and 900 mm high (adjustable ± 25 mm).
14. The legs should be able to provide strong support and hold to the entire unit securely.
15. The sink should include a drain valve, removable strainer, manually operated drain-valve, overflow drainpipe and water trap. The table also includes a mixing faucet with swivel spout, for cold and hot water connection.
16. Should be delivered ready for assembly.

14 . SS WORK TABLE

1. Size approx. (LxWxH):1200x650x900 mm approximately.
2. Stainless steel tables specially designed for working with dry goods and for general purpose pre-storage.
3. The work tables should have a rigid stainless steel construction which is easy to clean and without sharp edges or corners.
4. The table should be ergonomically worked up, should have easy to clean robust matt-finished (to reduce reflection of light from the surface) with minimum sheet thickness of 1.5 mm stainless steel (304) worktop/surface to withstand and carry out heavy work comfortably, either sitting or standing.
5. The edges along the front, back and sides should be reinforced and widened to 37 mm, giving a rigid construction.

6. They are welded together and polished at all corners for good hygiene, as well as for the comfort and safety of the staff.

7. The worktop should be supported by a complete assembly with full-length reinforcements along the front, back and ends, welded together at the corners.
8. The worktop and support frame are bonded together with double-adhesive tape of a special, age-resistant quality to give rigidity and noise abatement.

9. The support frame has to be mounted on a solid, stable floor stand, made of polished stainless steel square tubing, with horizontal braces 300 mm above floor level. An adjustable10 cm (± 25 mm) plastic foot, easy to clean, is mounted on each leg

10. The provision is to be made for a sturdy 445 mm-wide stainless steel shelf (optional) can be mounted on the horizontal braces.

11. Must be delivered ready for assembly

12. All edges should be smooth and the rigid frame should be made up of minimum 1.5 mm sheet thickness stainless steel (304).

13. There should be unobstructed access to the working space, since the only supports needed along the front of the table are the corner legs. This also facilitates cleaning of floors.

15. CONTROL & PACKING TABLE WITH TWO SHELVES FOR CLEAN AREA

1. Size (LxWxH) : 2000x1400 x 1400 mm approximately.

2. This table should be specially designed for sorting, inspection, functional control and packing of various sets for wards, clinics etc. and for surgical instrument sets in trays. The work could be done comfortably, either sitting or standing.

3. The worktop should be made of Stainless steel material. All edges should be smooth. The extended width of the worktop should be designed to facilitate thorough inspection of instrument trays and allow the use of large wrapping material.

4. The rigid frame is made of stainless steel (304).

5. There should be unobstructed access to the working space, since the only supports needed along the front of the table are the corner legs. This also facilitates cleaning of floors.

6. Should have double workspace. One workplace table should have 700 mm wide worktop and other workplace should have 1400 mm worktop.

7. The table should include a two-shelf console, mounted on the worktop, for storage of packaging materials. The rigid supporting columns of the console include 3 electrical outlets.

8. There should be a free space of 450 mm between the lower shelf and the worktop, and 150 mm between the two shelves.

9. The table should have a drawer unit (both sides as double model) mounted under the worktop.

10. Each drawer unit should be 400 mm wide and should include a drawer and a sliding plate.

11. Fluorescent tube fittings (Inspection lamp) should be available. (Optional)

16. WIRE STORAGE SHELF MODULE FOR DIRTY/CLEAN/ STERILE AREA

1. Size (LxWxH) : 1500x450x1900 mm approximately.
2. Construction should be based on single free-standing shelf modules for storage of clean linen, instruments, and packing material or sterilized goods, including disposables.
3. Moreover, two single modules can be placed back to back and combined as a double module unit.
4. If two units are to be connected, 10 S-hooks should be supplied.
5. The wire construction should allow good air circulation while permitting easy inspection of the goods.
6. The wire shelves should be made of special heavy-duty steel (304), chromium-plated and surface treated with clear epoxy varnish to facilitate cleaning.
7. The shelf unit should be easy to assemble on site and all parts should fit precisely.
8. Shelves should be mounted by means of plastic clamps onto circular rigid posts, with the adjustable height within a range of about 50 mm. Each post should include a height adjustable foot.
9. Each unit should include 5 shelves.
10. The shelf unit should have optional Ø 125 mm castors for using as a mobile storage unit by replacing the foot with castors.

17. PASS BOX

1. Area : Dirty to Clean supply, ETO to Sterile supply & Sterile Issue
2. Size : 600x600x600mm, internal
3. Should be made up of SS 304 sheets with double wall construction
4. Should have UV lights for safe storage of components
5. UV light should automatically switch off when any one door is opened
6. Pass-through chamber should be based on electrical sliding hatches and should fit all types of standard racks.
7. The chamber should consist of two electrically operated sliding hatches.
8. Each hatch should have its own 24 DC motor that powers a drive belt and ensures smooth operation, as well as its own convenient push-button control to ensure that both hatches cannot be opened at the same time.
9. The control should feature two modes of operation to open or close the hatch with a press button mechanism.
10. Should have door interlocking to prevent simultaneous opening of both the doors
11. Should have toughened glass paneling for easy visibility.

18. CLOSED TRANSPORT TROLLEY FROM STERILE STORE TO OT

1. Size : 1400x750x1260 mm(LxWxH) (External) approximately.

2. A Closed Transport trolley is used for sterile goods handling, for which higher protection than normal dust protection is required, e.g. short transports between hospital buildings. Suitable for handling baskets or containers with a total capacity of 9 STU (1 STU = 600 x 300 x 300 mm) on three solid, removable shelves (3 x 3 STU).

3. Trolley should be fitted with large stainless steel wheels (Ø 160 mm) for easier maneuverability.

4. Should have two fixed and two swivel wheels with brakes.

5. Should be of fully welded stainless steel construction (minimum 18 gauges, 304).

6. The doors should open 270° for easy access and cleaning.

7. Trolley should have lockable doors and should include handlebars.

19. TABLE TROLLEY FOR DIRTY/CLEAN/STERILE AREA

1. Size : 1080x550x800 mm approximately.

2. The table trolley is made of all-welded medical grade stainless steel tubing.

3. The trolley should have handlebars.

4. The solid top and bottom shelves are made of heavy gauge stainless steel (304) with a ground and polished finish, and with a 12 mm raised edge all around.

5. The lower shelf is 300 mm above floor level. There are protective buffer rollers on all four corners.

6. The table trolley has 4 swivel wheels, mounted in ball bearings, for easy handling even in narrow passages.

20. MODULAR STERILIZING BASKETS BIG

1. Size : 585x395x195 mm approximately.

2. Area : Various movement

3. It should be modular design with standard sizes and high precision and should be designed for sterilizing / processing as well as easy handling and management of the supply, storage and distribution of re-circulated sterilized goods.

4. It should be self-drying after disinfection in hot water (min.+85°C)

5. It should be sturdy, jig-welded trays maintain their size and shape even if handled carelessly.

6. It should be both nest able and stackable There should be special wire support to help making baskets both stackable (when the supports are folded into the basket) and nest able (when the supports are folded out)

7. The top frame should be designed such that it should serve as a handle grip for easy carrying even when heavily loaded.

8. There should be no sharp edges or wires.

9. The surfaces should be smooth to assure easy cleaning in a washer-disinfector.
10. The baskets should be made of electro-polishes heavy-duty stainless steel (304) and should have a rigid bottom frame that gives space for airing between goods and work surfaces and allow use on roller belt and chain conveyors.

11. It should be designed and manufactured in accordance with high quality specifications to assure long lifetime.

21. MODULAR STERILIZING BASKETS MEDIUM

1. Size : 585x395x100 mm approximately.

2. Area : Various movement

3. It should be modular design with standard sizes and high precision and should be designed for sterilizing / processing as well as easy handling and management of the supply, storage and distribution of re-circulated sterilized goods.

4. It should be self-drying after disinfection in hot water (min.+85°C)

5. It should be sturdy, jig-welded trays maintain their size and shape even if handled carelessly.

6. It should be both nest able and stackable There should be special wire support to help making baskets both stackable (when the supports are folded into the basket) and nest able (when the supports are folded out)

7. The top frame should be designed such that it should serve as a handle grip for easy carrying even when heavily loaded.

8. There should be no sharp edges or wires.

9. The surfaces should be smooth to assure easy cleaning in a washer-disinfector.

10. The baskets should be made of electro-polishes heavy-duty stainless steel (304) and should have a rigid bottom frame that gives space for airing between goods and work surfaces and allow use on roller belt and chain conveyors.

11. It should be designed and manufactured in accordance with high quality specifications to assure long lifetime.

22. BASKET RACK

1. Should be suitable for keeping 20 Baskets

2. Should be mounted on Bullet feet legs

3. Should be made up of stainless steel.

4. Should be provided with handle for easy transport.

23. **STORAGE RACK**

Size - 1830X535X1830

5 shelves; Made of Stainless Steel-AISI-304, Finished with Polishing with bullet feet

24. IN ADDITION TO THE ABOVE, FOLLOWING <u>TURNKEY WORKS</u> FOR INSTALLATION AND COMMISSIONING OF CSSD ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR :

- The turnkey work includes all modifications/Patch work to the built up space provided at the hospital site including Installation of Equipment, civil works, electrical works, plumbing works, furniture and other related works of the CSSD unit 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. The work includes demolition of unwanted walls.

- Bidder must take into consideration in its bid, costs to be incurred for the works pertaining to Civil, Electrical, Plumbing, Sanitary and any other protections relevant as per State/Central Govt. regulation/local authority, Servo stabilisers, U.P.S. etc. required for successful installation testing and commissioning of the system and the offered price should include all such costs, each Schedule is to be considered a package in itself and contractor to execute the order package on a "turn key basis".

- **Civil works** such as cladding of Vitrified tiles, Putty, PU painting, Epoxy flooring, Metallic False ceiling, Silicon sealant, Corner coving, Air locks, Interlocking doors with viewing panels, Change rooms, Auminium doors & Window and front flushed SS panelling among Autoclaves, Washer Disinfector and their surrounding walls, ceiling & floor.

- **Electric distribution panel** for the above CSSD 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). **Earthing system** of Control panel and other electrical instrument and accessories in the CSSD area **as per standard guidelines of BIS(Latest edition)**. All cable trenches and railings should be made wherever required.

- Laying of **uPVC water pipe line for Plumbing** with necessary taps, joints, elbows, Unions, Tees and valves of GI made and IS-1239 standard (Latest version) to various supply points in the CSSD Room from single point supply(Provided by the hospital). Contractor will be responsible for supply and installation of water storage tanks and Booster pumps. Individual plumbing lines with valves are required.

- Providing fixing of **Electrical Gadgets** like ELCB, MCB, LED light of size (2' x 2'), Light Points, Power points, Cool air Fans, Exhaust fan etc in the CSSD room. Clean room fitting light IP-65 to generate 500 Lux shall be fitted at the Sterile area and LED Light IP-20 of size-(2'x2') for Packing area and Wash area.

- Installation of MCB, ACB, ELCB & OCB of Havell/Siemens/L&T/Schneider etc **for Control Panel** for CSSD.

- Clean room fitting light (2ftx2ft) LED to be fitted with the false ceiling to produce 400-500 Lux inside the CSSD area.

- Installation of all **Electrical conduiting & cabling** must be of IS: 1554 (As per latest amendment) standard and wiring as per IS: 732 standard and proper earthing of all CSSD equipments and other electrical instrument and accessories in the CSSD room as per standard guidelines of BIS. All cable trenches and railings wherever required
- Construction/laying of **Draining system with SS drain pipe** from all the equipments/Sinks to the main drain (outside the CSSD) with SS Grating where opened and concealed with drain port, proper trap and flow trap system and tapping.

- Contractor should provide effective **firefighting system**. The contractor should provide FDA, fire extinguishers/Dry CO2 cyliners-2 kg with essential accessories. Cylinders should be certified by respective regulatory board.

- All necessary work associated with the installation of sterilizer including **integrated steam piping, pressure control valves and exhaust** as required should be done by the vendor. All steam piping should be of SS 304/SS-316/SS-316L as appropriate.
- Interlocking doors with Powder coated Aluminium frame and vision glass for all Airlock.
- Hermetically sealed window flushed on the wall for easy viewing through barrier walls.
- SS Panelling for double door Autoclave and Washer Disinfector.
- Ventilation of Wash area, Packing area and Sterile area shall be made with the existing HVAC system of the Building. Internal ducting and Diffusers in the CSSD room shall be fitted by the bidder. Exhaust fan to be provided wherever required. Aluminium ducting should be done in the sterile area and GI ducting for the balance area.
- The works includes all modifications/Patch work to the built up space provided at the hospital site including Installation of Equipment, civil works, electrical works, plumbing works, furniture and other related works of the CSSD and TSSUs required for the smooth and efficient functioning of the centre. These works shall comply with all relevant safety and standards guidelines. The vendor is fully responsible for installation and commissioning of all equipment. The work includes demolition of unwanted walls. Construction of Partition wall for installation of Double door Autoclaves in CSSD. Supply of requisite materials and connection for electrical supply, Plumbing line, drain line connection and exhaust of gases/steam inside CSSD and TSSUs.

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

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

Note :

- **The contractor shall be responsible for the complete works including submission of working drawing and walk through view.**
- **The contractor should provide complete Operation manual, Equipment manual, Service manual and manuals for all systems and subsystems.**
- **The contractor should provide Final electrical safety test, system test and calibration to be done by authorized person with test instruments.**
- **Engineer may instruct for any test this has to be got done by contractor at their own cost.**
- **All electrical accessories like cable wire, electrical outlets, switches etc supplied by the contractor should be fire proof of reputed make, certified for electrical safety.**

- **Wherever makes have not been specified for certain items, the same shall be as per BIS and as per approval of HSCC.**
- **The contractor should provide test certificate for all materials and equipments used for CSSD**
- **Training of personnel of the Institute should be 2 weeks by the contractor.**
- **The contractor should prepare and submit layout plan as well as As-Built drawing for Steam Pipeline, Electrical Wiring, Electrical Distributional Panel, Plumbing, Fire Fighting System, Air Washing and Ventilation and Drain line to HSCC for approval before beginning of supply and installation and As-Built drawing after installation.**
- **The contractor should provide test certificate for all materials along with manufacturer's test certificate and equipments used for CSSD.**
- **Third party quality certification of the CSSD equipment from SGS/TUV/Lloyds should be submitted by the contractor as "Certifies that the CSSD equipment to be supplied/supplied for installation meet the technical specification and BOQ of the tender document vide contract No (Mention Contract No.)."**

TECHNICAL SPECIFICATIONS OF MEDICAL GAS MANIFOLD SYSTEM

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

1.0 OXYGEN SYSTEM

1.1 Oxygen Manifold: Main with Middle Frames

Oxygen Manifold: Emergency with Middle Frames

The Manifold has been configured for 2 x 20 nos. of Oxygen Cylinders and is suitable to withstand a pressure of 145 Kg/cm2, along with high-pressure copper annealed tail pipes with end Brass adapter suitable for Oxygen Cylinders and manifold.

Top frame comprising of high pressure copper pipes of size 1/2" NB x 15swg with high pressure brass fittings made of high tensile brass and connections through non-return valves; high pressure copper tail pipes, made of high pressure copper pipe of size 1/4" NB x 15 swg. The design of middle and bottom frames has been provided to fit both round and flat bottom cylinders safely. The manifold has been tested (hydraulically) at 3500 psig and necessary test certificates accompany along with the supply.

1.2 Automatic Oxygen Control Panel with changeover Alarm

a) The Oxygen Control Panel shall be of microprocessor based and preferably Digital Display Type. Pressure reduction shall be in two stages. Panel shall be integrated with pressure gauges inside panel on downstream of pressure regulator. Panel shall be fitted with standby line regulator. Line regulators shall have pressure relief mechanism for testing and servicing purpose.

b) Panel shall be Fully Automatic and shall switch over from "Bank in Use" to 'Reserve Bank' without fluctuation in delivery line pressure and without the need of external electrical power. After the switch–over, the "Reserve Bank" shall become the "Bank in Use" and the "Bank in Use" shall become the "Reserve Bank". The Control Panel will be powered by a microprocessor.

c) A Microprocessor circuit board assembly shall provide a relay output to give indication when or just before the manifold switches from one bank of cylinders to another. The switch over shall be mechanically controlled, not electrically.

d) To avoid excess pressure being supplied to the distribution system, a pneumatically relief valve for the line regulator shall be incorporated. An intermediate pressure relief valve shall be installed between the high-pressure regulators and the line delivery regulators.

e) The control panel incorporates six coloured LED's, three for the Left Bank and three for the Right Bank: Green for Bank in use, Amber for Bank ready and Red for Bank

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

f) All components inside the Control Panel like Pressure Regulators, piping and control switching equipment shall be cleaned for Oxygen Service and installed inside the cabinet to minimize tampering with the regulators or switch settings.

g) The Control Panel should be made to provide Heavy Duty with a Delivery Flow Capacity of over **1500 lpm at 55-60 psig.**

1.3 Emergency Oxygen system has been configured with 6-cylinder oxygen manifold along with a High Pressure Regulator which will be mounted on the Emergency Manifold System for reducing the cylinder pressure suitable to the line pressure.

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

2.0 NITROUS OXIDE SYSTEM

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

Nitrous Oxide Manifold for 4 + 4 nos. of cylinders is suitable to withstand a pressure of 145 Kg/cm2, along with high-pressure copper annealed tail pipes with end Brass adapter suitable for N2O Cylinders and manifold.

Top frame comprising of high pressure copper pipes of size 1/2" NB x 15swg with high pressure brass fittings made of high tensile brass and connections through non-return valves; high pressure copper tail pipes, made of high pressure copper pipe of size 1/4" NB x 15 swg. The design of middle frames has been provided to fit both round and flat bottom cylinders safely. The manifold has been tested (hydraulically) at 3500 psig and necessary test certificates is accompany along with the supply.

2.2 Automatic Nitrous Oxide Control Panel with changeover Alarm

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

- Panel shall be Fully Automatic and shall switch over from “Bank in Use” to ‘Reserve Bank’ without fluctuation in delivery line pressure and without the need of external electrical power. After the switch–over, the “Reserve Bank” shall become the “Bank in Use” and the “Bank in Use” shall become the “Reserve Bank”. The Control Panel will be powered by a microprocessor.
- A Microprocessor circuit board assembly shall provide a relay output to give indication when or just before the manifold switches from one bank of cylinders to another. The switch over shall be mechanically controlled, not electrically.
- To avoid excess pressure being supplied to the distribution system, a pneumatically relief valve for the line regulator shall be incorporated. An intermediate pressure relief valve shall be installed between the high-pressure regulators and the line delivery regulators.
- The control panel incorporates six coloured LED’s, three for the Left Bank and three for the Right Bank: Green for Bank in use, Amber for Bank ready and Red for Bank empty. Both the Left and Right bank pressures and the main line pressure should be displayed on the front door of the cabinet by means of LED's. All pressure transducers, micro switches, and display LED’s shall be pre-wired to an internal microprocessor circuit board.

- All components inside the Control Panel like Pressure Regulators, piping and control switching equipment shall be cleaned for Oxygen Service and installed inside the cabinet to minimize tampering with the regulators or switch settings.

- The Control Panel will have heaters to prevent ice formation on the regulators at high flow rates.

- The Control Panel should be made to provide Heavy Duty with a Flow Capacity of over **500 lpm at 55-60 psig.**

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

3.0 COMPRESSED AIR SYSTEM

3.1 Compressed Air System

Medical compressed air system comprising of Compressors 150 CFM capacity at 8.5-10 Kg/sq.cm mounted with 3000 litres Receiver Tank and Filter, Non-Return Valve, Isolation Valves, Air Dryer and Pressure Reducing Station along with interconnecting piping to take care of the requirement of desired no. of air outlets.

Type of Compressor :

Compressed air system with appropriate standby arrangement).

Air Dryer Type :

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

Pressure Reducing System :
The System should have 2 nos. Pressure Regulators (one in working & one stand-by) to reduce air pressure 4.2 Kg./ cm2 required for Medical Air pipeline.

3.2 Auto Drain for Air Receiver should be provided.

3.3 **3-Stage Breathing Air Filters :**

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

4.0 VACUUM SYSTEM

4.1 Vacuum System

Vacuum Pumps of 220 CFM capacity with 3000 litres Receiver Tank, Filter, Non-Return Valve, Isolation Valves, Auto Switch Gear to set minimum & maximum operating vacuum and interconnecting piping to take care of the requirements of desired no. of vacuum outlets. (Make- Ingersol Rand/ Anest Iwata/Hitachi)

4.2 Type of Vacuum Pumps :

Lubricated, Air-cooled, Vacuum Pumps with appropriate standby arrangement).

Each Vacuum Pump are complete with Base Plate, Belt Guard, V-Belts, Motor and Starter. The system is of Automatic Start and Stop Type. The Pumps are connected to a common vertical receiver of 3000 Ltrs capacity. The receiver has a drain valve at the bottom.

Vacuum Bacterial filtration:

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

These elements are pleated construction giving a high surface area and long operational life. The efficiency exceeds the 0.005% penetration specified in HTM2022 for infectious disease unit.- i.e. complete bacterial removal.

Element is fitted in an aluminum housing suitable for various capacities. These are internally protected against corrosion by an alocrom treatment. The inner & outer

surfaces of the housing are epoxy coated. Complete assembly is fitted with a sterilisable drain flask with isolation valve for removal of liquid if any. Differential pressure indicators are provided to monitor the status of element.

5.0 GAS OUTLET POINTS

Double Lock Outlet

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

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

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

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

6.0 COPPER PIPE

Solid drawn, seamless, de-oxidized, non-arsenical, half-hard, tempered and de-greased **copper pipe** conforming to BS : 6017, 1981, Table 2 (Cu - DHP) and manufactured as per BSEN: 13348:2008. Table X (or as per BSEN 1057). All medical graded copper pipes are de-greased & delivered capped at both ends. The pipes are accompanied with manufacturers test certificate for the physical properties & chemical composition. Copper pipe also has third party inspection certificate from TUV/SGS/Lloyds' Register Services.

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

INSTALLATION & TESTING

Installation of piping is carried out with utmost cleanliness. Only pipes, fittings and valves which has been degreased and brought in polythene sealed bags has been used

at site. Pipe fixing clamps has been of non ferrous or non-deteriorating plastic suitable for the diameter of the pipe.

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

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

After erection, the pipes has been flushed with dry nitrogen gas and then pressure tested with dry nitrogen / Medical Air at a pressure equal to twice the working pressure for a period of not less than 24 hours. All leaks and joints revealed during testing has been rectified and re-tested till the pressure in pipes stands for at least 24 hours.

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

PAINTING

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

7.0 ISOLATION VALVES

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

8.0 Valve Box Assembly :

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

- Lever operated quarter turn valve (i.e. 90 degree shut-off ball valve- has been manufactured by ISO 9001 company and factory degreased) with brass body and chrome plated brass ball.
- Brass fittings (Nut, Nipples and extruded brass Adapter) Seat Brass Block for pressure gauge
- 2" Dial gauges (0 - 10 kg/cm2, 0 - 760mm Hg)
- Nylon Bush for copper pipes holding with the valve box
- Beading for box lead

- Lockable cover with breakable glass so that during normal operation access has been by key. But during emergency operation, access by breaking the glass panel.

9.0 ALARM SYSTEM

9.1 The Master Alarm

9.2 Area line pressure alarms

should be as per required locations.

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

The equipment has following features:

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

11.0 AGSS (Anesthesia Gas Scavenging System)

VACUUM SYSTEM

The Simplex tank mount design medical vacuum system must include Rotary Vane Dry vacuum pump of suitable capacity and associated equipment, one ASME air receiver and one control panel. The only field connections required are system intake, exhaust and power connection at the control panel. All components has been completely pre-piped and pre-wired to a single point service connection.

CONTROL PANEL

The system include a control panel in a NEMA 12 enclosure with externally operable circuit breaker with door interlock, control circuit transformer with fused primary and secondary circuits, H-O-A switch, magnetic starter with 3 leg overload protection, hour meter, motor running light and minimum run timer to prevent short cycle operation.

VACUUM PUMP

The medical vacuum pump operate completely dry with air cooled design, and has been equipped with self-lubricating carbon/graphite vanes with no water requirements. Bearings has been permanently lubricated and sealed.

VACUUM PUMP DRIVE

The Vacuum pump has been direct driven. Torque is transmitted from the motor to the pump through a shaft coupling.

12.0 **TUBING**

LP Tubing

13.0 HORIZONTAL BED HEAD PANELS

13.1 **Bed Head Panel (1500 mm long)**

- Has been made of High Strength Anodised Aluminium Extrusions with inbuilt single railing.
- The chamber of Medical Gas Outlets has been made of anodized aluminium
- Has been powder coated as per the customer's choice.
- The panel has been designed to has provision to accommodate the following:
  a). Gas Outlets,
  b) Electrical Sockets / Switches
  c). Audio Unit
  d). Room Lighting

- The railing has been designed to have the following accessories:
  a). I V Pole

b). Infusion pump / Syringe pump stand
c). I V Bottle holder
d). Medicine / disposable tray
e). Examination lamp
f). Reading lamp

14.0ACCESSORIES:

14.1 BPC Flow meter with Humidifier :

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

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

14.2 **Ward Vacuum Units :**

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

- A regulator,
- A 1000-2000 ml. reusable collection jar, made of unbreakable poly carbonate/Poysulphone material and fully autoclavable at 121 degree centigrade
- A wall bracket for mounting the jar assembly on the wall.

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

14.3Theater Vacuum Units :

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

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

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

- Left, Right or Both.

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

15. Electrical Distribution Panel :-

Panel shall be wall mounted and fabricated from16/14 SWG CRCA Sheet duly powder coated. Panel shall incorporate isolators for the following equipments.

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

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

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

16. Supply of O2 Cylinders – Class D Type
Should be as per BIS/IS/ASME Standard.

17. Supply of N2O Cylinders – Class D Type
Should be as per BIS/IS/ASME Standard

18. IN ADDITION TO THE ABOVE, FOLLOWING <u>TURNKEY WORK</u> FOR INSTALLATION AND COMMISSIONING OF MEDICAL GAS MANIFOLD SYSTEM IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR:

- Bidder must take into consideration in its bid, costs to be incurred for any additional work pertaining to Civil, Electrical, Mechanical and any other protections relevant as per State/Central Govt. regulation/local authority of Punjab, Furniture for Plant & Manifold Room, Servo stabilisers, U.P.S. etc. required for successful installation testing and commissioning of the system and the offered price should include all such costs, each equipment/system is to be considered a package in itself and contractor to execute the order package on a “turn key basis”.

- Providing fixing of **Electrical Gadgets** like ELCB, MCB, Light Points, Power points, etc in the Medical Gas Manifold System.

- Installation of MCB, ACB, ELCB & OCB of Havell/Siemens/L&T/Schneider etc for Control Panel for Medical Gas Manifold System.

- Installation of all **electrical cabling** must be of IS: 1554 (As per latest amendment) standard and wiring as per IS: 732 standard and proper earthing of all Medical Gas Manifold System and other electrical instrument and accessories in the Medical Gas Pipeline System as per standard guidelines of BIS.

- Arrangement for requisite **fire fighting** for Manifold Room & Plant Room and its maintenance for the contract period

In addition to the above mentioned equipment/appliances, if the contractor thinks it necessary to include any other equipment/appliances, accessories etc. for the MGMS then that may be provided after approval from Engineer in-charge.
The sizes are approximate. Minor variations in sizes shall be acceptable subject to prior approval of the Engineer.

Note :

- The bidder should attach Technical Compliance item wise with respect to the above technical specifications and turnkey work along with Printed catalogues
- The contractor shall be responsible for the complete works including submission of working drawing and walk through view.
- The contractor should provide complete List of Commonly used Spares, Operation manual, Equipment manual, Service manual and manuals for all systems and subsystems.
- Final electrical and pressure and other safety test, system test and calibration should be done by authorized person with test instruments.
- The contractor should provide all electrical accessories like cable wire, electrical outlets, switches etc, and they should be fire proof of reputed make, certified for electrical safety.
- Wherever makes have not been specified for certain items, the contractor should provide the same as per BIS and as per approval of HSCC.
- Training of personnel of the Institute should be 30 days at least by the contractor.
- The contractor should prepare and submit layout plan for Steam Pipeline, Electrical Wiring, Electrical Distributional Panel, Plumbing, Fire Fighting System, Air Washing and Ventilation and Drain line to HSCC for approval before beginning of supply and installation and As built drawing after installation.
- The contractor should provide test certificate for all materials along with manufacturer's test certificate and equipment used for MGMS.
- Third party quality certification of the MGMS equipment from SGS/TUV/Lloyds should be submitted as "Certifies that the MGMS equipment meets the technical specification and BOQ of the tender document".

TECHNICAL SPECIFICATIONS OF MINOR OPERATION THEATRE

SCOPE OF WORK

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

1. CEILING PANEL

The prefabricated construction for Double skinned panel of 0.8mm thick SS-304 Grade Stainless Steel sheet each. The double skinned panel of 25-30mm thick shall be sandwiched with core consisting of rigid polyurethane foam, which shall be injected under high pressure, with a minimum density of 40 kg/m3. with Silicon sealant to provide seamless operating room. The individual wall panels shall use the tongue and groove technology for joining two panels, no welding should be allowed.

The ceiling suspension from concrete ceiling should be as:

Suspension elements : Suspension bracket with tension spring
Suspension Height: Continuously adjustable from 250 to 1100 mm
Stability: Permanent and non-stop after adjustment.
Material High quality galvanized steel

The 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 light fixtures & diffusers. All the sharp edges and corners of the OT room should be rounded /coved to avoid bacterial contamination. The Ceiling design and construction should be strong enough to allow for the installation and support of all fitting and fixture should have provision of opening required for the installations without affecting rigidity

and strength. Access to enable maintenance to be carried out from outside the operating room. Ceiling panel should be of 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 ceiling system. The individual panels except those at the edges should be removable individually. The suspended Ceiling should be hermetically sealed. All the four corners should have return air duct outlets and grill for the same made of SS with the color choice to suit the hospital's choice. The system should afford the maximum versatility at the planning stage and flexibility during erection, ensuring openness to future alternations and trouble–free maintenance. During the installation of first the structural parts and subsequently the finishing elements, the system should ensure perfect integration of technical networks and allow ample operational flexibility at the construction site. The clean, dry installation method should enable optimum programming of the various work phases, allowing optimization of the installation of technical systems and any necessary alterations to be made – right up to checking and final testing of the installed systems – before the modules are sealed.

The ceiling panel should be fixed to the RCC ceiling with supports/sub-frame. 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 of off-white colour** (Factory Internal test report to be submitted) to a minimum dry film thickness of 300 microns with primer and putty. The anti bacterial paint coating should overlap the floor coving, 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.

A Galvanized steel cover plate shall be installed for 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. LAMINAR AIR FLOW SYSTEM

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

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

These filters should meet following specification

-Separators : continuous thermo plastic chord
Sealant : Polyurethane

Gasket : One piece polyurethane

MPPS average efficiency: > 99.95% 3

Micron DOP efficiency > 99.99%

Final Pressure drop : 600 pa (max)

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

c) The ceiling system should be equipped with "H 14" class HEPA filters position in the ceiling to achieve0.25m/sec flow at the diffuser.

d) Filtration Ceiling System holding structure, Filter frames and top plenum should be made of Aluminium/Stainless Steel.

e) The filtration ceiling system should have diffuser/flow equalizer to achieve uniform &constant air distribution over the whole surface. It should be BIS/CE/UL certified

f) The air management system should be designed to achieve class 100 with the following parameters:

Bacteriological class =B (5 CFU/m3)
Particle decontamination kinetics CP =5
min ISO 14644/1 classification = ISO 5

g) The positive pressure should be maintained inside the OT to prevent contamination due to air from outside the OT.

h) The supplier should provide test certificate for HEPA filter and laminar air flow systems from the original manufactures.

i) Size of laminar airflow system minimum 8 feet X 8 feet or more.

j) Should be BIS/CE certified.

k) Note: Prospective bidders are advised to collect the information regarding CFM and AHU capacity from the respective institute site. Total flow rate of filter bank shall match the CFM of AHU.

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 should be Powder coated Aluminium.

4. WALL PAINTING

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

5 DOUBLE LEAF DOOR- Size-2100 x 1500mm

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

6 SINGLE LEAF DOOR- Size-2100 x 1500mm

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

7 PERIPHERAL LIGHTING AND CLEAN ROOM LUMINARIES

a) To provide peripheral lighting and clean room luminaries with intensity min 500 Lux, it should be 8-10 in numbers for each OT. Luminaries cover should be made of highly resistant, disinfectant proof laminated safety glass/polycarbonate diffuser with stylish fine grained surface, glass pane with white coated steel frame.

b) The white luminaries body should be made of sheet steel/ perfectly powder coated, supplied ready for connection optionally for individual or series circuit with digital electronic control gear.

c) Recess frames should be gas tight. The fitting should be flush with the ceiling and should be removable from top or bottom. The light fitting

should be uniformly and aesthetically distributed on the ceiling to provide uniform illumination in the OT. Light should not interfere when green mode endoscopy is performed

d) Peripheral lighting should be done according to IP65 (international protection rating 65).

e) Control equipment for the general lighting and the light dimming should be provided in

the theatre control panel

f) Size of Peripheral light shall be 2' x 2' or 3' x 1' or 581mm x 581mm

8. . DISTRIBUTION BOARD

Electrical Distribution Board along with all high voltage equipment should be installed in a separate enclosure. Electric Distribution Panel, 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/BIS 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. 5/15 Amps **antibacterial switch** and socket outlet set -3 Nos shall be flushed equidistant in each wall at 325mm height from FFL of OT. Wiring for 250 volts single phase and neutral with switch and socket outlet with 4 sq.mm and 2.5 sq.mm PVC insulated copper conductor 1100 volts stranded flexible wires should be concealed with conduit. Installation of all electrical cabling must be of IS: 1554 (As per latest amendment) standard and wiring as per IS: 732 standard and proper earthing of OT and other accessories in the OT room as per standard guidelines of BIS. Fittings should be sealed on accordance with the standard IP54. Earthed equipotent bonding of all exposed metal work should be provided.

9. PVC FLOORING

a) It should be with 2mm antistatic seamless PVC flooring

b) Floor should be smooth, non-slip, impervious material conductive enough to dissipate static electricity but not conductive enough to endanger personnel from electric shock.

c) Electrostatic charge dissipation combat PVC seamless flooring of very high quality should be provided.

d) Thickness not less than 2 mm. Continuous roll should be used and joints should be welded by special PVC thermal welding units using PVC welding bars of same colour.

e) The sheets should be highly durable with resistance to shock and indentation. It should be scratch proof also. The conductive material should be uniformly impregnated as grains.

f) It should be inert to body fluids, chemicals and disinfectants. Should not be affected by temperature variation within the OT.

g) The floor should efficiently discharge electric charges up to 2 kV

h) Flooring should be done by skilled workers of accredited agencies authorized by the supplier of PVC sheets. The electrical resistance (point to ground) should be within $2.5x10^4$ to $5x10^6$ ohms. The floor should not allow building up of electrical charge beyond 100 volts due to antistatic effect. The corners should not be terminated sharply and concealed cove- former (aluminium) should be used to overlap the wall panel to a height of approx.25mm and sealed perfectly and uniformly. Self-levelling compounds should be used.

i) The conductive copper grid laid underneath the PVC sheet should be supported by liquid epoxy compounds allowed to set as a uniform and level surface. The copper strips to be made visible by grinding and no copper strip should project more than 0.5mm above level surface to avoid damage to the PVC sheet. One earthing lead should be brought out from every 150sq.ft area and attaching it to the main earthing strip/ground.

j) Copper grounding strips (0.05 mm thick, 50 mm width) should be laid flat on the floor in the conductive adhesive and connected to copper strip of grounding. The connection from copper grid should be brought out uniformly at places to form equipotential grid.

k) Flooring should be mechanically shock proof, scratch proof, flame retardant and anti-microbial

l) Corners should be uniformly curved

m) Final surface should be non-corrosive to biological fluids and detergents. n) Colour should be uniform pleasant and matching with ambience

o) Suitable self-levelling should be done before PVC flooring to avoid undulation with the OT.

10. INTERNAL DUCTING AND EXHAUSTION SYSTEM

a) All the ducting inside the OT shall be scope of the OT bidder

b) All necessary HVAC interconnection for supply and return air shall be the scope of bidder (the institute will provide the duct upto outside of the OT)

c) All the ducting should be as per industry standard and sheet should be Aluminum of appropriate thickness and insulated as per industry standard.

d) Return air exhaust grill should be provided in the OT

e) The exhaust cabinets should be cleanable

f) These cabinets should have suction from bottom and top also.

g) Designed flow rate should not be less than 1000 m^3/hr. Distribution of exhaust air volume should be divided between fluff strainers to maintain the required pressure within the theatre without causing turbulence.

h) Return air exhaust cabinet should be made from SS-304 and should be from the same manufactured of wall panel. Also it should match perfectly with ceiling system aesthetically.

11. **MEDICAL GAS PIPE LINE**

a) The bidder should ensure that all works carried out as per HTM 02-01 /NFPA 99C / DIN/ISO 7396-1standard

b) Bidder should provide Gas Outlets of Oxygen- 2nos, Medical Air 4bar-1no, Air7-1no, Co2-1no, Vacuum-2nos, AGSS-1no, and Nitrous Oxide-1no, etc. supply to Operation Theatres from the existing lines terminated outside the MOT.

c) Bidder shall be responsible for supply, installation, testing and commissioning of complete MGPS system inside the operation theatre including Distribution piping, connection to Pendants, outlets and other essential accessories.

d) Copper pipes should be of solid drawn, seamless, deoxidized, non-arsenical, half hard, tempered and degreased copper pipe. All copper pipes should be degreased & delivered capped at both ends. The pipes should be accompanied with manufacturers test certificate for the physical properties & chemical composition. The copper pipe should comply with BS EN 13348:2008

e) Copper pipe must have reputed third party inspection certificate (Eg. Lloyd's/

TUV/ SGS).

f) Fittings should be made of copper and suitable for a working Pressure of up to 17 bar and especially made for brazed socket type connections.

g) The copper fitting should comply with EN 1254-1

h) The Brazing filler material should comply with EN 1044

12. **SCRUB STATION** (1500mm minimum)

a) Compact surgical scrub sink should be designed for use in OT complex providing for pre procedural scrub up.(Double sink combination as suitable)

b) Each fixture should be fabricated from heavy gauge type 304 stainless steel (minimum thickness 1.5mm)and should be seamless welded construction, polished to a satin finish

c) The scrub sink should be provided with a front access panel which should be easily removed for access to the water controlled valve, waste connections, stoppers and strainers.

d) Hands free operation should include infra-red sensors with programmable adjustment.

e) Thermostatic mixing, valve control should be located behind the access panel and maintain constant water temperature.

f) Timing should be adjustable to meet individual application requirements.

g) Provided with infrared sensors, thermostatic control taps with fail safe temperature controls.

h) All units should have reduced anti- splash fronts.

i) Should have dispenser for soap/disinfection scrub solutions.

j) Knee/foot operated switch should be provided additionally.

13 X RAY FILM VIEWER

a) LED type flat panel X-ray viewing panel should be supplied. b) This should comply with relevant electrical safely codes.

c) Total 2 Nos Plates. Each panel should be able to illuminate films up to 14”x17” size. It may be One integrated wall Panel or adjacent.

d) Mounting should be flush with the wall to avoid dust accumulation and growth or organisms between wall and panel.

e) Body should be of extruded Aluminum powder coated with bacteria resistant and disinfectant resistant finish.

f) The diffuser on the front panel should be a uniformly lit screen.

g) Dimming electronic control should be enclosed at the bottom of the cabinet.

h) Proper spring loaded film clip with rollers should be provided to hold the films firmly and to remove the film without scratches.

14. **SURGICAL OT LIGHT – (Dual Dome)**

A. OT Light – LED

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

Such Lighting System should have the following technical specifications:

a) Number of Light heads : Two per suspension

b) Colour Temperature range: 3800 k -5000 (±10 %) - Variable colour temperature.

c) Field Size Diameter: 15 to 28cm (+/- 10%)

d) Depth of Field : 750 to 1100mm (+/- 10%)

e) Illumination Level : 160000Lux in each dome

f) Control Panel (wall and on dome)

g) Rotation : 360 -330degrees

h) Sterilizable Handle: 02 Nos. i) Mounting Type : Ceiling

j) Supply Voltage : 230 VAC 50 Hz k) Bulb Type : LED

l) Dimming Range : 50% - 100% or 30% - 80%

m) Operating/Storage Humidity: 10-95%

n) Life of Light Source : >40,000 Hrs

o) Should have provision to mount the Camera in one dome

p) Surgical Light System Should be compliant with relevant BIS/European CE with 4 digit /UL Listed/ETL/US FDA standards or Declaration of conformity for quoted model with ISO 13485.

15. **Turn Key Works to be provided by the Bidder**

1. Commissioning and installation of ceiling panelling, Frame Structures &substructure, PVC flooring, Lighting, Touch Screen Control Panel, laminar flow, pendants, OT Light, Painting (if any), electrical work, ups, windows (if any)and Doors, etc. as per technical specification.
2. All cable conduit, trenches and railings wherever required.
3. All electrical accessories like cable wire, electrical outlets, switches, Control panels, etc should be fireproof, of reputed make, certified for electrical safety.
4. Bidder has to provide and install hatch box, storage shelves, scrub basins and other service areas as mentioned in the tender.
5. Testing, Installation and commissioning of all equipment/services.
6. Any other necessary work required for satisfactory working/performance of the modular OT and not mentioned/specified.

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

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

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

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

The successful tenderer will be required to undertake to provide at his cost technical training for personnel involved in the use and handling of the equipment

on site at the institute immediately after its installation. The company shall be required to train the institute personnel onsite for a minimum period of 1 month

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

Note 3: DISMANTLING AND DEMOLISHING

Providing all tools, tackles, manpower for demolishing /dismantling, alteration/ addition for lime concrete, cement concrete, R.C.C, R.B work, precast concrete or stone slabs in walls, partition walls , stone rubble masonry, dressed stone work, ashlar face stone work, marble work or precast concrete work, dismantling doors, windows and clerestory window (steel or wood) shutter including chowkhats, architrave, holdfasts etc. CI or asbestos rain water pipes of any diameter with fittings and clamps, dismantling G.I. pipes (external work) including excavation and refilling trenches after taking out the pipes, taking out doors, windows and clerestory window shutters (steel or wood), wood work

in frames, trusses, purlins and rafters, dismantling steel work in single sections including dismembering and stacking, dismantling steel work in built up sections in angles, tees, flats and channels including all gusset plates, bolts, nuts, cutting rivets, welding etc., old plaster or skirting raking out joints and cleaning the surface for plaster, dismantling of R.C.C. spun vent shaft including excavating the cement concrete pit completely, taking out the shaft, refiling the excavated gap, stacking the useful materials near the site extra for cutting reinforcement bars, Dismantling aluminium/ Gypsum partitions doors, windows, fixed glazing and false ceiling including disposal of unserviceable surplus material and stacking of serviceable material within 1000 meters lead and any other work as directed by engineer-in-charge. Disposal of building rubbish/ malba/ similar unserviceable, dismantled or waste materials by mechanical means, including loading, transporting, unloading to approved municipal dumping ground or as approved by Engineer-in-charge.

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RESPONSIBILITY OF BIDDER

1. Bidder shall be responsible for complete design, construction, testing and commissioning of modular operation theatres.

2. Bidder shall execute all required civil, electrical and peripheral lighting, plumbing, air-conditioning system(Ducting inside the OT), demolition and other works as may be required for complete installation and trouble-free functioning of the operation theatres as a part of the "turnkey work". Necessary coordination with fire-safety vendor for the installation of fire safety sensor/instrument inside the OT and also other necessary coordination with civil contractor to be done by the OT bidder.

3. The bidder shall be responsible for the complete works including the submission of Working Drawings, and walk through view.

4. Bidder shall be responsible for installation and commissioning of medical equipment for MOT in coordination with respective institute/hospital authorities.

5. Bidder shall be responsible for free maintenance with spares of modular operation theatres during warranty period.

7. Bidder shall be responsible for commissioning of Medical Gas pipe lines, Pendants, LED OT Light and Gas outlets for the OTs and other associated works to make MOT fully functional. MOT Bidder should coordinate with MGPS, Integration and other vendors for the successful completion of MOTs.

8. Bidder shall be responsible for maintaining suitable air conditioning inside the operation theatre (Ducting inside the OT). Setting and monitoring of temperature and RH should be in the scope of the OT.(Necessary coordination with HVAC vendor to be done by the OT bidder)

9. Bidder should provide factory test certificates for the material used for the construction of modular theatres.

10. Bidder should supply complete set of Operation manuals, service manuals and As-Built drawing for all the systems and subsystems supplied.

11. Training should be provided for a week by the factory trained engineers /Original Equipment Manufacturer(OEM).

12. Final electrical safety test, system test, and calibration should be done by authorized persons using calibrated test equipment.

13. OEM or his authorized agent should post a trained engineer who should be available at site or should reach the site within 24 hrs of raising a service call.

14. Third party quality certification of the equipment from SGS/TUV/Lloyds/Bureau Veritas should be submitted by the contractor as "Certifies that the imported Modular OT items meet the technical specification and BOQ of the tender document vide contract No (Mention Contract No.)."

16. Third party test certificate and manufacturer test report for the items/equipment should be provided at the time of pre-despatch inspection.

17. Training should be imparted to the hospital staff for 2 weeks by the contractor.

TECHNICAL SPECIFICATIONS OF NORMAL OPERATION THEATRE

SCOPE OF WORK

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

1. CEILING PANEL

The prefabricated construction for Double skinned panel of 0.8mm thick SS-304 Grade Stainless Steel sheet each. The double skinned panel of 25-30mm thick shall be sandwiched with core consisting of rigid polyurethane foam, which shall be injected under high pressure, with a minimum density of 40 kg/m3. with Silicon sealant to provide seamless operating room. The individual wall panels shall use the tongue and groove technology for joining two panels, no welding should be allowed.

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Stability: Permanent and non-stop after adjustment.
Material High quality galvanized steel

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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.

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A Galvanized steel cover plate shall be installed for 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.

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4. PVC FLOORING

a) It should be with 2mm antistatic seamless PVC flooring

b) Floor should be smooth, non-slip, impervious material conductive enough to dissipate static electricity but not conductive enough to endanger personnel from electric shock.

c) Electrostatic charge dissipation combat PVC seamless flooring of very high quality should be provided.

d) Thickness not less than 2 mm. Continuous roll should be used and joints should be welded by special PVC thermal welding units using PVC welding bars of same colour.

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g) The floor should efficiently discharge electric charges up to 2 kV

h) Flooring should be done by skilled workers of accredited agencies authorized by the supplier of PVC sheets. The electrical resistance (point to ground) should be within $2.5x10^4$ to $5x10^6$ ohms. The floor should not allow building up of electrical charge beyond 100 volts due to antistatic effect. The corners should not be terminated sharply and concealed cove- former (aluminum) should be used to overlap the wall panel to a height of approx.25mm and sealed perfectly and uniformly. Self-levelling compounds should be used.

i) The conductive copper grid laid underneath the PVC sheet should be supported by liquid epoxy compounds allowed to set as a uniform and level surface. The copper strips to be made visible by grinding and no copper strip should project more than 0.5mm above level surface to avoid damage to the PVC sheet. One earthing lead should be brought out from every 150sq.ft area and attaching it to the main earthing strip/ground.

j) Copper grounding strips (0.05 mm thick, 50 mm width) should be laid flat on the floor in the conductive adhesive and connected to copper strip of grounding. The connection from copper grid should be brought out uniformly at places to form equipotential grid.

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l) Corners should be uniformly curved

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o) Suitable self-levelling should be done before PVC flooring to avoid undulation with the OT.

5. LAMINAR AIR FLOW SYSTEM

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

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

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

Gasket : One piece polyurethane MPPS average efficiency: > 99.95% 3 Micron DOP efficiency > 99.99% Final Pressure drop : 600 pa (max)

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

c) The ceiling system should be equipped with "H 14" class HEPA filters position in the ceiling to achieve0.25m/sec flow at the diffuser.

d) Filtration Ceiling System holding structure, Filter frames and top plenum should be made of Aluminium/Stainless Steel.

e) The filtration ceiling system should have diffuser/flow equalizer to achieve uniform &constant air distribution over the whole surface. It should be BIS/CE/UL certified

f) The air management system should be designed to achieve class 100 with the following parameters:

Bacteriological class =B (5 CFU/m3) Particle decontamination kinetics CP =5 min ISO 14644/1 classification = ISO 5

g) The positive pressure should be maintained inside the OT to prevent contamination due to air from outside the OT.

h) The supplier should provide test certificate for HEPA filter and laminar air flow systems from the original manufactures.

i) Size of laminar airflow system minimum 8 feet X 8 feet or more. j) Should be BIS/CE certified.

k) Note: Prospective bidders are advised to collect the information regarding CFM and AHU capacity from the respective institute site. Total flow rate of filter bank shall match the CFM of AHU.

6. INTERNAL HVAC DUCTING AND EXHAUSTION SYSTEM

a) All the ducting inside the OT shall be scope of the OT bidder

b) All necessary HVAC interconnection for supply and return air shall be the scope of bidder (the institute will provide the duct upto outside of the OT)

c) All the ducting should be as per industry standard and sheet should be Aluminum of appropriate thickness and insulated as per industry standard.

d) Return air exhaust grill should be provided in the OT e) The exhaust cabinets should be cleanable

f) These cabinets should have suction from bottom and top also.

g) Designed flow rate should not be less than 1000 m^3/hr. Distribution of exhaust air volume should be divided between fluff strainers to maintain the required pressure within the theatre without causing turbulence.

h) Return air exhaust cabinet should be made from SS-304 and should be from the same manufactured of wall panel. Also it should match perfectly with ceiling system aesthetically.

7. PERIPHERAL LIGHTING AND CLEAN ROOM LUMINARIES

a) To provide peripheral lighting and clean room luminaries with intensity min 500 Lux, it should be 8-10 in numbers for each OT. Luminaries cover should be made of highly resistant, disinfectant proof laminated safety glass/polycarbonate diffuser with stylish fine grained surface, glass pane with white coated steel frame.

b) The white luminaries body should be made of sheet steel/ perfectly powder coated, supplied ready for connection optionally for individual or series circuit with digital electronic control gear.

c) Recess frames should be gas tight. The fitting should be flush with the ceiling and should be removable from top or bottom. The light fitting should be uniformly and aesthetically distributed on the ceiling to provide uniform illumination in the OT. Light should not interfere when green mode endoscopy is performed

d) Peripheral lighting should be done according to IP65 (international protection rating 65).

e) Control equipment for the general lighting and the light dimming should be provided in

the theatre control panel

f) Size of Peripheral light shall be 2' x 2' or 3' x 1' or 581mm x 581mm

8. X RAY FILM VIEWER

a) LED type flat panel X-ray viewing panel should be supplied. b) This should comply with relevant electrical safely codes.

c) Total 2 Nos Plates. Each panel should be able to illuminate films up to 14"x17" size. It may be One integrated wall Panel or adjacent.

d) Mounting should be flush with the wall to avoid dust accumulation and growth or organisms between wall and panel.

e) Body should be of extruded Aluminum powder coated with bacteria resistant and disinfectant resistant finish.

f) The diffuser on the front panel should be a uniformly lit screen.

g) Dimming electronic control should be enclosed at the bottom of the cabinet.

h) Proper spring loaded film clip with rollers should be provided to hold the films firmly and to remove the film without scratches.

9. HATCH BOX

a) A hatch should be provided in each operation theatre to remove waste materials from the operation theatre to dirty linen area/corridor just adjacent to Operation Theatre.

b) Each hatch box should be equipped with two doors and the door should be operated electrically/motorized.

c) The hatch should be designed in such a way that only one door should be opened at one time ie doors shall be interlocked.

d) The UV light should be so installed that it is kept on while both the doors are closed. This UV light has to be automatically turned off in case of opening of either of the doors.

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

f) Hatch Box material should be of SS304.

g) Size of the Hatch box minimum: 600mm x 600mm.

10. **PRESSURE RELIEF DAMPERS**

a) Pressure relief dampers or over flow ports should be provided in each room to prevent contamination of air from clean and dirty areas.

b) Suitably sized air pressure relief damper should be strategically placed, enabling differential room pressure to be maintained and ensure that when doors are opened between clean and dirty areas.

c) Counter- weight balancing system should be provided in the PRD to maintain positive pressure inside the operation room.

d) Air pressure stabilizers should have unique capability of controlling differential pressure to close tolerance. The PRD should remain closed at pressure below the set pressure and should open fully at a pressure only fractionally above the threshold pressure.

e) The frame, body and blade should be of SS304 stainless steel.

11. **HERMETICALLY SEALED DOORS**

a) The door should be a hermetically sealed, single sliding of following size a. A - Door of 2.1 (H) X 1.8 m (W)

b) The controller should be capable of being operated by elbow switches/foot switches as well as touch less sensor.

c) The track should be of stainless steel/Aluminum and the running surface for the top rollers should be suitably angled to reduce resistance to movement

d) The door leaf should be hung by means of hard plastic rollers of high quality with double bearing at the top. Rollers should be provided under the stainless steel/Aluminium track to enable smooth and noiseless movement.

e) Opening and closing of the door should be microprocessor controlled electromechanical movement.

f) The door material should be of SMS Color should match the interior and care should be taken to make the leaf strong and light weight.

g) One should be able to open and close the door effortlessly in case of failure of automatic mechanism.

h) Door opening handle should be strong and sturdy. Material should be of SS (glossy/Matt finish). Should be provided with high quality cylindrical/ESPg lock.

i) Door leaf should have high quality synthetic rubber gasket with long life to ensure hermetic sealing (to maintain air pressure differential). Air tightness 99.99% at a pressure of 100Pa.

j) The finished floor on either side of the door should be perfectly level (maximum permissible difference+1mm).

k) The overall thickness of the finished door should be 40 to 60mm. The inner part of the door should be filled with CFC free polyurethane foam thickness of 48mm or nearby. (Sealed airtight to prevent further ingress of any microbial organism).

l) The door and controls should comply with IEE regulation/EU Directives. All motors used should be DC brushless/PMDC motors with essential isolation from mains.

m) Door should be with vision window 300 mm x 300 mm with double glazed panels and hermetically sealed.

n) Door movement should have minimum noise.

o) The starting time after receiving the signal should be adjustable between 0.5 to 20 seconds.

p) The door controller should be BIS/CE marked.

q) Test certificate for hermetically sealed door frame (factory test certificate) should be enclosed with the pre dispatch documents.

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

Same as Sl.No.-9

13. **OPERATING LIST BOARD**

a) One operating list board should be provided in each operating theatre.

b) It should be made of ceramic having magnetic properties and should be flushed to the wall of the operating room.

14. **SCRUB STATION** (1500mm minimum)

a) Compact surgical scrub sink should be designed for use in OT complex providing for pre procedural scrub up.(Double sink combination as suitable)

b) Each fixture should be fabricated from heavy gauge type 304 stainless steel (minimum thickness 1.5mm)and should be seamless welded construction, polished to a satin finish

c) The scrub sink should be provided with a front access panel which should be easily removed for access to the water controlled valve, waste connections, stoppers and strainers.

d) Hands free operation should include infra-red sensors with programmable adjustment.

e) Thermostatic mixing, valve control should be located behind the access panel and maintain constant water temperature.

f) Timing should be adjustable to meet individual application requirements.

g) Provided with infrared sensors, thermostatic control taps with fail safe temperature controls.

h) All units should have reduced anti- splash fronts.

i) Should have dispenser for soap/disinfection scrub solutions.

j) Knee/foot operated switch should be provided additionally.

15. **DISTRIBUTION BOARD**

Electrical Distribution Board along with all high voltage equipment should be installed in a separate enclosure. Electric Distribution Panel, 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/BIS 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. 5/15 Amps **antibacterial switch** and socket outlet set -3 Nos shall be flushed equidistant in each wall

at 325mm height from FFL of OT. Wiring for 250 volts single phase and neutral with switch and 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.

16. **SURGICAL OT LIGHT**

A. OT Light – LED

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

Such Lighting System should have the following technical specifications:

a) Number of Light heads : Two per suspension

b) Colour Temperature range: 3800 k -5000 (±10 %) - Variable colour temperature.

c) Field Size Diameter: 15 to 28cm (+/- 10%)

d) Depth of Field : 750 to 1100mm (+/- 10%)

e) Illumination Level : 160000Lux at both domes

f) Control Panel (wall and on dome)

g) Rotation : 360 -330degrees

h) Sterilizable Handle: 02 Nos. i) Mounting Type : Ceiling

j) Supply Voltage : 230 VAC 50 Hz k) Bulb Type : LED

l) Dimming Range : 50% - 100% or 30% - 80%

m) Operating/Storage Humidity: 10-95%

n) Life of Light Source : >40,000 Hrs

o) Should have provision to mount the Camera in one dome

p) Surgical Light System Should be compliant with relevant BIS/European CE with 4 digit /UL Listed/ETL/US FDA standards or Declaration of conformity for quoted model with ISO 13485.

17. **PENDANTS FOR ANESTHETIST**

Double arm moveable Pendant for Anaesthetist

a) The Pendants should comply with NFPA 99C/HTM 02-01/ISO 7396-1/DIN. The support arms should be extremely robust and revolve on high quality bearings, so that the pendant head glides smoothly and quickly to any desired position

b) Double moveable arms (any combination) with total coverage of min 1800mm and 330 deg. Horizontal movements for each arm and the arm height should remain to a height greater than 6.5 feet above floor level

c) Weight carrying capacity of the arm should not be less than 150-180 Kgs. should have electromagnetic/pneumatic brakes

d) Each arm should be capable of 300-340 degrees of rotation, which can be easily adjusted to suit the desired mode of operation.

e) The Pendant Service Heads should be modular with 600-800mm head or more and pendants must accommodate all the fittings, all gases outlets, electrical switch & sockets and shelves. The heads should be capable of accepting a range of shelves, and infusion poles, electrical switches & sockets, gas outlets other accessories. The Pendant Heads should support the range of Physiological Monitor Mounting Solutions.

f) The Pendant Service Heads should be supplied with medical gas terminal units and 5/15 or 6/16 Amps antibacterial hybrid sockets with switches.

g) Double arm pendant anesthesiologist : Each pendant should be supplied with outlets and probes as mentioned below :

Oxygen Outlets – 2 nos., Vacuum Outlets – 2 nos., Nitrous oxide –1 nos., Air(4 bar) Outlets - 2 nos., AGSS outlet - 1 no

Electrical switch & sockets(Antibacterial) - 10 nos. Shelf with two rails one on each side – 2 nos. or more IV Fluid Pole with 4 hooks – 1No.

Data socket RJ-45 -2 nos.

h) Pendant should be supplied with Ceiling Flange Tube, Ceiling Plate from OEM along with shipment. It should not be fabricated in India.

i) Pendant should have IV Pole with IV Hooks on both side required for operation. m) Shelf of Pendant should be made of High quality Bio- Clean Material.

j) Pendant should have Anti-microbial Coating/Powder coating.

k) For Safety reasons, all the Electrical Sockets should have Earthing Points

18. **MEDICAL GAS PIPE LINE**

a) The bidder should ensure that all works carried out as per HTM 02-01 /NFPA 99C / DIN/ISO 7396-1standard

b) Bidder should provide Oxygen, Air4, Air7, Co2, Vacuum, AGSS, and Nitrous Oxide, etc. supply to Operation Theatres from the existing lines terminated outside the MOT.

c) Bidder shall be responsible for supply, installation, testing and commissioning of complete MGPS system inside the operation theatre including Distribution piping, connection to Pendants, outlets and other essential accessories.

d) Copper pipes should be of solid drawn, seamless, deoxidized, non-arsenical, half hard, tempered and degreased copper pipe. All copper pipes should be degreased & delivered capped at both ends. The pipes should be accompanied with manufacturers test certificate for the physical properties & chemical composition. The copper pipe should comply with BS EN 13348:2008

e) Copper pipe must have reputed third party inspection certificate (Eg. Lloyd's, TUV, SGS).

f) Fittings should be made of copper and suitable for a working Pressure of up to 17 bar and especially made for brazed socket type connections.

g) The copper fitting should comply with EN 1254-1

h) The Brazing filler material should comply with EN 1044

19. **Turn Key Works to be provided by the Bidder**

1. Commissioning and installation of SMS wall & ceiling panelling, Frame Structures &substructure, PVC flooring, Lighting, Touch Screen Control Panel, laminar flow, pendants, OT Light, Painting (if any), electrical work, ups, windows (if any)and Doors, etc. as per technical specification.
2. All cable conduit, trenches and railings wherever required.
3. All electrical accessories like cable wire, electrical outlets, switches, Control panels, etc should be fireproof, of reputed make, certified for electrical safety.
4. Bidder has to provide and install hatch box, storage shelves, scrub basins and other service areas as mentioned in the tender.
5. Testing, Installation and commissioning of all equipment/services.

6. Any other necessary work required for satisfactory working/performance of the modular OT and not mentioned/specified.

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

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

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

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

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

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

Note 3: DISMANTLING AND DEMOLISHING

Providing all tools, tackles, manpower for demolishing /dismantling, alteration/ addition for lime concrete, cement concrete, R.C.C, R.B work, precast concrete or stone slabs in walls, partition walls , stone rubble masonry, dressed stone work, ashlar face stone work, marble work or precast concrete work, dismantling doors, windows and clerestory window (steel or wood) shutter including chowkhats, architrave, holdfasts etc. CI or asbestos rain water pipes of any diameter with fittings and clamps, dismantling G.I. pipes (external work) including excavation and refilling

trenches after taking out the pipes, taking out doors, windows and clerestory window shutters (steel or wood), wood work

in frames, trusses, purlins and rafters, dismantling steel work in single sections including dismembering and stacking, dismantling steel work in built up sections in angles, tees, flats and channels including all gusset plates, bolts, nuts, cutting rivets, welding etc., old plaster or skirting raking out joints and cleaning the surface for plaster, dismantling of R.C.C. spun vent shaft including excavating the cement concrete pit completely, taking out the shaft, refiling the excavated gap, stacking the useful materials near the site extra for cutting reinforcement bars, Dismantling aluminium/ Gypsum partitions doors, windows, fixed glazing and false ceiling including disposal of unserviceable surplus material and stacking of serviceable material within 1000 meters lead and any other work as directed by engineer-in-charge. Disposal of building rubbish/ malba/ similar unserviceable, dismantled or waste materials by mechanical means, including loading, transporting, unloading to approved municipal dumping ground or as approved by Engineer-in-charge.

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

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

RESPONSIBILITY OF BIDDER

1. Bidder shall be responsible for complete design, construction, testing and commissioning of modular operation theatres.

2. Bidder shall execute all required civil, electrical and peripheral lighting, plumbing, air-conditioning system(Ducting inside the OT), demolition and other works as may be required for complete installation and trouble-free functioning of the operation theatres as a part of the "turnkey work". Necessary coordination with fire-safety vendor for the installation of fire safety sensor/instrument inside the MOT and also other necessary coordination with civil contractor to be done by the MOT bidder.

3. The bidder shall be responsible for the complete works including the submission of Working Drawings, and walk through view.

4. Bidder shall be responsible for installation and commissioning of medical equipment for MOT in coordination with respective institute/hospital authorities.

5. The bidder should provide UPS power supply in OT complex with necessary cabling as per electrical standard (if UPS for OT is under the scope of bidder)

6. Bidder shall be responsible for free maintenance with spares of modular operation theatres during warranty period.

7. Bidder shall be responsible for commissioning of Medical Gas pipe lines, Pendants, LED OT Light and Gas outlets for the OTs and other associated works to make MOT fully functional. MOT Bidder should coordinate with MGPS, Integration and other vendors for the successful completion of MOTs.

8. Bidder shall be responsible for maintaining suitable air conditioning inside the operation theatre (Ducting inside the OT). Setting and monitoring of temperature and RH should be in the scope of the MOT.(Necessary coordination with HVAC vendor to be done by the MOT bidder)

9. Bidder should provide factory test certificates for the material used for the construction of modular theatres.

10. Bidder should supply complete set of Operation manuals, service manuals and As-Built drawing for all the systems and subsystems supplied.

11. Training should be provided for a week by the factory trained engineers /Original Equipment Manufacturer(OEM).

12. Final electrical safety test, system test, and calibration should be done by authorized persons using calibrated test equipment.

13. OEM or his authorized agent should post a trained engineer who should be available at site or should reach the site within 24 hrs of raising a service call.

14. Regarding Outlets of the Anesthesia & surgeon Pendants, bidders have to supply same type of outlets as installed in the same building/block. Before

shipment of the Pendants, bidders should take necessary action for selecting the same outlets.

15. Third party quality certification of the equipment from SGS/TUV/Lloyds/Bureau Veritas should be submitted by the contractor as “Certifies that the imported Modular OT items meet the technical specification and BOQ of the tender document vide contract No (Mention Contract No.).”

16. Third party test certificate and manufacturer test report for the items/equipment should be provided at the time of pre-despatch inspection.

17. Training should be imparted to the hospital staff for 2 weeks by the contractor.

ANNEXURE-II

REVISED LIST OF APPROVED MAKES

REVISED LIST OF APPROVED MAKES – CIVIL WORKS

For all items to be used in the work samples, catalogues and specifications are to be submitted by the contractor for approval of the Engineer In charge. Only approved makes shall be used in the works. Equivalent makes may be added with price adjustment with approval of Engineer In charge. The approved samples shall be kept in the custody of the Engineer for comparison.

S.No	Materials	Recommended Makes
1	Doors & Windows fixtures/ Fittings	Dorma, Godrej, Dorset, Arkay, Ozone, Hettich
2	Door Closer / Floor spring	Dorma, Godrej, Dorset, D-Line, Hardwyn
3	Aluminium Sections.	Hindalco, Jindal, Indal, Mahaveer
4	Clear Glass/ Clear Float Glass/ Toughened Glass	Saint Gobain, Asahi, Modi Guard
5	Laminates	Greenlam, Merino, Kitply, Century
6	Synthetic Enamel Paints	Asian, Berger, Nerolac
7	Oil Bound Distemper	Asian, Berger, Nerolac
8	Cement Paint	Snowcem plus, Asian, Berger
9	Plastic Emulsion Paint	Asian, Berger, Nerolac
10	Other Paints/Primers	Asian, Berger, Nerolac, Shalimar
11	OPC 43 Grade Cement (Conforming to IS 8112)	ACC, Ultratech, Jaypee Cement, Century Cement &J.K.Cement
12	Reinforcement Steel (TMT Bars)	SAIL, RINL, TISCO
13	Glass Mosaic Tiles	Bissazza, Mridul, OpioMosaica, Paladio, Italia
14	MS Pipe/ Sections	Jindal, Tata, SAIL
15	Wooden Fire Check Doors	Navair, Pacific, Sukriti, Shaktimet
16	Metal Fire Check Doors	Navair. Shaktimet, Godrej, Pacific, Sukriti,
17	Ceramic Tiles	Kajaria, Somany, Naveen, Jhonson, Orient
18	White Cement	JK White, Birla White
19	Powder Coating Material Pure Polyester	Nerolac, Berger, J&N
20	Stainless Steel Friction Stay	Earl-Bihari, Securistyle, Hafele, Hettich, Ebco or equivalent
21	Reflective Glass	Saint Gobain, Asahi, Modiguard
22	Stainless Steel Railing/ pipe/sheet	Jindal, SAIL
23	Structural Steel	TATA, SAIL, RINL
24	Gypsum Board System	Gyproc (Saint Gobain), USG Boral
25	Texture Paints	Asian, Berger, Nerolac, , Snowcem

26	Wall care putty	JK, Birla, As approved by Engineer
27	Fire rated Glass	Saint Gobain, Schott, Pyroguard
28	Acrylic Exterior Paint	Asian, Berger, Nerolac, J&N
29	Fabricators of Structure Glazing work	Glaze Techno, S.P Fabricators, D Glass Trend
30	Vitrified Tile	Jhonson, Euro, Naveen, Bell or equivalent etc.
31	Weather Coat paint	Asian paint, I.C.I, Berger or equivalent ISI make paint
32	Water proofing compound	M/s Cico Engineer Service, Hydro Proof, Fosroc

Note:

- All the item shall be BIS certified standard.
- Makes other than 'Make in India' are not allowed.
- Items, for which 'Make in India' is not available, BIS equivalent standard shall be allowed/followed.
- Items, for which BIS is not available, the same shall be as per approval of Engineer.
- Wherever makes have not been specified for certain item, the same shall be as per approval of Engineer.
- Equivalent makes can also be added or deleted, subject to price adjustment if any.

REVISED LIST OF APPROVED MAKES: PLUMBING AND FIRE FIGHTING WORKS

For all items to be used in the work samples, catalogues and specifications are to be submitted by the contractor for approval of the Engineer In charge. Only approved makes shall be used in the works. Equivalent makes may be added with price adjustment with approval of Engineer In charge. The approved samples shall be kept in the custody of the Engineer for comparison.

Sl.No	Material	Relevant IS Code	MANUFACTURERS
1	Vitreous China Sanitary ware	771	Jaquar/Parryware/Hindware
2	G.I. Pipes	1239 Part I	Jindal-Hissar, Tata, Prakash-Surya, TT Swastik,
3	G.I. Fittings	1239 Part I	Unik, K.S., Zoloto, Plato
4	Gunmetal Valves	778	Zoloto, Leader, Castle,
5	Ball valve with floats	1703	Zoloto, Leader, Audco, Adavance, Kirlosker, Intervalve, Cim
6	Sluice valve / NRV		Zoloto, L&T, Castle, Audco, Adavance, Kirlosker, Intervalve, Leader, Cim
7	Water supply pumps		Crompton (CG), GRUNDFOS, KSB, Mather & Platt, Kirloskar
8	Submersible pumps		GRUNDFOS, KSB, Mather & Platt, Kirloskar
9	Drainage Pumps		Grundfos, KSB, Mather & Platt, Kirloskar
10	G.I./M.S. Heavy class pipe	1239/3589	Jindal-Hissar, Tata, Prakash Surya, TT Swastik,
11	Gate Air Valve		Leader, Zoloto, Castle,
12	Butterfly valves	13095	Audco, C & R, Zoloto, Castle, Adavance, Kirlosker, Intervalve, Leader, Cim
13	Diesel engine		Cummins, Ashok Leyland, Caterpillar, Greaves, KOEL
14	Electric motors		GEC, Siemens, NGEF, ABB, Crompton, Kirloskar, KEC, CGL, Bharat Bijlee, Grundfos
15	Flow meter		Scientific Equipment (P) Ltd. Hyderabad, System Sensor /CPWD
16	Suction strainer		Leader, ZOLOTO, AUDCO, Castle
17	G.I. Fittings	1239 Part I	Unik, K.S., Zoloto,
18	DI pipes		Jindal, TATA, Electro steel,
19	DI Fittings		Jindal, TATA, Electro steel,
20	Kitchen Sink		Nirali, Neel-Kanth, Jaina, Faber, Cryistal
21	Mirrors		Atul/equivalent
22	Fire Hose Pipes/First aid fire hose reel/Fireman's Axe		Newage, Ceasefire, jayshree, Ushafire, Safex, Eversafe, Jyoti
23	Fire hydrant Valves/ Short branch pipe/ FB Withdrawl & inlet		Newage, Ceasefire, Vijay, Mimimax, Eversafe, Peter autokit, Padmini

24	Sprinkler Heads		Tyco, Eversafe, Reliable, Spraysafe, Viking
25	Fire Extinguishers		Cease fire, Safex, Minimax, Newage, Peterautokit, Eversafe, Ansul
26	Electrical Driven Fire Pump, Jockey Pump, Terrace Pump, Dewatering Pump		Mather & Patt (Willo), Kirlosker, Beacon, Grundfos, ITT
27	Storage Water Heater		Spherehot, Racold, Venus, Bajaj

Note:

- All the item shall be BIS certified standard.
- Makes other than 'Make in India' are not allowed.
- Items, for which 'Make in India' is not available, BIS equivalent standard shall be allowed/followed.
- Items, for which BIS is not available, the same shall be as per approval of Engineer.
- Wherever makes have not been specified for certain item, the same shall be as per approval of Engineer.
- Equivalent makes can also be added or deleted, subject to price adjustment if any.

REVISED LIST OF APPROVED MAKES - ELECTRICAL SYSTEM

For all items to be used in the work samples, catalogues and specifications are to be submitted by the contractor for approval of the Engineer In charge. Only approved makes shall be used in the works. Equivalent makes may be added with price adjustment with approval of Engineer In charge. The approved samples shall be kept in the custody of the Engineer for comparison.

S.No.	ITEM	MAKE
1	HT VCB Panel Board/ RMU	Siemens/L&T/ABB/Schneider / Sudhir/ Areva/ C&S/ Crompton greaves
2	Transformer	ABB/Schneider/Sudhir/Voltamp/ Alstom, Crompton Greaves/ Emco/Bharat bijlee
3	Main LT Panel/Main HVAC Panel / APFC panels / Active Harmonic Filter (AHF)	Siemens/ABB/Schneider/ Adlec/SPC Electrotech
4	Additional make for APFC Panel/ AHF	EPCOS, Ducati
5	Synchronization Panel/AMF Panel	OEM of the DG set or above panel manufacturer as mentioned against s.no.-3
6	Diesel Engine:	Cummins/ Caterpillar/MTU/ Kirloskar Oil Engine Ltd/ Greaves/ Ashok Leyland /Penta/volvo / Mahindra / Eicher
7	Alternator:	Stamford/AVK/ Leroysomer/ Kirloskar/ CG
8	Fastener	Hilti/ Fisher or equivalent as approved by HSCC
9	Anti-vibration mounting:	Dunlop, Gerb, resistoflex
10	Bus Duct/Rising main	L&T/ABB/Siemens/Schneider/GE/C&S/ Legrand (Zuchhini)
11.	Battery:	Panasonic/Hitachi/Cummins/Exide/Amar Raja/ Standard/ Amco
11a	Automatic Battery Charger	Max Power/3EM/Amara raja Batteries ltd./Chhabi Electrical/Statcon power control ltd./ CDC/AE/Expofyn/ Thycon india
12.	MV panels/Fire panel/AHU Panel	Tricolite/Adlec/Control & Switchgear/SPC Electrotech
13.	ACB	L &T 'U' Power(Omega)/ Siemens 3WL/ ABB/ Schneider (NW- Master Pact)/ GE/ C&S
14.	Moulded Case Circuit Breaker	L &T – (D sine/DL) / Siemens-VA/ ABB-TMA/ Schneider – (Compact-NSX/NS) / Legrand, C&S/ HPL/ Indoasian, BCH/ Havells/ GE

15.	Power/auxiliary Contactors, timers, Relay, starters	ABB/ Schneider/ L&T/ Siemens / BCH/ GE/SprecherSchuh/ C&S/ Indoasian /HPL,Havells
16.	AMF Relay	wood ward/ Schneider/ Siemens
17.	SFU with HRC	L&T/ Siemens/ ABB/ Schneider/GE/ HPL/ C&S/BCH Indoasian/ Havell's
18.	Change over switches/Isolators	Schneider / Siemens/ABB/GE/L&T/ HPL (Socomec) Gerard (Elcon) C&S/ Indoasian/ Havell's
19.	Instruments (Analog & Digital)	L&T/ AE/ Siemens/ Schneider/ ABB /Conzerve/ HPL/ Secure/ Neptune/ Raychem RPG
20.	Timers	L&T/ Siemens/ ABB /Legrand,/GE/Schneider/ Indoasian/Milborn
21.	Cast resin current Transformers:	AE/L&T/Kappa/SPC Electrotech/ C&S/ Nippen, Schneider, Siemens/ Milborn
22.	Selector Switches:	L&T /KAYCEE/ Siemens/ C&S, HPL/ GE/ ABB, Schneider
23.	Push button, Indicating Lamps LED:	L&T (salzer,Esbee)/Siemens/Schinder/Rishab/ C&S, GE/ BCH, ABB/ Vaishno/Rass control/ Kaycee/ HPL,Milborn
24.	Auto manual changeover switches (3Way)	Kaycee/L&T/ Schnieder/Siemens
25	MCB distribution Boards	L &T/Hager/Legrand (Ekinoxe^3 / Lexic)/ Siemens/ Schneider (Acti-9)/GE / ABB (SH200M)
26	RCCB/MCB	L & T / Legrand-DX3/ Siemens / Schenider –Acti 9/GE/ Hager/ ABB (SH200M)
27	HT/LT- XLPE cables	CCI/Universal- Unistar /Finolex/Rallison/Bonton/ Gloster/ RPG, Polycab/ Havell's/MPCAB / Gemscab, Paramount/ Unicab/ Diatron/, KEI/Gemini/SBEE
28	Copper Control cable	CCI/ Universal/Finolex/ Rallison/Bonton
29	Compression Glands & Lugs	Comet/ Dowells/ Metalcraft, Cabend, Trinity Touch, HMI/ Gripwel, Jainsons/ Elcon,
30	PVC Tape	Steel Grip /Burger/3M
31	Cable Jointing kit	Raychem / 3M / Denson, M – Seal/Safe Kit/Cabseal/ Shrinkfit/MasterSeal
32.	Cable Trays/ Raceways	OBO/BEC/SPC Electrotech/ Veenus, Pasco/Storrax, Skaber/ Profab/ Pilco/Slotco/Needo
33	Terminal Strips	Elmex/ Connectwell/ Technoplast
34	LED light fitting & Fixture	Philips / GE/ Crompton Greaves/Bajaj /BEC/ Wipro,Surya,Havels & EESL approved

35	MS conduit	BEC/AKG/Wimco/ Steel kraft/MKay
36	PVC conduit	Supreme/Prince/Finolex/AKG/ Steel kraft, MKay/ BEC/ Precision/ Polypack/ Shrinath/ Polycab/ Plaza/ Dauphin/ Richa
37	Conduit accessories MS & PVC (ISI Marked)	BEC / Sharma Sales/ Wimco/Supreme/Prince/Finolex/AKG/ Steel kraft/ MKay/ Precision/ Polypack/ Shrinath/ Polycab/ Plaza/ Dauphin/ Richa
38	Copper conductor PVC insulated wires, Co-axial , Telephone wires & cables	L&T/ BatraHenlay/ Bonton/Rallision/RR Kabel/Finolex/ National/ Polycab/Havell's
39	Additional make for telephone & LV wires and Cable	Delton/Fusion polymer/ Polycab/ Havell's
40	Modular Switches & sockets Outlets	Legrand-Myrius or Anti bacterial/L&T Oris/ Schneider -Livia, Opale / Philips -Sleek /North west- Venia, PC Plus / MK (wrap around)/ ABB (Classic Luminia/ C&S/Plaza (Rose)/ Anchor (Wood)/ Leader (Teak wood / Blenz)/ Havell's (Crabtree)/ Vinay (Camy Corsa),
41	Metal clad Socket outlets With boxes	L & T /Hager/ Siemens/ Schneider/ ABB/Legrand /HPL/ Havell's, Standard/ BCH/ Indoasian/ C&S/GE
42	Lighting protection	Erico/Galaxy electrode /Earth plus/OBO
43	UPS system	Schneider- MG/3EM/ Eaton Power ware/ Emerson/ APC/Luminus/Sucam/Elnova/Logicstate/ IPS
44	High Mast poles & special Pole	Crompton Greaves /Phillips /Bajaj/Valmont/ BPP, PE/ Aster/ Surya/ Valmont/ CG/ Transrail/ Utkarsh/Skipper
45	Ceiling fans	Crompton Greaves/ Orient/ Usha/ Almonard/ Bajaj/ Ortem/ Havell's/Polar/ Khaitan,
46	PC with CPU and monitor etc	HP/ Compaq/Del/IBM
47	Auto Transfer switch	Cummins/Emerson-Asco/GE/ Russelectric/ ABB/ Siemens/ L&T/ Schneider/ Legrand/ C&S
48	Public address system	Bosch/ Bose/ Honey well /Harman/ Ahuja/ Philips/ Odionix/ Cooper
49	CCTV camera	Pelco /Bosch/Sony/Axis
50	LCD/LED Monitor	Sony/Samsung/ Toshiba
51	Fire Detection System Addressable	Honeywell-Notifier/Edward/Bosch/ Siemens/ Simplex/ Johnson control/ Cooper/ Fike / Esser

52	FDA Conventional	Honeywell/Bosch/cooper/ Schneider / Bentel, System sensor/ Agni / GST/ Ravel/ Fike/ Essar
53	Nurse Call bell system	Honeywell/Schreak/Raulland/Omnitech
54	Capacitor	Epcos, Schenider, L&T, Ducati,ABB/ GE/ Neptune
55	APFC Relay	Epcos, L&T/Ducati, Schneider/ Beluk/ GE, Neptune, ABB, Vishay ESTA
56	Occupancy Sensor	Philips/ Honeywell/ Schneider/Lutron
57	Lifts/ Dumb Waiters/Escalators	Otis /Kone/ Mitsubishi/ Scheindler/Johnson
58	BMS, field devices etc	Honeywell-Trend/L&T-Atmos/Siemens/Schneider
59	Lighting Control	Lutron/ Philips/ ABB/ Schneider/ Legrand
60	Chemical Earthing	OBO Bettermann / Erico/Furse / Ingesco/
61	Access Control System	Honeywell-Pro-3000/Schneider/Lenel/Cardex
62	Boom barrier	Magnetic/ Somfy/ RIB/FAAC
63	CAT6 UTP, CAT 6A UTP/STP, Optical Fibre-cable	Molex/Systimax/Panduit/R&M/ Amp, Avaya / Dax
64	Grid connected SPV Power Plant	(**A)SPV Modules**-TATA/BP/Solar Maxx/BEL/CEL/ /Indosolar / Lanco Solar /Vikram Solar **(B) Solar lnverter**-ABB/ Delta/ Sunglow/ Zever/ Emerson/ Schneider/Aditi Solar/Luminious/ /Sucam

Note:

- All the item shall be BIS certified standard.
- Makes other than 'Make in India' are not allowed.
- Items, for which 'Make in India' is not available, BIS equivalent standard shall be allowed/followed.
- Items, for which BIS is not available, the same shall be as per approval of Engineer.
- Wherever makes have not been specified for certain item, the same shall be as per approval of Engineer.
- Equivalent makes can also be added or deleted, subject to price adjustment if any.

REVISED LIST OF APPROVED MAKES - HVAC WORKS

For all items to be used in the work samples, catalogues and specifications are to be submitted by the contractor for approval of the Engineer In charge. Only approved makes shall be used in the works. Equivalent makes may be added with price adjustment with approval of Engineer In charge. The approved samples shall be kept in the custody of the Engineer for comparison.

S.No	Material/Item	Approved Makes
	Air Handling Units	
1	Air Handling Units (High Static) with cooling coils	Carrier/Caryaire/Blue-star/Systemair/ Voltas/ VTS/ Flaktwood/ Waves /Edgtech /Zeco
2	Centrifugal Fan for AHU's	Nicotra/ Comefri/ Flakt/ Kruger/ VTS
3	Air washer	Ambassador/Humidin/ Roots Cooling/ Ambiator/ Zeco/ Flaktwood / Edgetech/ BryAir/ Trane/ Jevica
4	Scrubber (Wet/Dry)	Wet : same as AHU, Dry: Espair/Trion/Thermax/ Rydair
5	Fan section	Same as AHU
6	Centrifugal /Axial Flow Fans/Tube Axial (AMCA Certified)	Flakt/ Nicotra/ Kruger /System air /Air flow/ Comefri
7	Propeller Fans	Crompton Greaves/ Khaitan/ Usha / Newtek/ Almonard / Havell's/ Bajaj / Orient
8	Window/split AC/ Ductable	Hitachi/ Daikin/ O-general /Voltas/ Bluestar/Carrier / Mitsubishi/ Lloyds/ LG/ Samsung
9	Inline Fans	Flakt/ Nicotra/ Comefri/ Kruger/ SystemAir/ Alstom/ CG/ Almonard/ Havell's/ Usha/ EPC/ Orient
	Electrical Equipment	
10	Main AC Panel	As per electrical
11	AHU/ventilation electrical panels	Tricolite/ Adlec/ C&S/ Jackson Engineers/ / SPC Electrotech
12	Electric Motors	Siemens/ Kirloskar/ ABB/ Crompton Greaves/ Bharat Bijlee/
13	ACB	L &T 'U' Power(Omega)/ Siemens 3WL/ ABB/ Schneider (NW -Master Pact)/ GE-Entelliguard / C&S
14	MCCB	L &T – (D sine/DL) / Siemens-VA/ ABB-TMA/ Schneider – (Compact-NSX/NS) / Legrand, C&S/ HPL/ Indoasian, BCH/ Havells/ GE-Record Plus
15	MCB	L&T/ Hager / Seimens-VA/ ABB/ MDS Lexic
16	PVC Tape	Steelgrip/Burger/3M or equivalent as approved by engineer in-charge.
17	Push button starter	L&T(salzer, ESBEE)/Siemens/Schinder/Rishab/ C&S, GE/ BCH, ABB/

		Vaishno/Rass control/ Kaycee/ HPL,Milborn
18	Auxiliary Relays/Contactors	ABB/ Schneider/ L&T/ Siemens / BCH/ GE/SprecherSchuh/ C&S/ Indoasian /HPL,Havells
19	Line Type Fuse	L&T/ Siemens/ ABB/ Schneider/GE/ HPL/ C&S/BCH Indoasian/ Havell's
20	Timer	L&T/ Siemens/ ABB/ Schneider
21	Terminal Block	Elmex/ Connectwell/ Technoplast or equivalent as approved by engineer in-charge.
22	Voltmeter/Ammeter	L&T/ AE/ Siemens/ Schneider/ ABB /Conzerve/ HPL/ Secure/ Neptune/ Raychem RPG
23	Indicating lamps	L&T (salzer)/Siemens/Schinder/Rishab/ C&S, GE/ BCH, ABB/ Vaishno/Rass control/ Kaycee/ HPL,Milborn
24	Selector Switches	L&T /KAYCEE/ Siemens/ C&S, HPL/ GE/ ABB, Schneider
25	Change Over Switch	Schneider / Siemens/ABB/GE/L&T/ HPL (Socomec) Gerard (Elcon) C&S/ Indoasian/ Havell's
26	CT/PT	ABB/ AE/L&T/Kappa/SPCElectrotech/ C&S/ Nippen, Schneider, Siemens/ Milborn
	Cables	
27	Power Cables / Control Cables	As per electrical
28	Cable tray	As per electrical
29	Cable lugs	Comet/ Dowells/ Metalcraft, Cabend, Trinity Touch, HMI/ Gripwel,Jainsons/ Elcon,
	Ducting	
30	Factory fabricated duct	Ductofab/ Rolastar/ Technofab or Equivalent
31	G.I. Sheet	TATA/ SAIL/ Jindal
32	Spiral duct	Atco/ Seven Star
33	Grilles/Diffusers/Volume Control damper	Ravistar/ Caryaire/ Mapro/ Airflow/ Airmaster / Lloyd/ Dynacraft/ Balanceair/ Tristar/ Rolastar/ Zeco
34	Fire Dampers UL listed	Caryaire/ Ravistar/ Ruskin/Mapro
35	Sound Attenuator	Caryaire/ Ravistar/Trox
36	Aluminium Sheets	Balco/ Nalco/ Hindalco
	Pipes	
37	G.I.	Jindal Hissar/ Tata/ SAIL/PrakashSurya / TT Swastic
38	M.S. upto 150 mm	Jindal Hissar/ Tata/ SAIL/PrakashSurya / TT Swastic
39	M.S. 200 mm and above dia factory rolled	Jindal Hissar/ Tata/ SAIL/PrakashSurya / TT Swastic
40	Filters (pre,fineHepa)	Thermadyne/ Spectrum/ Kirloskar /Anfilco/ Johnflower/ Dynafilter/ Puromatic/ AAF
	Insulation	

41	Expanded Polystyrene	Beardsell Ltd./ BASF / Lloyd/ Styrene packaging
42	Glass Wool	FGP Ltd./UP Twiga/ Kimmco
43	Crossed linked Polyethylene Foam	Trocellene / Superlon
44	Closed Cell Elastomeric Insulation	K-flex /Vidoflex/ Armacell/ Aeroflex / Armaflex/ Superlon/ Aflex
45	Aluminium Tape	Johnson/ Birla 3M/ Garware
46	2/3-Way motorized valve for AHU/FCU	Johnson control/ Danfoss/ Siemens/ Belimo
47	Thermostats	Honeywell/ Johnson controls/ Belimo/ Danfoss/ Siemens
48	Humidistat	Honeywell/ Johnson control/ Belimo/ Danfoss /Siemens
49	Electric Strip Heaters	Escorts/ Daspass
50	Safety Thermostat for Heaters	Honeywell/ Siemens/ Danfoss/ Belimo /Siemens
51	Cooling/heating Mode Changer	Honeywell/ Siemens/ Danfoss/ Belimo/ Siemens
	Miscellaneous	
52	V Belt	Dunlop/ Fenner
53	Anchor fastners	Fischer/ Hilti
54	Dash fastner	Fischer/ Hilti
55	Vibration Isolator	Resistolflex/Dunlup/Kanwal
Note	**1) All the item shall be as per BIS standards** **2) Makes other than 'Make in India' are not allowed** **3) Items, for which 'Make in India' is not available, BIS equivalent standard shall be allowed/followed** **4) Items, for which BIS is not available, the same shall be as per approval of Engineer** **5) Wherever makes have not been specified for certain item, the same shall be as per approval ofEngineer.** **6) Equivalent makes can also be added or deleted, subject to price adjustment if any.**	